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RESEARCH—A NATIONAL RESOURCE

I.—RELATION OF THE FEDERAL GOVERNMENT TO RESEARCH

MESSAGE

FROM

THE PRESIDENT OF THE UNITED STATES

TRANSMITTING

A REPORT ENTITLED "RESEARCH—A NATIONAL RESOURCE" COMPILED BY THE NATIONAL RESOURCES COMMITTEE

JANUARY 23, 1939.—Referred to the Committee of the Whole House on the state of the Union and ordered to be printed

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MESSAGE FROM THE PRESIDENT

To the Congress of the United States:

I transmit herewith for the information of the Congress a report entitled "Research—A National Resource" compiled by the National Resources Committee.

This report deals with the relation of the Federal Government to research. Subsequent reports in this field will cover research by colleges, universities, and foundations, by business organizations, by the industrial laboratories, and by the State and municipal governments.

The dependence of civilization on science is universally recognized, but the extent of the activities of private and public agencies carrying on scientific inquiry is not generally known. It is unlikely that large numbers of our people have any adequate realization of the services which are being rendered by the executive agencies of the Federal Government through scientific researches in medicine, agriculture, economics, public administration, and the other natural and social sciences.

This report indicates the new emphasis in recent years on activities in the social science fields and stresses the need for effective coordination of all agencies engaged in research in order to achieve the solution of many of our more difficult problems.

I commend the report to the consideration of the Congress.

FRANKLIN D. ROOSEVELT.

The WHITE HOUSE, *January 23, 1939.*

NATIONAL RESOURCES COMMITTEE

NORTH INTERIOR BUILDING

WASHINGTON

November 21, 1938.

The PRESIDENT,
The White House.

MY DEAR MR. PRESIDENT:

We have the honor to transmit herewith the first of a series of reports on Research—A National Resource. This volume deals with Federal relations to research and has been prepared in accordance with your letter of July 19, 1937, by our Science Committee consisting of three members each designated by the National Academy of Sciences, the Social Science Research Council, and the American Council on Education. The subcommittee in charge of the preparation of the study consisted of Dr. Charles H. Judd, Chairman, Dr. William F. Ogburn, and Dr. E. B. Wilson. The Science Committee has agreed to undertake further studies of research by industrial laboratories, business organizations, and by State and local governments.

Research constitutes one of our most important national resources. The Federal Government has always played an important role in relation to scientific research, and in the last decade has expended its activities, particularly in the social sciences. If we are to make more effective use of all of the resources of the Nation for the benefit of all of our citizens, our research resources must be conserved and developed.

We endorse, in principle, the findings and recommendations of the Science Committee in this report.

Sincerely yours,

HAROLD L. ICKES,
Secretary of the Interior, Chairman.

HARRY H. WOODRING,
Secretary of War.

HENRY A. WALLACE,
Secretary of Agriculture.

DANIEL C. ROPER,
Secretary of Commerce.

FRANCES PERKINS,
Secretary of Labor.

HARRY L. HOPKINS,
Works Progress Administrator.

FREDERIC A. DELANO.

CHARLES E. MERRIAM.

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This report was prepared under the direction of a subcommittee of the Science Committee. The latter group is made up of designees of the National Academy of Sciences, the Social Science Research Council, and the American Council on Education. These organizations assume no responsibility for the views and opinions expressed by their designees.

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NATIONAL RESOURCES COMMITTEE
NORTH INTERIOR BUILDING
WASHINGTON

October 22, 1938.

MR. FREDERIC A. DELANO,
Chairman, Advisory Committee, National Resources Committee, Washington, D. C.

DEAR MR. DELANO:

We have the honor to transmit herewith a report on "The Relation of the Federal Government to Research," constituting the first of a series of reports on research resources of the United States, requested by the Advisory Committee.

The report has been prepared by a staff under the general direction of a subcommittee consisting of Dr. Charles H. Judd, Chairman, Dr. William F. Ogburn, and Dr. Edwin B. Wilson. It includes both a general report for which the Science Committee assumes responsibility, and a series of supporting studies signed by individual members of the staff.

Respectfully submitted:

CHARLES H. JUDD, *Chairman.*

ROSS G. HARRISON.
JOHN C. MERRIAM.
EDWIN B. WILSON.
WALDO G. LELAND.
HARRY A. MILLIS.
WILLIAM F. OGBURN.
WALTER D. COCKING.
EDWARD C. ELLIOTT.

I. — REPORT OF THE SCIENCE COMMITTEE

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THE WHITE HOUSE
WASHINGTON

July 19, 1937.

MR. FREDERIC A. DELANO,
Vice Chairman, National Resources Committee,
6137 North Interior Building, Washington, D. C.

MY DEAR MR. DELANO:

I am glad to learn that the National Resources Committee, in accordance with the program presented to and approved by me, is getting under way a study of Federal Aids to Research and of the place of research (including natural and social science) in the Federal Government.

Research is one of the Nation's very greatest resources and the role of the Federal Government in supporting and stimulating it needs to be re-examined. Your Science Committee, with members designated by the National Academy of Sciences, the Social Science Research Council and the American Council on Education, is eminently fitted to undertake this task.

The special committee, of which Dr. Charles H. Judd is chairman, will naturally wish to secure help and cooperation of many agencies of the Government, and I am sure that all Federal officials engaged in scientific research activity will be glad to make available needed information and aid for the successful prosecution of the committee's study.

Sincerely yours,

(Signed) FRANKLIN D. ROOSEVELT.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Findings

1. From the earliest days of national history the Government of the United States has conducted scientific investigations in order to establish a sound basis for its legislative and administrative activities. Governmental agencies were pioneers in this country in carrying on research.

2. As the population has increased and new problems have arisen, such as those relating to agriculture, conservation of natural resources, and general economic conditions, the Government has found it necessary to extend greatly the scope of its research program. It is now engaged in research on a vast scale.

3. Research is at the present time universally recognized as highly important. Universities, the foundations, special research institutions, and industrial and commercial concerns are all engaged in the encouragement and prosecution of research in many lines.

4. Competition for research workers and the demand for large funds to support research have created a situation which calls for better coordination of the research facilities of the Nation than now exists.

5. Research is of many different types. There is ample opportunity for all the agencies, private and public, engaged in research to make valuable contributions, especially if further cooperation can be developed.

6. The Congress engages directly in many lines of inquiry through its special committees and special commissions. It often carries on through these committees and commissions researches which contribute significant findings to both the natural sciences and the social sciences.

7. When research projects become elaborate and the necessity for continued investigations of particular types arises, the Congress creates permanent research agencies to make these investigations.

8. There has been in recent times a great expansion of the professional and scientific personnel in the departmental and field services of the Government.

9. Great sums of money are spent annually by industry and commerce on research. It is estimated that research in industrial laboratories alone involves the expenditure of $100,000,000 a year. Some universities spend 25 percent of their income on research. Some industrial corporations spend as high as 4 percent of their gross income on research. The Government spends approximately 2 percent of its total budget on research. The Government spent in the aggregate for its own research activities and those which it subsidized during the fiscal year 1936–37, $120,000,000, including both regular and emergency expenditures.

10. Most branches of the Government are supplied with a research division.

11. The recruiting, placement, and in-service training of research workers in the Government are, under present conditions, less satisfactory than they should be. The Civil Service system and the management of research personnel might be modified at a number of points with advantage to the Government. Two of these points deserve special mention. The Government would gain in the efficiency of its research agencies if it inaugurated a plan of internship training and if it allowed the assignment of its civil career employees, as it does its military and naval employees, to study from time to time in institutions outside of Washington for the purpose of bringing to governmental agencies the methods and findings of science which are being developed outside of governmental research centers.

12. Research agencies in the Government have taken advantage of the aid which can be contributed by able scientists not in the employ of the Government. To some extent such aid is now secured through advisory committees and through cooperation of state institutions with the Government.

13. In both Government and industry science can render its unique service to the Nation only when research is so organized and conducted as to be absolutely impartial in its discovery and statement of facts.

14. The solution of the problem of the utilization of the research facilities of the country as aids to research in the Government is rendered readily possible by the existence of a number of national councils made up of the scientific specialists in the major lines of research.

15. The Government has developed a pattern of cooperation with research agencies outside the Government by making contracts for the prosecution of specific research projects with responsible institutions and national organizations.

16. It seems feasible to make more extended use than at present of the plan of entering into contracts with national research organizations to take charge of research projects. In order that extension of the contract plan may be realized, the governmental research agen-

cies need to secure from the Congress some latitude in the use of funds.

17. Research supported by State and municipal governments is now common. The possibilities of cooperation between the Federal Government and the other units of government in the country should be more fully explored than they have been up to the present time.

18. Similarly, the universities in some areas have organized with a view to cooperating with one another and with the Government.

19. International cooperation in scientific research now exists on a large scale. It could be encouraged to the great advantage of this Nation if the Federal Government would adopt the practice which is common among the Governments of other nations of according official recognition and, wherever necessary, financial support to international gatherings of scientists.

20. The methods of securing the funds necessary for research in the Government can be improved. Clear and explicit statements as to the purposes of research projects should be prepared by research agencies. The equipment of the Bureau of the Budget for the consideration of research proposals should be substantially increased.

21. The interrelation of research agencies within the Government would be improved if the various interagency committees which now exist were consolidated into central councils in the same general fields of research as those in which the national councils of research workers have been developed.

Recommendations

On the basis of the survey which it has sponsored, the Science Committee makes the following recommendations:

1. That further studies be undertaken for the purpose of making a comprehensive review of the research resources of the United States, such as those of—

(*a*) Industrial laboratories.

(*b*) Business organizations.

(*c*) Social and welfare agencies.

(*d*) Private institutions.

(*e*) State and local governments in cooperation with State and regional planning boards.

2. That a study supplementing those in this volume be made of the advisory committees which now cooperate with Federal research agencies.

3. That steps be taken to improve the methods of recruiting research workers for governmental service and to provide more effective in-service training for civil employees of the Government.

4. That research agencies of the Government be authorized and encouraged to enter into contracts for the prosecution of research projects with the National Academy of Sciences, the National Research Council, the Social Science Research Council, the American Council on Education, the American Council of Learned Societies, and other recognized research agencies.

5. That official recognition and, where necessary, financial support be given by the Government to international meetings of scientists, and that American participation in international organizations and projects be encouraged.

6. That research within the Government and by nongovernmental agencies which cooperate with the Government be so organized and conducted as to avoid the possibilities of bias through subordination in any way to policy-making and policy-enforcing.

7. That research agencies of the Government extend the practice of encouraging decentralized research in institutions not directly related to the Government and by individuals not in its employ.

8. That the interrelations of governmental research agencies be furthered by the organization of central councils along the lines followed by the existing national councils of research specialists. These interagency councils would serve to systematize the efforts which are now made by various interbureau committees to coordinate the research activities within the Government.

Research Essential to the Conduct of the Government

The Government of the United States has always found it necessary to carry on a program of scientific investigations. In the early days of national history, when there was little popular recognition of the importance of science and no adequate provision in this country for scientific research, the Government was compelled in the interests of defense, commerce, public health, and public finance to establish fact-finding agencies which supplied the information needed as a basis for legislation and administration.

As the number and complexity of governmental activities increased, the demand for research increased. At the present time the Government is equipped with numerous research divisions that furnish the facts essential to its internal operations.

The Expanding Range of Governmental Research

During the past hundred years, especially since the beginning of the twentieth century, research within the Government has gone far beyond the collection of information needed to guide legislation and administration. The Government today assumes responsibility for scientific studies which deal with many general problems, such as the improvement of agriculture, the conservation of natural resources, and the development and maintenance of physical standards. While it formerly enumerated the population of the country merely for the purpose of adjusting representation in the lower house of the Congress, it now collects in the census many facts about the individuals who make up the Nation—their occupations, their domestic conditions, and other aspects of their lives. It studies industrial and economic conditions. In all these extended researches the Government is serving the double purpose of directing its own operations and supplying the people with important scientific findings which they need for their private purposes.

The Government is engaged in research on a vast scale.

Research Now Universally Recognized as Highly Important

The Government is by no means alone in conducting research. The universities of the country, which before the last quarter of the nineteenth century were small colleges with meager facilities for advanced scientific study, have become important centers of research. Many of them have the equipment and the staff necessary for the conduct of research and are making large contributions to the natural sciences, the social sciences, and the humanities.

The foundations established and endowed by leaders in industry and commerce have promoted research by giving it financial support. They have made grants for research to universities and to other agencies. These grants have in many cases equalled in magnitude the expenditures of the Government for its major research projects.

A number of independent institutions, such as the Carnegie Institution of Washington, the Mellon Institute, the National Bureau of Economic Research, the Rockefeller Institute, and the Brookings Institution, have been organized for the prosecution of research.

Industrial and commercial concerns have become so keenly aware of the importance of scientific research in anticipating and meeting competition that many of them maintain staffs of trained scientists and invest liberally in the support of the investigations made by these scientists.

The governments of all the civilized nations are extensively engaged in research. Some of them have found it advantageous to make generous subventions to nongovernmental agencies as well as to maintain their own agencies for research.

Problems Arising Because of the Expansion of Research Interests and Activities

There are a number of proposals before the Congress for the creation of new research agencies within the Government. There are also applications for subventions from the Federal Treasury for the support of research projects to be carried on outside the Government. It is evident that there is to be further expansion of research activities in this country. There are a number of problems which are even now serious, but are sure to become acute with further expansion of research agencies. These are such problems as the training and proper placement of research workers, the division of labor among research agencies, and the most advantageous allotment of research funds.

Up to the present time the research agencies of the United States have developed independently and have given little attention to their interrelations. The governments of certain other countries have undertaken

by direct exercise of authority to compel all who engage in research to coordinate their activities. In the United States compulsory coordination is impossible. The only procedure which can succeed is voluntary cooperation based on agreement as to the best ways of making research productive.

In view of the importance to the Government itself and to the nongovernmental research institutions of the country that the problems arising from the expansion of research be properly solved, it was deemed desirable that a survey be made of the character and extent of research within the Government. Such a survey, it was believed, would contribute to an understanding of the proper sphere and range of research within the Government and would stimulate the consideration by nongovernmental research workers of the steps which may be taken better to solve the problems that arise in the conduct of research throughout the country.

A Survey of Research in the Government

With the approval of the President, the National Resources Committee authorized its Science Committee to make a survey and prepare a report the scope of which is defined in the President's letter of approval. The subject of the survey assigned to the Science Committee in this letter is "Federal Aids to Research and the place of research (including natural and social science) in the Federal Government."

The Science Committee, through a subcommittee and a staff appointed for the purpose, collected the materials which are summarized in this volume. This, the first, section is the report adopted by the Science Committee. Subsequent sections report details regarding various aspects of the Government's program of research. The responsibility for each of these subsequent sections belongs to the individual whose name appears as author.

Broad Use of the Term "Research"

Throughout the survey the word "research" was used in a very broad sense. It is fully recognized by the Science Committee that there is a disposition in many quarters to draw a distinction between pure, or fundamental, research and practical research and to think of the research carried on by governmental agencies as altogether of the practical type. It did not seem wise in making this survey to draw this distinction. The study of plant diseases or of cancer leads to intensive, often very far-reaching studies of biological processes; the development of standards for electrical and other physical appliances leads to fundamental investigations in physics; the examination of the relation between commodity prices and rates of production depends on the development of elaborate techniques of research and leads to generalizations in economics far beyond immediate practical applications.

It may be well to point out explicitly that for the purposes of this survey such activities as the collection of data were recognized as phases of research. It is true that collection of data is often a routine operation requiring a minimum of technical preparation on the part of the collectors. The enumerators employed by the Bureau of the Census, for example, are not in most instances research workers. They are, however, indispensable assistants to the individuals in the Bureau of the Census who analyze and interpret the returns; moreover, the schedules used by the enumerators are prepared by highly trained research workers and are rendered by this method of preparation suitable instruments for use in the first steps of important research undertakings.

There are certain strictly routine applications of measuring techniques, such as the testing of materials and of the products of manufacturing. While these require the employment of formulas or instruments refined by research, they do not contribute to progress in scientific knowledge. Such routine testing was not recognized in this survey as research.

Scientific Investigations Made by the Congress

The Congress is not only the creator of such research agencies as are maintained within the Government; it is itself engaged directly through its own committees in numerous projects of research. The results of many of the inquiries carried on by Congressional committees are important contributions to the natural sciences and the social sciences. Some Congressional committees deal chiefly with matters of policy and depend on bureaus of the executive departments or on independent branches of the Government for the information on which they act. From time to time, however, the Congress has found it necessary to create special committees or commissions made up in whole or in part of its own members to secure the information required to guide action. In many cases these committees and commissions have employed special staffs and have conducted extensive researches. What is true of the Congress is true in lesser measure of State legislatures. A later section of this volume presents in detail an account of the scientific investigations carried on directly by the Congress and by State legislatures.

In 1937 the Senate of the United States had special committees on the investigation of labor conditions on the Mississippi flood control project; the investigation of receiverships and bankruptcy proceedings and the

administration of justice in the United States; and the investigation of the production, transportation, and marketing of wool. The House of Representatives had special committees on a number of subjects calling for research. Among these, to mention only two, were a committee to investigate cross-licensing and pooling of patents and a committee to investigate real estate bondholders' reorganizations.

It is but a short step from the pursuit of fact-finding by a special committee of the Congress to the creation of a permanent research agency. In the later section of this volume to which reference has been made, an example is given of the way in which the Congress has, in effect, extended its own research activities by the creation of agencies such as the Federal Trade Commission, on which broad investigatory powers have been conferred. Various inquiries have been referred by Congress to these agencies, rather than to its own standing or special committees.

Recently the Congress created a special commission to make a comprehensive census of employment and unemployment. This census was organized and conducted in a way which showed that there are large possibilities of developing important techniques of census-taking.

Many of the permanent research agencies of the Government and of the States are outgrowths of inquiries which originated under conditions similar to those referred to in the foregoing paragraphs. A striking example is seen in the fact that, after the Congress had discussed the problems of agriculture for years, it took two steps which have been of great importance in their effects on research. It created a Department of Agriculture and made grants of land to the States for the specific purpose of promoting the scientific study of agriculture.

The Professional and Scientific Personnel of the Government

It is by no means easy to ascertain with definiteness the extent to which the Federal Government is engaged in research. One method of measuring the magnitude of the Government's research program is to enumerate the number of employees engaged in professional and scientific services. To be sure, the individuals in governmental service who are of professional and scientific grade are not in all cases engaged in research. However, a general view of the expanding support for professional and scientific services gives some indication of the interest of the Congress in activities that are either scientific or closely related to science. Table I, which was supplied by the Civil Service Commission, shows the marked increase in the number of professional and scientific employees in the departmental service at Washington in two periods following 1924.

TABLE I.—*Number of positions in the departmental service at Washington (including the District of Columbia government), subject to the Classification Act of 1923, distributed by classification services, July 1, 1924, fiscal year 1929, and January 31, 1937*

Classification service	July 1, 1924		1929 [1]		Jan 31, 1937 [2]	
	Number	Percent	Number	Percent	Number	Percent
Professional and scientific [3]	4,363	7.99	5,202	11.11	9,356	12.05
Subprofessional	2,539	4.65	2,659	5.68	4,150	5.35
Clerical, administrative, and fiscal	34,578	63.36	28,121	60.05	49,158	63.30
Custodial	9,647	17.68	7,872	16.80	11,837	15.24
Clerical-mechanical	3,448	6.32	2,977	6.36	3,154	4.06
All services	54,575	100.00	46,831	100.00	77,655	100.00

[1] Average for fiscal year 1929.
[2] Permanent, full-time positions only.
[3] This group includes lawyers, accountants, etc., as well as persons engaged in research. For a detailed analysis of the gross figures here presented for 1937 see table I in the later section of this publication entitled "Summary of memoranda on research of the Federal Government in the social sciences" (page 49).

Besides the professional and scientific employees of the Government in the departmental service there are many scientific workers in governmental agencies outside of Washington. Some comparison of the change which has taken place in the total professional and scientific personnel since 1896 can be made. The Civil Service Commission is authority for the following statement:

> In 1896, only 4,089, or 2.3 percent of the 178,717 civilian positions in the executive civil service at that time, involved work involving a professional, scientific, or technical subject matter or function. Of these, 1,605, or 39.3 percent, were located in the departmental service at Washington and 2,484, or 60.7 percent, were located in the field service outside of Washington. The largest group of professional, scientific, and technical workers, numbering 1,189, or 29.08 percent, was engaged in engineering and drafting work. Teaching, mostly in the schools of the Indian Service, accounted for 664 employees, or 16.24 percent. Professional legal activities, in passing upon claims and in the conduct of litigations and prosecutions, required the services of 614 employees, or 15.02 percent. In addition, 456, or 11.15 percent, were engaged in one or more of the physical sciences, 342, or 8.36 percent, in the agricultural and biological sciences, and 313, or 7.65 percent, in the medical phases of hospital and health administration. While there was a fair sprinkling of statisticians in the service, economics and the social sciences were not represented appreciably in the personnel lists of that period.

In contrast with conditions as they were in 1896, the number of employees of various classes as of January 31, 1937, is shown in table II, which was also supplied by the Civil Service Commission.

Extent of Research as Indicated by Expenditures

Another method of securing evidence with regard to the magnitude of the Government's research program is to note the items in the Federal Budget which are specifically allocated to research. Before the figures on Federal expenditures are reported, it may be well

TABLE II.—*The distribution of 234,254 positions the salaries of which are fixed under the pay schedules of the Classification Act, summarized according to the four services covered in this inquiry*

Classification service	Departmental		Field		Total	
	Number	Percent	Number	Percent	Number	Percent
Professional and scientific	9,356	12.56	20,439	12.79	29,795	12.72
Subprofessional	4,150	5.57	30,982	19.39	35,132	15.00
Clerical, administrative, and fiscal	49,158	65.98	66,809	41.82	115,967	49.50
Custodial	11,837	15.89	41,523	26.00	53,360	22.78
Total	74,501	100.00	159,753	100.00	234,254	100.00

to establish a basis for comparison by calling attention to certain facts which are available with respect to recent developments and expenditures in industrial research.

Writing in 1930, the Chairman of the National Research Council made the following statement:

> Everybody knows that applied science has been enormously developed in the United States in recent years. Where 10 years ago the existence of less than 500 industrial research laboratories, maintained by commercial industrial concerns, was recorded in a bulletin issued by the National Research Council, this year more than 1,600 such laboratories have been listed in a revised edition of this bulletin.
>
> In addition to the scientific output of these laboratories there is an ever-swelling tide of new applications of science coming from the numerous technological institutes and colleges and the university schools of engineering.

Not all the work in the laboratories of the industries is to be classified as research. Some of it is testing of the routine type, which, as stated earlier, is not recognized in this report as scientific research. With the fact in mind that there is a distinction between research and testing, William A. Hamor, of the Mellon Institute, writing in the issue of *Industrial and Engineering Chemistry* for January 10, 1938, furnishes perhaps the best estimate that can be made of the expenditures of industry for strictly scientific research. He states: "In the United States, over $100,000,000 was expended in industrial research during 1937." The same authority estimated for the Science Committee the number of research workers employed in industry. In a letter dated March 10, 1938, he writes: "The number of industrial research workers at present is said to be approximately 25,000, embracing scientists and engineers engaged in basic production, plant, and merchandising investigations. Some authorities, however, believe that 20,000 is a much closer calculation."

The foregoing statements do not include the research costs and personnel of commercial establishments which conduct inquiries in banking, marketing, and other social science fields. Estimates as to the extent of such research are difficult to secure for the reason stated by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce in the 1936 edition of its publication entitled *Market Research Sources*. The statement made in this publication is: "The preparation of *Market Research Sources* is an attempt to bring together projects of current value in the field of marketing. * * * There are many organizations conducting research of a confidential nature not included in *Market Research Sources*."

Expenditures by the Government in Support of Research During the Fiscal Year 1936–37

A complete statement of the expenditures of the Federal Government for research during the fiscal year ending on June 30, 1937, is presented in a later section of this volume. It is there shown that in the fiscal year 1936–37 the Federal Government spent on research about one dollar for each person in the United States. About 70 million dollars came from regular funds and an additional 50 million dollars from emergency funds. If Federal contributions for research carried on by non-Federal agencies are deducted from these amounts, the expenditures in the fiscal year 1936–37 for research within Federal agencies were about 65 million dollars from regular funds and about 20 million dollars from emergency funds.

Research has never been a large part of the Federal budget and still remains insignificant in the work of many governmental agencies. Since the World War, however, the trend of research expenditures has been upward despite the rather severe retrenchment in 1932 and 1933. Research expenditures in the social sciences and statistics have increased markedly since the adoption of the recovery programs. The percentage of governmental expenditures for research is less than the percentage of expenditures for research in universities and in some industries. According to the studies made by the members of the staff who prepared the report on research in universities, about 25 per cent of the expenditures of 20 leading universities is for research. Some industrial concerns are known to be spending more than 4 per cent of their gross income for research. The part of the regular current expenses of the Federal Government appropriated for research is about 2 per cent.

The regular research activities of the Federal Government are largely in the fields of the natural sciences and their applications. Researches in the social sciences and statistics account for about one-fourth of the expenditures made from regular funds. Most of the expenditures for research made from emergency funds are in the social science fields and statistics. There are included in the total of approximately 65 million dollars of expenditures from regular funds

about 6 million dollars for surveys and mapping and about 2 million dollars for library and archival aids to research.

The work of such agencies as the Bureau of Chemistry and Soils, the National Advisory Committee for Aeronautics, and the Bureau of the Census consists almost entirely in research. There are some 125 Federal bureaus and independent agencies engaged in some form of scientific research. On the other hand, about the same number of active Federal agencies carry on no scientific investigations. The Post Office Department, for example, has practically no research within the several divisions of its huge organization.

Investigations in agriculture predominate among the fields of governmental research, with over one-third of the total regular expenditures for research devoted to research in this field. Next in importance to agricultural research comes research for improved military and naval equipment and techniques, which accounts for about one-fifth of the regular expenditures for research. The relative importance of the different fields changes as new problems arouse national concern. For example, aeronautical research has increased until now it accounts for one-eighth of the research expenditures from regular funds. Every 10 years there is an appreciable increase in the total research expenditures of the Government as the decennial census, one of the oldest as well as the largest research project of the Government, carries on its Nation-wide canvass.

Range of Researches in the Government

Various efforts have been made to prepare lists of the types of research which are to be thought of as the primary responsibility of the Federal Government. One of the most comprehensive of these lists is as follows:

(a) Defense.

(b) Weather interpretation, short-time prediction, and long-range forecasting.

(c) Problems of public health which are clearly the responsibility of the whole people.

(d) Much of agriculture requiring intensive study of critical biological problems for which the small operator is not competent to obtain the necessary data.

(e) Questions of national scope relating to physical, biological, and human values inherent in public domain or Federal possessions.

(f) National problems that have to do with mental health, crime control, the opening of opportunity for constructive living and enjoyment of life, and other basic questions concerning health, education, recreation, and psychology.

(g) Problems concerning life and culture of native American peoples considered with a view to development of their best opportunity.

(h) All questions of physical or biological research involved in international relations. Development of proper perspective in ethnological and historical research as touching international questions.

(i) Population changes and problems connected with distribution, etc.

(j) International trade. Goods and money and their effects, especially on the balance of payment and in relation to primary domestic industries.

(k) Indices of economic changes in production, employment, etc.

(l) The conditions of labor, including especially costs and standards of living.

(m) Government finance—revenues, expenditures, including grants in aid.

In each of the fields mentioned in the foregoing list the Government is now engaged in carrying on major researches. An even more extended list than the foregoing could be prepared if the research undertakings of all subdivisions of the Government were catalogued. Practically every subdivision has within its organization provision for researches related to its field of operation.

Illustrative Examples of Governmental Research

The subsequent sections of this volume describe and discuss typical research projects in which governmental agencies are engaged. No attempt will be made here to repeat the descriptions there given. It is the function of the present section to focus attention on certain problems which a careful study of material collected for the Science Committee shows to be important.

Problems of Personnel

A highly important problem facing the Government, if it is to maintain and improve its standards of research, is that of securing able research workers. It is enlightening to note that a special committee of the British Government was recently commissioned, because of conditions in England similar to those which exist in the United States, to make a study of the personnel problems in the governmental research agencies of Great Britain. The findings of that committee may be quoted at some length. The statements made might with slight changes be used in describing the personnel problems of this country.

Failure to recruit or retain implies successful competition from other sources, and reference is often made in this connection to the fact, to which we have already drawn attention, that an appreciable number of officers leave some of the Government scientific establishments to take up employment elsewhere. Nevertheless this criticism cannot be accepted in all cases at its full face value. Substantial advantages, such as the benefit of outside experience and the application of fresh minds to State problems, are to be gained from a reasonably free flow of research workers into and out of the State service. The flow will necessarily be more marked in some establishments than in others. For example, in some branches on

the civil side of research, State scientific workers are in close touch with private industry, and it is only to be expected that officers who have done fundamental pioneer work under the aegis of the State will sooner or later be attracted, both on intellectual and on financial grounds, to outside posts responsible for its development for industrial purposes. Indeed, even though such transfers may appear to be mainly out of, rather than into, State establishments, we can, from a broad point of view, see advantage in them to the community as a whole.

Subject, however, to what has just been said, it is clear that the keen competition for the services of men who show an aptitude for scientific research must be an important factor in the staffing of the State scientific establishments. The number of such men leaving the universities in any year is limited. The growing combined needs of the State, of the universities, and of the research organizations of private industry will no doubt in time influence the supply; but it is open to question whether the State services are at present attracting a fair proportion of the best recruits. In any case, we think that the present supply is neither so large nor so good as it might be if the conditions of employment were made more attractive.

At an early stage in our discussions we made enquiries to ascertain how far any relative inadequacy of salaries was responsible for such a position. We do not think it could be said that the existing salaries of the State scientific staffs compare unfavourably with those of similar staffs in university institutions, although it must be recognized that the conditions of service under the State are in some respects less favourable than in the universities. Competition is keenest, however, with private industry; and here it would appear that while the higher posts in industrial laboratories are paid better, the lower posts are often paid worse than similar posts in Government employment. Moreover, conditions of service in private industry are generally more onerous and tenure less secure, although the latter fact will deter the brilliant man less than the average man. Owing to the much larger size of its establishments, and to the general conditions of Government employment, the State cannot follow private industry either in the amount of the higher salaries the latter pays or in the practice of paying personal salaries according not only to the individual merits of research workers but also to their potential commercial or industrial value. Nevertheless, the fact remains that the State has to compete with private industry as well as with the universities for the services of research workers, and we are clear that some steps must be taken to make that competition more effective. In achieving this end the ultimate financial prospects offered will be more important than the salaries paid immediately on recruitment; and with that consideration in view we have come to the conclusion that the present schemes of grading and salary scales in the establishments under review are generally inadequate.

While thus admitting that some improvement is necessary in the careers offered to scientific workers in the Government service, we have regarded it as of primary importance to examine carefully whether the State needs, for all the work at present performed by the scientific staffs, the services of those whom the present salaries are said to be inadequate to attract and retain—that is, men of high academic qualifications and of special aptitude for research. It is vital in our view that before any important changes are made in the present organization and pay of the staffs of the scientific departments the staff needs of each department should be carefully reviewed in the light of the character as well as the volume of the work to be performed.

In the first place it would appear that in most departments some of the scientific staff are engaged on work which is quite definitely of an ancillary character. Those of us who have experience of the direction of scientific work in the Government service are of opinion that much of this ancillary work could be, and should be, transferred to technical assistants and staff of similar grades, whose main equipment will generally be not academic knowledge but experimental, constructional, and observational ability.

By making the fullest use of technical assistants it should be possible to ensure that men of the scientific officer class are always employed either on investigations which definitely require originality of outlook and execution, or on work which, though not demanding exceptional originality, does require wide knowledge and special experience, and cannot be adequately performed by technical assistants. Even in the research departments there will be work which, although of a responsible nature and best undertaken by officers recruited after graduation at a university, requires scientific experience rather than special aptitude for research. In departments whose functions include a large proportion of work which cannot be classed either wholly or mainly as individual or directive research work, the proportion of officers of the research type will be considerably less. Thus, in the technical departments a proportion of the officers will be employed on individual and experimental work leading to development, but a large number will also be required for work requiring technical experience rather than initiative. Similarly, in the other established departments, the number of research officers required below the supervisory and directing grades will be relatively few in proportion to the number of scientific officers required for administrative work of a routine character.

Within each of the above classes there will, of course, be room for a measure of grading varying with the standard of individual work or with the volume and quality of blocks of work requiring supervision.[1]

The Recruitment of Personnel

In general, there is little participation by the Government in the initial training of research workers. Such workers are prepared in the educational institutions of the country and are brought into governmental service through the examinations conducted by the Civil Service Commission. A sharp contrast is to be drawn between the methods of securing personnel for governmental service, especially personnel for research, and the methods adopted by the Government in recruiting leaders and other personnel in the Army and the Navy. The Federal Government assumes full responsibility for preparing its military personnel. The Army conducts some 50 schools of various types, including the Military Academy; the Navy conducts some 100 schools, including the Naval Academy. Nowhere else does the Government go as far in providing education for recruits as it does in the Army and the Navy. There are educational activities in other branches of the Government through which individuals are brought into governmental service, but in general the recruits thus prepared for service are of the subprofessional or technical classes. The Forest Service, for ex-

[1] His Majesty's Treasury: *Report of the Committee on the Staffs of Government Scientific Establishments*, published by His Majesty's Stationery Office, 1937, pp. 17–20.

ample, gave courses during 1936–37 to 800 rangers and 9,000 guards. The Bureau of the Census trained 650 persons in editing, reviewing, and coding. The Farm Credit Administration trained 750 appraisers.

In contrast with the methods of recruiting subprofessional employees in governmental service and in sharp contrast with the methods of recruiting the personnel of the Army and the Navy is the fact that the research workers for governmental agencies are largely drawn directly from the colleges, universities, and technical schools. It is also important to note that there is a great difference between the ways in which the Government secures graduates from these institutions and the methods of industry and of the universities in recruiting their personnel. Each year leading industrial establishments send to the institutions of higher education representatives who have personal conferences with the most promising seniors. Not infrequently those who conduct these conferences are major officers of the industrial concerns which they represent. The universities themselves have, of course, a great advantage in competition for the best graduates because instructors know from their intimate contacts with students who are the most promising among them.

In the face of such effective competition, the Government is at a disadvantage because in most cases it waits for the candidate to take the initiative in seeking employment. Not only so, but, when a college graduate seeks employment in the Government, he must overcome many discouraging obstacles directly traceable to the cumbersomeness of the civil service system. It is undoubtedly true that the safeguards of the civil service are necessary to protect the Government against the pressures of spoils politics. However, it seems clear that certain remedies might be applied to the present situation to correct evils which are well known to those who are responsible for recruiting research personnel.

Testimony as to the difficulties in securing properly qualified research workers.—Two statements submitted to the Science Committee by governmental agencies may be quoted. One of these is from a bureau chief in the field of the natural sciences, the other from a director of research in the field of the social sciences.

Except in a few ways, we have had little difficulty in recent years in obtaining qualified personnel through the civil service when such qualified personnel existed and desired to work for the Bureau. The most important difficulty inheres in the gross fallacy that anyone earning a rating of 70 is good enough for Government employment. This seems to carry forward from the system of grading that is followed throughout our educational system. A rating of 70 means mediocrity, and yet a restricted list of eligibles, a few declinations from the top, and preferences of one kind or another from the bottom, frequently necessitate either appointing an individual with a low rating or leaving the position open. The civil service procedures should be modified so as to reject a much larger proportion of applicants than at present is the case. The system is particularly obnoxious in its current administration in that lists of eligibles when established are continued unduly long. Thus, when the one, two, or three outstanding folks have been picked from a list of eligibles or have declined appointment, the register remains active under present practice, and one must elect either to take the less capable or leave the position vacant, even though other capable people might be included in a new list. If the Federal Government wishes really high-grade personnel, the passing grade should be raised from 70 to 80, or even 85, or a much stricter grading should be followed to give an equivalent result.

There still is too much of a tendency on the part of the Civil Service Commission in classification, to require a showing of administrative responsibility among scientific personnel for higher ratings. This is less serious than it formerly was, but still exists.

Another difficulty is encountered in the classification of employees. It has been difficult to get the Civil Service Commission to recognize that administrative officers for research divisions cannot be evaluated solely by the amount of funds for the expenditure of which they are responsible. Some employees in these positions may make themselves invaluable by their initiative in learning what the work is all about, thereby saving their superior research officers the necessity of making a vast number of decisions. Others, restricting their interests to the mere business operations as such, do not save their superiors' time for more important activities. The funds expended for such administrators' salaries are part of our research appropriations and their effective expenditure justifies salaries that will retain the really superior individuals here as much as in the research itself. This difference is one that cannot be evaluated on the basis of the size of the division either as to personnel, money expended, or cooperative relations involved, and yet it has been peculiarly hard to get the Civil Service Commission to recognize this situation.

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The shortage of experienced and competent research personnel has been acute in recent years, both for governmental and private work. Junior personnel with academic training and inherent ability, but with little or no practical experience, is obtainable through the exercise of reasonable diligence. Analytical personnel of senior grade, trained in the social sciences and familiar with the new techniques of social research, has been exceedingly difficult to secure, however, and in some fields first-class men are almost unobtainable.

This shortage appears to be due largely to a very rapid growth in demand for such analysts in recent years; to the recent development of new research techniques requiring specialized skills for which there was slight previous demand; and to the absence of adequate provision for the proper training of personnel, either in the universities or in governmental agencies.

The sharp increase in demand for research personnel in recent years is too obvious to require comment. New research techniques are required to meet the rapid growth of large-scale statistical research in the social sciences. This type of research was by no means unknown to the social sciences prior to the World War, but the post-war development has been startlingly rapid, and many persons trained in earlier years are as yet unfamiliar with the problems which it presents or the methods which it employs.

The universities have been slow to recognize the importance of this development. Research and statistical courses, with few exceptions, provide little training in the new techniques for mass research. Few schools in the country now give a statistical course which concentrates attention primarily on this type of research, including study of such matters as research planning, schedule construction, instruction writing, field operation, editing, coding, tabulation, analysis, and report writing. The various governmental agencies have likewise done relatively little toward training personnel in the new techniques.

The consequences of the shortage of well-trained and competent senior analysts are serious. Many research projects have been inadequately directed, and accordingly have failed to secure the best results. The small staff of competent personnel available has had to carry a heavy burden, and frequently has been seriously overworked. The universities, which have provided most of the personnel now available, have suffered serious inroads on their teaching staffs, with consequent impairment of academic work. Governmental agencies have frequently been handicapped in initiating research which was urgently needed for administrative planning.

Recruitment Through Internships

No attempt is made in this report to enumerate the changes in civil service regulations which are needed to improve the research personnel of governmental agencies. Recommendations have been presented in a number of recent documents prepared by those who have made the civil service a subject of special study. It is appropriate, however, to present in the interest of improved research in the Government a description of an experiment in internship training of employees of the State Government which has been inaugurated by the University of Wisconsin. The plan adopted in this experiment is so closely related to the plans common in the large industrial laboratories and in all institutions which prepare physicians, that it seems worthy of careful consideration by the Congress and the Civil Service Commission.

The University of Wisconsin makes it advantageous for students to specialize during their senior year in studies which prepare them for governmental positions. After the student completes the specialized study of his senior year he is taken into the employ of the State for a period and is trained through direct contact with a State office in the methods of dealing with governmental problems. The internship plan is described briefly in the following statement supplied by the University:

Public service scholarships—their nature.—The Wisconsin Legislature has provided for a University Scholarship which makes use of apprenticeship in-service training in the various State departments. The only students eligible are those who have entered or are about to enter their last year in pursuit of a degree in the University. Students selected as scholars will be granted a loan not to exceed $400, which will be paid to them in monthly installments during the school year. The scholars agree to work in some State department or departments for a period not to exceed two years at the prevailing salary for the kind of position taken. During this period, the loan is repaid to the regents. This apprenticeship work begins upon completion of the work for the degree, usually in July. The work is of a definite apprenticeship, educational character, aimed to acquaint the scholar with some aspect of the administrative functions of the State. After completion of the apprenticeship period, those scholars interested in continuing in the State service will take the regular competitive examination in the civil service.

Under plans now in operation, no appointments are made except where a prospective vacancy in some State department has been certified to the university by the director of personnel. But the act provides that "if no position in the State is made available for him as provided hereunder, all interest on the loan will be waived, and the regents will, if he desires, appoint him as a research fellow or assistant for the ensuing academic year at the prevailing stipend for such positions, and will make reasonable provision for repayment of the loan without financial hardship."

Method of selection.—When, during the year, a prospective apprenticeship opening has been certified to the university by the State director of personnel, the appropriate university departments are notified. They then recommend a candidate or two for the scholarship. The candidate must have a high grade-point average and must be considered an excellent prospect for such a position. His candidacy must be approved by the university public service scholarship committee. The State director of personnel, with the advice of the State department directly concerned, and after a study of the candidate's records and an interview, then makes the final selection of rejection.

Students of exceptional merit who are interested in these scholarships should make their interests known to the faculty member in their major department who is managing them.

Other universities have organized schools and courses for the training of candidates for public service but have not articulated these instructional programs directly with either State governments or the Federal Government.

Experiments in voluntary service in Washington bureaus.—Some efforts have been made by certain universities and private organizations to find places in the Washington bureaus for college graduates who are contemplating entrance into governmental service. Such efforts are handicapped because there is no legal recognition of internship status in the Government. Bureau chiefs may admit individuals to certain activities which supply some training, but the arrangement is one of tolerance of the individuals rather than effective internship.

In-Service Training

Beyond initial training, governmental employees often require training in service. The most extensive program of such training is found in the Graduate School of the Department of Agriculture. This school conducts more than 50 courses and enrolls students to the number of more than 3,000. Some of these students belong to departments other than Agriculture.

Similar, though less extensive, programs of training are organized in other branches of the Government. It

is not possible for the governmental civil agencies to take advantage of the opportunities for advanced training which exist outside the Government. They cannot under a ruling of the Comptroller General, assign employees on salary to study outside the governmental service. The Army and the Navy can do so. The desirability of making provision under proper circumstances for an extension of the practice of the Army and the Navy to other divisions of the governmental service is set forth in a letter from the head of one of the leading technical institutions of the country. The statement made in this letter is in part as follows:

> The point that I desire to emphasize most strongly with respect to the whole field which you are discussing is that, so far as my connection with Government scientific services is concerned the most obvious and disastrous weakness that I have found in the present government procedures which I have met with in my work is in the inability of a bureau which is in dire need of a better trained personnel than it now has to do what both the Army and Navy are now doing regularly, namely, sending its younger men on furlough to outstanding centers of scientific progress such as exist in institutions in this country and abroad for further training and association. Whether your Board can exert any influence to remove this great handicap or not I do not know, but in my judgment it ought to be removed with respect to practically all the scientific branches of the Government, for in the last analysis the most vital element in our progress as a nation, of course, has to do with *personnel*, and every impediment we put in the way of getting good personnel hits us at our most vulnerable point.

Utilization of Non-Governmental Personnel

There are many lines of research important for the Government for which the best qualified research workers are not in governmental employ and probably should not be. Under present conditions it is difficult to secure the services on temporary appointments of these outside research workers. The emergency agencies of the Government are freer in this respect than are the older, permanent agencies.

Advisory committees.—One device adopted by some of the governmental bureaus for securing the help of persons not in the regular employ of the Government is the organization of advisory committees. In such committees leading research workers have been brought together to aid in the development and conduct of research programs within the Government. In the field of aeronautics the Congress set up a so-called "advisory committee" which is in reality a board of strategy performing functions that go far beyond mere advising. Committees have been appointed by executive order to investigate special problems. A recent example of this type is the Advisory Committee on Education, which made elaborate reports on various aspects of public education. Other advisory committees have been appointed by secretaries of the several executive departments or by bureau chiefs.

Advisory committees are able to assist the governmental agencies with which they are connected to very different extents. Their contributions depend on (1) the energy of the chairman, (2) the frequency of meeting, (3) the attitude of the governmental officials, (4) the competency of the individual members of the committee, and (5) the funds available for the work of the committee.

This survey did not include a special study of advisory committees. It is impossible, therefore, to contribute to the discussion of their value, except in terms of the comments made by members of advisory committees and by governmental officials.

One suggestion which was made several times, is that the services of advisory committees would be improved if the experience of each committee could be made available to all others. Where a committee finds it difficult to operate effectively, it might learn much from another committee which has been more successful. It is the belief of some who have been members of advisory committees that the organization of a council of chairmen of advisory committees would serve a useful purpose.

Experience in the Affiliation in Research of Non-Federal Institutions With Governmental Agencies

In 1862 the Federal Government, which at that time was not equipped to carry on extensive researches in agriculture, took steps to encourage research in all the States by giving grants of land to be used in developing agriculture and the mechanic arts on a scientific basis. The so-called "land-grant colleges" were established as State institutions. They have received by acts of the Congress subsequent to the original grants of land a number of grants of money. Agricultural experiment stations were set up at the land-grant institutions as centers of scientific experimentation. The Government contributes stimulation, support, and a measure of supervision to these experiment stations. The land-grant institutions are also used by the Government in the conduct of a program of extension education and service to the farmers of the country. Through this extension service the findings of research in agriculture and related subjects have been made available to the people of the Nation.

In conducting local researches and in cooperating with governmental research, the land-grant colleges have given a demonstration of a method by which decentralized research activities can be stimulated and carried on in close cooperation with Federal agencies. A central research office in the Department of Agriculture makes contracts with the agricultural experiment stations, disburses funds under these contracts, and otherwise assists in the prosecution of research. The

projects for which contracts are made are sometimes suggested by research workers in the States, sometimes by scientists in the Department of Agriculture. The States supplement the funds given for research projects by the Federal Government.

Great wisdom is being shown in the management of the relations between the Department of Agriculture and the experiment stations. The Department of Agriculture as a scientific agency of the first order has experts in many lines. The services and findings of these experts are always available to the experiment stations and to other divisions of the land-grant colleges. The institutions have derived valuable assistance from the Department. They in turn have performed the important function of making State legislatures and the people of the country, especially the people in rural areas, aware of the value of research.

Complications Arising from Decentralization

There are two problems that have arisen in connection with the land-grant colleges which are not yet solved. The first of these has to do with the participation or nonparticipation of the extension divisions of the land-grant colleges in the administrative activities of the Department of Agriculture.

In recent years the Department of Agriculture has been made responsible by the Congress for a vigorous action program. In the execution of this action program the Department has had frequent occasion to deal with the people in the States. The people in the States are accustomed to thinking of the land-grant colleges, without distinguishing between the various divisions of the institutions, as the intermediaries in many important undertakings between themselves and the Department of Agriculture. When the action program of the Department is in any measure administered through the extension divisions of land-grant colleges, the question arises in the minds of many persons inside and outside the colleges whether research and administration can be carried on in one and the same institution without prejudice to research.

There is a sharp difference of opinion among the land-grant institutions themselves as to their relation to the action program. All the institutions are in agreement with respect to the research program of the Department of Agriculture. They are satisfied with the arrangements under which research projects are carried on, and they welcome the helpful cooperation which they receive from the Department in the conduct of these projects. Some of the land-grant colleges insist that their institutions gain by allowing their extension divisions to serve as agents of the Department in enforcing the requirements of the action program. They maintain that their services as agents of action have prevented the invasion of their States by the spoils politics which might otherwise have become a part of the action program.

While some land-grant colleges have for the reasons given participated in the action program, others have flatly refused to do so. The institutions which have refused explain their attitude by saying that their research activities would be disturbed and their relations to the people of the State would be perverted if they turned themselves into administrative arms of the Federal Government.

There seems to be some element of regionalism in the dispute which has thus arisen. The southern land-grant colleges more generally favor participation in the action program than do institutions in the northern States.

The second problem which has arisen because of the established relation between the Government and the land-grant colleges results from the insistence that there be substantial increases in Federal subventions to these colleges.

It has been urged in recent sessions of the Congress that there be established at the land-grant colleges engineering experiment stations similar to the agricultural experiment stations. Although it is pointed out that many of the States now have strong engineering schools at institutions other than the land-grant colleges, the Association of Land-Grant Colleges insists that the act of the Congress creating these colleges designated them as centers for both agriculture and the mechanic arts. Therefore, it is argued, the Government is under obligation to make possible the complete development of the program described in the original act.

The State universities which do not include land-grant colleges are becoming vocal in the contention that the land-grant colleges are taking advantage of their relations with the Department of Agriculture to magnify their own importance unduly and to gain advantages over other educational institutions in a way which is not to the best interests of the States and the Nation.

The problems which are discussed in the immediately preceding paragraphs are problems of general importance. If the Government is to extend its research work, there will undoubtedly be increasingly intimate relations with agencies outside the Federal Government. The methods of developing these relations must be planned with care and wisdom.

Further Examples of Decentralized Research

The Tennessee Valley Authority has secured the cooperation of institutions and individuals throughout

the territory in which it operates by making grants to research workers located in the land-grant colleges and elsewhere for the purpose of inducing them to carry on studies of the natural resources and social conditions in the valley. These research workers do not participate in any way in administration. The Tennessee Valley Authority is much freer to use its funds for the employment of nongovernmental agencies than are the research bureaus in the departments in Washington.

The Public Health Service has established relations with State boards of health and with medical schools. It has in some cases supplied research personnel to these agencies and in other cases has secured from nongovernmental sources services of importance for medical research. Although the Public Health Service has an action program in its administration of interstate quarantines, it has succeeded in maintaining a clear distinction between its action program and its research program. It has done so internally in its own organization and externally when it has secured cooperation from non-Federal agencies.

Research Sponsored by States and Municipalities

In recent years States and municipalities have employed educational institutions and individual research workers within their territories for scientific investigations of many of the problems which arise within their areas. This survey did not cover research in centers outside the Federal Government except in those cases in which Federal agencies were directly involved. There is need of a survey of research in States and municipalities. Such a survey could be made in cooperation with the State and regional planning boards. It would probably reveal new possibilities of decentralized research and would also stimulate wide recognition of the importance of science as a source of guidance in the solution of problems confronting local and State governments.

Advantages to be Gained Through Decentralized Research

Certain advantages of decentralized research which may be specifically mentioned are the following: (1) Research workers of ability scattered widely among the people of the country create a general understanding and appreciation of science. (2) Subjects which need to be investigated are in many cases most accessible in localities remote from the seat of the Federal Government. (3) Services other than the conduct of research are made possible where competent research workers are resident in institutions distributed through the States. Such research workers contribute to the training of young people who later participate in research.

Scientific Research, Policy-making, and Policy-enforcing

Scientific research must be free to discover and report with complete impartiality all the facts that it can ascertain in any given situation. Policy-making often involves choice among several possible lines of action. Both research and policy-making must therefore be free to follow their own courses. While the two are closely related, they are distinct and are never to be subordinated one to the other. One of the most delicate problems of governmental agencies is to maintain independence while entering into productive cooperation.

Especially is it difficult when central Federal agencies make the effort to decentralize research by giving support to outside institutions to avoid infringing on the independence of the nongovernmental research agencies. The outside agencies to which support is given must be selected with careful regard to their competency and independence. Fortunately, there are today strong organizations of scientific workers to which the Government may turn for aid with assurance that they will maintain their independence in research.

Organization of National Councils of Research Workers

While governmental agencies have been reaching out in various ways in order to secure the cooperation of individuals and institutions in the States, a certain degree of voluntary centralization has appeared among research workers. Specialists in various fields of research found it desirable to organize societies for the purpose of refining techniques of inquiry and exchanging findings. It soon became apparent in meetings of specialists that they needed, in the interests of their own researches, to extend their contacts so as to learn what was going on in related fields. Federations of societies developed. There exist today several national councils each of which includes representatives of a number of organizations of specialists.

National Councils and the Government

During the Civil War it became evident to both the Government and the scientific men of the country that the Government needed the help of scientists who were not in the governmental bureaus. The National Academy of Sciences was chartered for the express purpose of making such help available to the Government. During the World War the National Research Council was organized to supplement the National Academy in bringing to the Government the services of the Nation's research workers in the fields of natural science, an-

thropology, and psychology. The other national councils which can be thought of as serving in somewhat the same way to contribute the results of scientific research to the Government are the Social Science Research Council, the American Council of Learned Societies, and the American Council on Education.

Before the two movements, the decentralizing of research activities by governmental agencies and the centralizing of research workers through the organization of national councils, can become fully effective in coordinating research within and without the Government, there are certain adjustments which must be made.

Latitude in the Use of Research Funds

The first adjustment is that governmental agencies must be allowed more latitude than they now have in the use of research funds. In all the cases described in earlier paragraphs where governmental agencies have been able to secure the cooperation of outside workers latitude in the use of research funds has been permitted. The Congress has given power to some responsible official or research agency to employ competent research workers wherever they are to be found.

It is not at all necessary for the Congress to surrender jurisdiction over research in order to allow latitude to research agencies. When a particular line of research is approved as worthy of support, a small percentage of the funds appropriated, from 5 to 10 percent, might be made available for contracts with nongovernmental agencies. The contracts here suggested should follow the pattern already established in the cases cited. Definite projects should be agreed upon between governmental agencies and responsible national organizations of research workers. If one of the central councils were made the responsible party under the auspices of which a contract is to be executed, governmental expenditures would be amply safeguarded.

Cooperation Through Contracts With the National Councils

A single illustration of successful cooperation between a governmental agency and a national council may be cited. The Bureau of Public Roads has a contract with the National Research Council under which the Council receives a grant of $20,000 for researches on road-making and road-making materials. This grant is supplemented by funds received by the Council from other sources, chiefly from interested industrial concerns. The Council has organized a series of investigations. It has assembled a conference of the people from all parts of the country who are studying the problems of road construction. In short, it is serving the Government, as a central scientific agency should, by bringing together the scientific agencies of the country for the solution of an important national problem.

A byproduct of governmental cooperation with the national councils would be a fuller realization by these councils of the purposes for which they were originally organized, namely, the coordination of the efforts of the institutions and individuals who are engaged in research. The national councils are operating at the present time with wholly inadequate funds. The funds which the Government would invest in the activities of the councils by making contracts with them to sponsor specific research projects would enliven the whole program of activities of the councils and would put them in a position to stimulate scientific work in all parts of the country.

Advantages of Latitude in the Use of Research Funds

A further advantage to research which would result from latitude in the use of funds is the possibility of following the unforeseen leads which research itself reveals. Research is always something of an adventure; and the more freedom it enjoys, the more likely it is to achieve important results.

It is recognized in many of the recent appropriations made by the Congress to research agencies that they flourish and are most productive when they are free to initiate and carry on fundamental research. Striking examples of the results of free research can be taken from the history of the Smithsonian Institution. This Institution has an income from endowment which it can use on any project which its Board of Trustees approves. It has been able to pioneer in research with results of the highest importance. A single illustration must suffice. Before there was a Weather Bureau or any general recognition of the value to the public of scientific studies of the weather, a wise director of the Smithsonian Institution began to secure data on the meteorological conditions in different parts of the country. The Government was ultimately persuaded to take over the scientific enterprise which the Smithsonian Institution had developed.

Another example of comparatively free funds devoted to the general aid of research is to be found in the support received by the Library of Congress. The great collection of books and other documentary materials housed in the Library and the facilities which are there made available to scholars represent not restricted resources definitely limited in their use to the pursuit of a single research project but aids to workers in various lines.

There can be no doubt that in the future the Government will for its own sake and for the sake of the

public extend the range of its scientific interests and activities. If at this time a series of experiments can be inaugurated with a view to utilizing such existing agencies as the Smithsonian Institution, the Library of Congress, the national councils, and the many competent institutions in various parts of the country, the methods of extending the scope of scientific inquiry through coordination of research within the Government with research outside the Government will be perfected.

Studies of the Results of Adopting and Enforcing Policies

A critical study of the results of a public policy after the policy has been in operation for a time is quite certain to furnish valuable guidance to legislation and administration.

There are a few cases in which investigations have been made by the Government of the results of policies adopted and enforced. The courts sometimes review policies, but in general they pass on specific questions and supply only by implication the broad basis needed for revision of policies or for supplementary legislation.

A recent example which shows the far-reaching effects which may issue from critical evaluation of policies is the report of the National Commission on Law Observance and Enforcement.

After the National Recovery Act was declared to be unconstitutional, an elaborate examination was made of the administrative records which had been accumulated during the period when the act was in force. The results of this examination go far beyond the pronouncements of the Court in laying the foundation for future treatment of the problems with which the act attempted to deal.

Relation Between Research in Universities and Research in the Government

The oldest universities in this country are under the control of private boards of trustees. They derive the support for their research activities from endowments and gifts from various sources. As noted earlier, the foundations have been sources of aid to the universities in the development of their programs of research. The privately controlled universities have far more freedom to pursue pure research which is not directed to the immediate solution of practical problems than do the research agencies of the Government. It is entirely possible that the assignment of certain problems to universities and of others to other publicly supported research agencies would result in a fortunate division of labor and thus contribute to coordination of effort. Before any such division of labor can be arranged, there must be more intimate association of the universities with one another.

Regional Organization of Universities

It has frequently been suggested that the universities in different parts of the country organize regional councils for the purpose of promoting cooperation with one another. There are now in existence regional associations which prepare lists of approved colleges and secondary schools. For the purpose of developing cooperative relations in research and in related lines of academic activity, the existing associations are too large. The area which can be most advantageously covered in order to promote research is one which is fairly homogeneous with respect to its industrial and social characteristics. Intimate association of the universities in a comparatively small, homogeneous region would tend to overcome some of the difficulties which result from the present division of research workers into isolated groups. The research agencies of the Government would find it far easier to establish relations with individuals and institutions if they could secure advice from regional councils.

International Cooperation in Scientific Research

There are many problems which can be solved only through the cooperation of scientists in different parts of the world. The truth of this statement is immediately evident when such problems are considered as those of terrestrial magnetism, meteorology, oceanography, and astronomy. It is equally true, though perhaps less generally recognized, that the development of techniques of scientific investigation, such as the techniques of biology, physics, mathematics, economics, and sociology, have been greatly advanced by intercommunication among investigators of different nations. Science is by its very nature international in its methods and findings.

Any measures which will promote international cooperation in scientific research will be of distinct advantage to the Government of this country. It has to be recognized that, while the Government of the United States has taken a strong stand in favor of international amity, it has been backward in promoting cordial relations among the scientific associations of the nations of the world. When a great international association of scientists comes to this country, it is not accorded the official recognition and support which it is accustomed to receive in other countries. An important step in the direction of official support for international scientific enterprises has been taken, however, with the establishment in the Department of State of a Division of Cultural Relations, for the specific purpose of improving intellectual cooperation between the United States and other countries.

Employees of the Government of the United States are often seriously limited in the possibility of attending scientific meetings abroad when their attendance would go far to promote international friendliness and cooperation.

Budget Provisions for Research

The scientific workers in the Government recognize the necessity of the most rigorous scrutiny of public expenditures. They find themselves prevented, however, from entering upon scientific investigations which they deem to be important because of the difficulty of making clear to the Bureau of the Budget and to the Congress the desirability of certain research enterprises. Established lines of research which have been passed on and approved secure renewed appropriations much more readily than do new research projects. With the advance of science and the appearance of new problems in the Government, it frequently becomes urgently necessary for research to enter new fields. It is the belief of many of the research workers in the Government and of outside scientists acquainted with the research program of the Government that it would be advantageous if means could be found of insuring more adequate consideration of proposals for research before decisions are made with regard to Budget items. The Congress has now passed a proposal to increase by more than double the staff of the Bureau of the Budget. This increase in staff will permit far more detailed examination of requests for appropriations for research than is at present possible. It is suggested earlier in this report that the national councils of research workers be drawn into closer association with governmental research. Any device which will result in a more adequate weighing by the Bureau of the Budget and by the Congress of the requests for funds with which to carry on properly sponsored research projects will be of advantage.

Requests for appropriations have often been inadequately presented. Scientific agencies are shown by a review of the hearings before the Appropriations Committees of the Congress to have been timid in their statements. They have failed to make clear that research is essential to the public welfare. The attitude assumed by appropriating authorities has not infrequently been that research workers are making requests for personal and selfish reasons.

There is need for frankness and clarity in presenting the claims of research. Members of the Congress should be informed with convincing directness regarding the character and purposes of each research activity projected. There are cases in which research projects have been covered up because of fear that they would not receive support if they were fully described. A single case of this type does much to jeopardize the future of research in the Government.

The development of research is inevitable; it is quite as certain as the progress of civilization. Research will profit in the long run if its defenders are bold in presenting its claims and insisting that these claims are legitimate and imperative. As the President wrote in his letter approving this survey: "Research is one of the Nation's very greatest resources."

Coordination of Research Activities Within the Government

The Government is so complex in its structure and so broad in the scope of its activities that sometimes there is duplication of studies or employment by different agencies of research of methods of inquiry which are conflicting or overlapping. With respect to duplication, it was found in this survey that there is very little evidence of waste through repetition of investigations. Confirmation of research results is often quite as important as their first discovery. Repetition of investigations also serves in many cases to add findings which were overlooked in the first inquiry.

When two agencies employ entirely different methods of inquiry, conflicts sometimes result. The Government took a step which has been amply justified by experience when it created the Central Statistical Board, which has the function of coordinating the statistical methods of different branches of the Government. This Board has a staff which operates under its direction. The Board is made up of representatives of some of the major agencies that collect basic statistics.

There are a great many committees of coordination which serve to bring together representatives of different agencies more or less closely related in the investigations that they carry on. Finally, there are informal personal conferences at which coordination is often promoted even more effectively than it would be through a formal committee.

It has been stated by some of the research workers in the Government that efforts at coordination have led to the multiplication of committees until attendance on the meetings of these committees has become a burden. Some channeling of coordination through a limited number of avenues of intercommunication seems desirable. If a small number of general coordinating boards somewhat on the analogy of the Central Statistical Board could be devised, it seems likely that coordination would be promoted. The type of organization which has developed in the national councils is suggestive of a possible solution of the problem here raised. If there were a board on natural-science projects, one on social-science projects, one on education, and one devoted to the humanities, the foundation might be laid for internal coordination of governmental research and also for productive coordination of such research with that of outside agencies.

APPENDIX DESCRIBING THE ORGANIZATION AND PROCEDURE OF THE COMMITTEE WHICH PREPARED THE REPORT

At a joint meeting of the Science Committe and the Advisory Committee of the National Resources Committee held on June 26 and 27, 1937, it was voted to establish a subcommittee to prepare a report on the relations of Government to research. The subcommittee appointed consisted of W. F. Ogburn, E. B. Wilson, and C. H. Judd, chairman. The committee was instructed to prepare and present a report within a year.

During July 1937, Stuart A. Rice, Chairman of the Central Statistical Board, was appointed director of the study. Dr. Rice served until early in October at which time he was obliged to withdraw because of the duties which he was officially called on to perform in connection with the census of partial employment, unemployment, and occupations.

Dr. Baldwin M. Woods, professor of mechanical engineering at the University of California was also appointed a member of the staff and acted until the end of March 1938. He submitted on March 26 a report on the researches in the natural sciences and technology in which agencies of the Federal Government are engaged.

In addition to the members of the subcommittee and the members of the staff mentioned in the foregoing paragraphs, the following persons have participated in the collection of materials and the preparation of reports:

BUCHANAN, ROBERT E., *Iowa Agricultural Experiment Station.*
CLEMEN, RUDOLF A., *American University.*
GRAY, EDWARD R., *Central Statistical Board.*
HUGHES, RAYMOND M., *Iowa State College.*[1]
JONES, CHARLES H. *University of Chicago,*
LANGBEIN, WALTER B., *Geological Survey.*
POTTER, ANDREY A., *Purdue University.*
ROBERTS, MARTIN A., *Library of Congress.*
STOUFFER, SAMUEL A., *University of Chicago.*
WILLOUGHBY, WILLIAM F., *Institute for Government Research.*[1]
WILTSE, CHARLES M., *National Resources Committee.*

Clerical and stenographic assistance:

BIRKEL, MRS.
ELLIS, ROY W.
MCGRAIL, MISS
PECKHAM, MISS
SHAW, MRS.
THOMAS, MISS

The materials for the reports were collected with the cooperation of the various research agencies in the Government.

[1] Retired.

A number of the executive departments and independent commissions were asked to designate representatives from whom the subcommittee could obtain information on the research activities of these agencies. The members of the subcommittee and the staff also consulted members of the national councils, universities, research laboratories of industries, and research bureaus of business organizations.

The memorandum which was used in some of the conferences with Federal agencies will indicate the method which the subcommittee employed and its conception of the kind of report which it was to prepare. The memorandum is as follows:

Memorandum Describing an Inquiry With Regard to Relations of the Federal Government to Research

With the approval of the President the National Resources Committee has undertaken the preparation of a report on Federal aids to research and the place of research (including natural and social science) in the Federal Government. The National Resources Committee has appointed a subcommittee and has engaged a staff to collect the materials necessary for this report.

It is the purpose of the subcommittee to secure memoranda from a number of those who within the departments of the Federal Government are engaged in the supervision or pursuit of research projects. It will also secure statements regarding research enterprises which, outside the departments of the Government, are supported directly or indirectly by Federal funds or are being carried on by agencies stimulated, though not supported, by governmental bureaus.

Through these memoranda and statements it is expected that it will be possible to discover the points at which the conditions for research are most favorable and the points at which conditions are less favorable than they can be made. Also, if there is unnecessary duplication of effort or lack of cooperation or failure of proper intercommunication between research agencies the facts should be brought to light.

Special attention will be given to problems of personnel. The recruiting and classification of governmental employees will be studied with the aid of the Civil Service and of the special personnel officers, when such exist, in the various departments. The opportunities afforded research workers in governmental bureaus for continued study and for the pursuit of unprescribed lines of inquiry will also be studied.

One problem on which it is expected that the inquiry will result in suggestions is the problem of coordinating research by agencies outside the Government with research carried on directly under governmental auspices. Outside agencies such as universities, commercial research departments, foundations, and scientific councils will be consulted and considered in their relations to research by or with the aid of governmental agencies.

It may be well to state explicitly that it is not the purpose of the present inquiry to pass in any way on the quality of

particular researches. The purpose is to consider what may be described as the administrative conditions under which research can be most advantageously stimulated and carried on. The question will be pointedly raised what researches should the Federal Government undertake and what researches should be left to nongovernmental agencies.

The definition of research which is adopted for this inquiry is broad. It covers the collection as well as the interpretation of data. The aim will be to find what are the best conditions for the collection of scientific findings and the proper treatment of these findings after collection. The range of research which will be considered will be extensive enough to cover historical and documentary inquiries as well as investigations in the natural and social sciences. Such an agency as the Congressional Library will be included as well as the bureaus of the Department of Agriculture, the Bureau of the Census, and the Bureau of Standards.

Those to whom requests for information are addressed are asked to provide the subcommittee with the fullest possible account of the researches now under way; researches which are desirable as governmental projects but are now for some reason not being carried on; methods of organizing research which are most successful; and methods that seem to be more promising than those now being followed.

The subcommittee received full cooperation from all the officers of the Government and from the other persons consulted. The memoranda received are on file with the National Resources Committee and present in concrete detail accounts of typical research activities of governmental agencies. Acknowledgment of the indebtedness of the subcommittee to those who gave it assistance has been made and is here repeated.

The Science Committee met on February 5 and 6, April 9 and 10, and June 4 and 5, 1938, and considered at each meeting the tentative reports which had been prepared by the subcommittee.

At the meeting of June 4 and 5, the Science Committee voted to recommend to the Advisory Committee the publication of this report and the following supporting documents:

A summary of the memoranda collected from Federal agencies engaged in researches in the natural sciences and in technology.

A summary of the memoranda collected from Federal agencies engaged in researches in the social sciences.

A report on the Budget items allotted to research by E. R. Gray.

A report on investigations sponsored by Congress and State legislatures by W. F. Willoughby.

A report on researches in the universities by R. M. Hughes.

A report on the Bureau of the Census by S. A. Stouffer.

A report on the Library of Congress by M. A. Roberts.

A report on the Office of Education. (This report is being published by the Advisory Committee on Education. It was prepared for the joint use of the Science Committee and the Advisory Committee on Education.)

II.—SUPPORTING STUDIES

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SECTION 1

SUMMARY OF MEMORANDA ON THE RESEARCH OF THE FEDERAL GOVERNMENT IN THE NATURAL SCIENCES AND TECHNOLOGY

Contents

SECTION 1. SUMMARY OF MEMORANDA ON THE RESEARCH OF THE FEDERAL GOVERNMENT IN THE NATURAL SCIENCES AND TECHNOLOGY

By Baldwin M. Woods and Charles M. Wiltse[1]

Introduction

In conducting the present survey of governmental research in the natural sciences and technology it was thought preferable to employ what may be termed an "inside approach." No one is better aware of the problems encountered in carrying on research under Government auspices than those who are responsible for the task, and it was, therefore, to the scientific bureaus themselves that the Committee turned for information.

A suggested list of questions was prepared and submitted to officials of more than 50 research agencies, including the various scientific bureaus of the Departments of Agriculture, War, Navy, Interior, and Commerce, the Public Health Service, and many independent agencies. Problems for which solutions were sought were discussed by members of the Committee's staff with bureau chiefs and directors of research, as well as with leading scientists outside the Government service. Following these discussions memoranda describing typical research projects in the natural science field and the special problems encountered in conducting them were prepared for the Committee by the governmental agencies consulted. The list of these agencies is, of course, far from complete, but it is believed to be representative.

The discussion in the following pages is based on the materials supplied by Government scientists and administrators of research. Unless otherwise credited, quotations throughout this section have been taken from the memoranda referred to above.

Summary

I. *There are certain fields of natural science and technology in which the Federal Government is obligated to carry on research.*—These are fields in which there is a constitutional responsibility, such as national defense and the determination of standards; fields in which the Government performs essential regulatory functions, such as control of traffic in foods and drugs and supervision of power production; fields in which extensive administrative or construction functions have become a Federal responsibility, as is the case with flood control and highway transportation; and fields in which the major problems are of a definitely national or interstate character like those of agriculture, weather forecasting, and fisheries.

II. *There are certain fields of natural science and technology in which the Federal Government is better equipped to carry on research than is any other agency.*—In general the fields falling under this category are those in which research is unusually costly in proportion to its monetary return but is of high practical or social value. Current activities of this type are aeronautical research, investigations and surveys in geology, geodesy, and mineral technology, public health research, and soil-conservation studies.

III. *The Federal Government is better able than any other agency to coordinate extensive research programs.*—The authority, prestige, and resources of the Federal Government may be used to organize and direct research in any given field on a national scale. Agricultural research, for example, is coordinated through the State experiment stations, the method being that of cooperative agreement. The War and Navy Departments keep continuously informed as to developments in industry and avoid duplication by making use of private facilities wherever possible. A third method is exemplified by the National Advisory Committee for Aeronautics, whose laboratory is a central research plant serving industry and Government alike.

IV. *If the scientific work of the Federal Government is to compare favorably with that of other agencies, it must be made possible to secure and retain a uniformly high quality of personnel.*—The civil service procedure at present in effect places the Government at a disadvantage in recruiting and holding scientific personnel in competition with other scientific agencies. Security of tenure does not altogether compensate for lower salaries and slow and uncertain promotions, while it operates to keep the inefficient as well as the competent in permanent positions.

V. *Where specialized fields of research are pursued, it must be made possible to secure special training for the more promising employees.*—While the War and Navy Departments may detail scientific personnel to universities or to special service schools for advanced

[1] Mr. Charles H. Pierce and Mr. Walter B. Langhein, both of the U. S. Geological Survey, rendered valuable assistance in the collection and analysis of materials.

study, other agencies of the Government are not permitted to increase the usefulness of their employees in this way. In certain cases, notably that of the Weather Bureau, the performance of service functions is seriously handicapped by inability to train members of the scientific staff in newly developed techniques.

VI. *If the research of the Federal Government is to be of maximum value, findings must be promptly published or otherwise made available for general use.*—Printing appropriations have failed to keep pace with the general expansion of scientific work by the Government, and in recent instances have been materially reduced. Governmental research, with the exception of projects of a secret nature bearing on the national defense, fails of its purpose insofar as findings are unavailable to those who may be interested in them.

VII. *Coordination between Federal research agencies is essential in the interest both of science and of efficiency.*—In so large an organization as the Government establishment, it is inevitable that there will be points at which the work of the various bureaus converges or overlaps. At these points coordination is effected in various ways, such as interbureau committees, contractual agreements, and interchange of personnel. The primary bar to coordination is inadequate information as to the functions of other agencies.

VIII. *Administrative techniques employed by the scientific agencies of the Government are conditioning factors in the success of their research programs.*—Governmental research is essentially a group product to which many individuals contribute, and the organization of these individuals so as to obtain maximum returns with the least possible friction is therefore a problem of major importance. Various types of administrative organization for research purposes have been worked out by the individual departments in terms of their particular needs.

IX. *Present procedures with respect to authorizing and financing research projects tend to limit rather than to promote intelligent consideration of the Government's scientific program as a whole.*—Among the bureaus doing research in natural science, appropriations are made for specific research projects, usually quite detailed, and each project is considered in itself rather than in its relation to the larger pattern of a general scientific program. Restrictions on funds for equipment, travel, and other items also demonstrate a failure to appreciate the governmental research function in its entirety.

X. *Governmental research serves to stimulate and to catalyze scientific activity by nongovernmental agencies.*—In many fields new lines of research are expensive and returns may be small or long delayed. Industry cannot afford to enter such fields unless there is reasonable prospect of definite financial gain within a predictable future, and it is under such circumstances that Government agencies may lead the way, leaving the field to industry when commercially applicable processes have been developed.

XI. *There is no uniform policy on the part of the Federal Government with respect to patents growing out of the work of the research agencies.*—The Government retains a "shop right" to make use of all patents issued as a result of work done in its laboratories, but in some cases commercial rights are retained by the employee responsible for the invention, while in others patents are dedicated to the public. Neither system offers a satisfactory answer to the patent problem.

Responsibility for Research

There are certain fields of natural science and technology in which the Federal Government is obligated to carry on research.—Scientific research has become a necessary instrument in carrying out many of the assigned functions of the Federal Government. National defense, for example, is now as largely a matter of scientific ingenuity in devising weapons as it is of maintaining armed forces, and the constitutional obligation of the Government in this regard consequently includes scientific research.

National Defense

The national defense is the specific task of the War and Navy Departments, and the major part of governmental research for defense purposes is conducted by the various technical bureaus of these services. A considerable volume of research of military value is also carried on, however, by other agencies of the Government such as the Bureau of Standards, the Bureau of Mines, the National Advisory Committee for Aeronautics, the Bureau of Chemistry and Soils, and the Tennessee Valley Authority.

The development of war materials and supplies requires research of a highly specialized nature. Physics, chemistry, metallurgy, and engineering are combined in the production of ordnance, armor plate, mines and torpedoes, bombs and ammunition. In other fields, research is directed toward the discovery of chemicals which may be effectively employed in warfare, such as smoke and incendiary materials and toxic gases; and toward the adaptation and improvement of radio, telephony and telegraphy, and other means of communication for military use. All phases of ship construction and propulsion are studied by the various bureaus of the Navy Department; and both service branches are concerned with aeronautics, optics, and ballistics, as well as with problems of construction in-

volved in military works such as highways, bridges, and fortifications, or naval shore establishments such as drydocks.

Almost without exception these various lines of research must be instigated by government. They often lead, it is true, to the development of new products, but they are products for which there is no market except in wartime and consequently no incentive for private industry to undertake research in connection with them, except to the extent that it is federally subsidized. Preparation for war in time of peace is a governmental function—a function which, under modern conditions, must be largely carried out in the laboratory.

Standardization

The constitutional authority of the Government to fix the standard of weights and measures opens another vast field of scientific activity which is the special province of the National Bureau of Standards. Progress demands new kinds of measurements, new standards, and ever-increasing accuracy; and the Bureau is therefore continuously engaged in research and testing in many fields such as electricity, weights and measures, heat and power, optics, chemistry, mechanics and sound, organic and fibrous materials, metallurgy, and clay and silicate products, in an effort to discover and evaluate material standards and to solve basic problems of industry.

Support of Regulatory Functions

In numerous other fields besides those of national defense and standardization the Federal Government has a clear-cut obligation to conduct research. Among these fields may be mentioned those in which the Government performs necessary regulatory functions such as control of traffic in foods and drugs, and supervision of power production. Wherever Government regulation has become necessary, research in the same field is also a governmental obligation. The findings of possibly interested agencies cannot be relied upon, either in determining a need for regulation or in prosecuting violations.

The Federal Power Commission cannot protect the public interest in issuing licenses for hydroelectric power developments without making a thorough study in each case, through its own disinterested experts, of all the factors involved. More broadly, if the Commission is to regulate the generation, transmission, and sale of electric energy, it must have accurate and current information covering the whole field of power development, and it cannot rely upon any outside source to analyze and evaluate the information it secures. Regulation implies unbiased knowledge of the field to be regulated—knowledge which can be accumulated only by research, and which will be accepted as reasonably free from bias only if the research is done by Government.

Administrative and Construction Functions

Similarly, where the Federal Government by virtue of its national authority has undertaken extensive administrative or construction functions, as it has in the fields of reclamation, flood control, and highway transportation, it is obligated to do whatever research may be required in fulfilling them. In the construction of Boulder Dam, for example, there was no reliable experience on which to draw because no structure of such magnitude had ever before been attempted. Only the Federal Government possessed sufficient resources to build the dam, and the building process required research of an elaborate and highly specialized order. In like manner, the Bureau of Public Roads must supplement its construction function by an extensive research program designed to develop better methods and materials for building highways, and to determine factors influencing highway location. Failure to do so would mean failure to get value received for an investment which runs into the hundreds of millions annually.

National Problems

In addition to the fields already noted in which the Federal Government is obligated to carry on research because of some administrative responsibility, there are various problems of a definitely interstate or national character which must be solved nationally. Perhaps the outstanding example in this field is agricultural research. The numerous activities of the Department of Agriculture have grown up almost invariably in response to demands from farmers for assistance in solving practical problems which could not be handled by individual effort. Agriculture itself is one of the country's major industries and is Nation-wide in scope. The problems of the farmer are essentially the problems of all farmers. The insect enemies of crops, the diseases of plants and livestock, and the ravages of drought and flood waters are no respecters of property rights or political boundaries. The agricultural problem is national and calls for a continuous and widespread application of science which only the Federal Government is in position to make.

The Bureau of Animal Industry, for example, functions as the central research agency for the livestock and poultry industries of America. The original activity of the Bureau, while it was still only a division of an adolescent department without cabinet rank, was investigation of livestock diseases at the insistence of cattlemen whose products had been consistently condemned as unsanitary in foreign markets. It was also

pressure from the livestock industry that brought bureau status to the division in 1884, and similar requests have been behind much of its subsequent expansion. Because of the essentially interstate nature of the industry and because its products and byproducts are familiar items in interstate commerce, its problems are of national concern, and form a legitimate and necessary field of research by government.

The achievements of the Bureau which are directly due to successful research are many and familiar. To cite only the more obvious, tuberculosis in cattle has been reduced for the United States as a whole from more than 4 percent to about 0.4 percent, and similar gains have been made in combatting hog cholera. The resources of the Bureau are now being directed toward discovering means of eliminating Bang's disease. The meat-inspection service is the consumer's guarantee of pure meat products; and on the positive side, nutrition and breeding experiments are resulting in progressively improved animals for meat and other purposes.

In another field of agricultural research, the Bureau of Plant Industry estimates the annual value of 22 specific accomplishments at more than $230,000,000. The largest item on the list is the breeding and introduction into use of varieties of spring wheat, resulting in an annual increase in production worth $40,000,000 and improved quality worth not less than $5,000,000. Other items are the introduction of durum wheat, a crop now worth $30,000,000 annually; an increase in soybean acreage from less than 50,000 in 1907 to nearly 4,000,000 in 1932, estimated as worth $30,000,000; and an annual saving of $30,000,000 as a result of improved orchard spraying practices.

Among the achievements of the Bureau of Chemistry and Soils are also many which have become part of our daily lives, although we have probably forgotten the source. The pure food and drug laws are based on research by the Bureau of Chemistry, predecessor of the present agency, which also played a major part in the development of the American dye industry. More recent accomplishments are American substitutes for the imported nitrates used in fertilizer, and the development of a process for manufacturing starch from sweetpotatoes. The Bureau estimates that only about 5 percent of its research is productive—an average that will probably hold for most research agencies in and out of Government—but that 5 percent repays more than $100 for every dollar spent on the whole program, productive and unsuccessful alike.

Illustrations from the Department of Agriculture might be multiplied indefinitely, but for the sake of proportion only one more instance will be mentioned, that of the Weather Bureau. Weather forecasting depends on an extensive series of observations taken at specified times at numerous places throughout the country, and where possible outside the country as well. Only a national agency with the authority of Government behind it can perform such a task successfully.

Another interstate and international field in which research is essential is that of fisheries. As early as 1871 it had become obvious that the industry and the States were helpless to protect the fisheries in the face of a diminishing supply and an expanding market. The solution lay in continuing scientific research by an agency with authority to move freely across State lines and in international waters. It was at the demand both of the States and of the industry that the United States Fish Commission, predecessor of the Bureau of Fisheries, was established; and similar considerations led to the establishment of the Biological Survey a decade and a half later.

Superiority in Resources

There are certain fields of natural science and technology in which the Federal Government is better equipped to carry on research than is any other agency.—There are many fields of research in which the Federal Government must take the lead for purely practical reasons, and wholly aside from any obligation other than a general responsibility for the public welfare and for national progress. The particular activities falling within this category will necessarily vary as new problems assume imposing magnitude and old problems find acceptable solutions, but there will probably always be some fields in which the Federal Government seems to be the only agency with sufficient authority and resources to carry out an adequate research program. Outstanding among these fields at the present time is that of aeronautical research.

Aeronautical Research

The National Advisory Committee for Aeronautics was created by Congress in 1915, after the first year of conflict in Europe had demonstrated the potential value of aircraft as instruments of war. For a decade the Committee functioned as a research agency for the military services, but extended the scope of its activities to include civil aviation in the 1920's when air traffic assumed commercial importance. Today it performs a unique function which the Nation could not well do without but which is beyond the resources of any but a governmental institution.

The performance and potentialities of aircraft are revolutionizing the concept of national defense the world over. Aeronautics is becoming a factor vital to national existence. Its importance in international commerce is now just beginning to be felt.

As a rapidly advancing branch of engineering science, aeronautics has received from the Government of the United States and from the leading world powers special consideration and generous support. There is today an intense international rivalry in the design and production of aircraft of the highest possible performance, efficiency, and safety. For the past decade the United States has led the world in this effort. This has been due chiefly to the sound organization for scientific research in aeronautics, and to the generous support and complete freedom of action accorded by the Government to its aeronautical research organization. The present American leadership is seriously threatened by the greatly increased interest in and support of scientific research in aeronautics by leading world powers during the past 2 years.

Fundamental aeronautical research is conducted under the auspices of the National Advisory Committee for Aeronautics through standing subcommittees on aerodynamics, power plants for aircraft, aircraft materials, aircraft structures, aircraft accidents, and aeronautical inventions and designs. Specific research programs are recommended by these subcommittes, which represent all governmental agencies concerned with aeronautical development and manufacturers of aircraft and equipment. The Langley Memorial Aeronautical Laboratory, at Langley Field, Virginia, is still the largest and best-equipped single aeronautical research laboratory in the world, but constant provision of new equipment is necessary to keep abreast of the rapidly advancing science of aeronautical engineering.

The high efficiency and international prestige of the agency may be judged by the fact that—

leading world powers have sent aeronautical missions to the United States, whose chief objective has been to study the N. A. C. A. research organization and laboratories. The N. A. C. A. has pioneered progress in this field, and especially in the development of research equipment and methods. Most of the Committee's novel research equipment has been, or is now being, duplicated in the great research laboratories of foreign nations.

Geology

Another field in which only the Federal Government has adequate resources to conduct extensive research is that of geology, and the related disciplines of geodesy and mineral technology.

The Geological Survey is the principal Federal agency in the field of geologic research, and is believed to be the largest contributor in the United States to geologic science. The results of this research are used by other agencies in connection with geologic problems such as those presented by the mining and petroleum industries and by construction of highways, bridges, water storage, and other works. The Geologic Branch of the Survey engages in systematic examination of land surfaces, aided by magnetic observations in connection with magnetic ores. Samples of rocks and ores and fossil specimens are collected; and field work is supplemented by laboratory analysis which includes microscopic and chemical examinations of rocks and ores, and paleontologic study of fossils.

Measurements of the flow of rivers, investigations of underground currents and artesian wells, and determination of the available water supplies of the United States are among the functions of the Water Resources Branch of the Geological Survey. Streamflow measurements have been made at more than 7,200 places in the United States, and at many points in Alaska and Hawaii. These measurements have in most cases extended over a considerable period of time, during which determinations have been made of the average flow at the place of measurement for each day of the period of observation. The data thus obtained are used in connection with studies in hydraulics and hydrology, and for numerous engineering purposes. The increasing need for additional ground-water supplies in many parts of the country, especially in the less humid areas, has led to comprehensive ground-water studies and reports; and studies have also been made of the inorganic constituents of many sources of water supply.

None of these activities of the Geological Survey is of a nature to return financial profits. They are, therefore, beyond the scope of industry; and while they are of interest to the academic geologist and to the engineer as well as to governmental agencies, the scale on which the work must be carried on, and the cost involved, preclude satisfactory research programs by any agency other than the Federal Government.

The research activities of the Bureau of Mines are similarly national in scope, and too extensive for any nongovernmental agency to engage in. The mining industry is contributing data of much value, but each segment of the industry is concerned only with the technology of its own particular ores or minerals, while the Bureau of Mines from its detached position may investigate the problems of the industry as a whole.

Another illustration is offered by the work of the Coast and Geodetic Survey in mapping the coast line, investigating tides and currents, and making the geodetic control surveys on which surveying and mapping operations depend. The fundamental triangulation required in geodetic work usually consists of long arcs which are connected into a great network over the whole country in disregard of political boundary lines.

Public Health

Public health is another problem which is increasingly coming to be appreciated as national in scope. Disease knows no State lines, and prepared foods and drugs are articles of interstate commerce. Streams polluted in one State may spread disease in another;

and the health and safety of industrial workers is a matter of general concern.

The Public Health Service of the Treasury Department has broad authority to study the diseases of man, and carries on at the National Institute of Health an extensive program of investigation as to the causes, nature, means of spread, methods of prevention, and treatment of human diseases. The program varies in emphasis as specific problems assume national importance, guiding criteria being the amount of attention devoted to a problem by outside agencies, and its geographical scope.

Health as a social problem is one of the more recent fields of investigation by the Public Health Service. A national health inventory, including surveys of the prevalence of chronic diseases, communicable diseases, occupational morbidity and mortality, and a study of health facilities, has been made; and attention is also given to the influence of environment upon health, sewage disposal, water purification, and milk pasteurization. In the field of nutrition, it was Public Health Service physicians who finally established the dietary origin of pellagra, once the scourge of the South, and determined the food elements needed to overcome the disease.

Soil Conservation

Another problem recently recognized as transcending the resources of nongovernmental agencies is that of soil erosion. To meet national needs in this respect, the Soil Conservation Service has been created in the Department of Agriculture, and is undertaking a research program designed to build a body of basic data from which erosion control methods may be developed. Investigations include the broad basic questions of how, why, and where erosion takes place, with particular reference to the part played by climate, geology, soil, and natural vegetation; the cause, effect, and control of erosion on farm lands and methods of restoring eroded lands to economic use; and the effect of various types of land-use and erosion-control practices on the control of floods and on the conservation of surface and groundwater supplies.

Industrial Research

Experience in the depression has led many to believe that industrial problems have also become so important as to justify much more extensive research by government than has yet been devoted to them. The standardization and testing work of the Bureau of Standards and the research of the Bureau of Chemistry and Soils on the processing of farm products and byproducts are believed to be far from adequate to meet national needs, especially those of small industries which cannot finance extensive research activities on their own account. Government cooperation with trade and industrial associations in developing research programs is a suggested activity in this field.

Coordination on a National Scale

The Federal Government is better able than any other agency to coordinate extensive research programs.—The authority, prestige, and resources of the Federal Government may be used to organize and direct research in any given field on a national scale to an extent impossible for any other agency. The value of such coordinated national research programs in time of war is obvious, but peacetime programs may also benefit from governmental leadership, which may be so applied as to sacrifice none of the freedom essential to scientific progress. The present governmental organization exhibits three main forms of national coordination of research which are exemplified by the Department of Agriculture, the War and Navy Departments, and the National Advisory Committee for Aeronautics.

Coordination in Agriculture

The United States Department of Agriculture is said to be the largest single research organization in the world, and in the course of its more than 75 years of growth it has become without question the center of American agricultural research. Through field laboratories, grants-in-aid, extension activities, and cooperative relationships with Federal, State, and private agencies, the Department effectively coordinates and in large measure directs all research work in the country in its various fields of interest.

The method employed is the democratic one of cooperation, carried out under the general supervision of the Office of Experiment Stations. The function of the Office is not to conduct scientific work, but to administer Federal grants for research to the States, and to coordinate the research activities of the subject-matter bureaus of the Department. The formidable nature of the task may be gathered from the fact that there are approximately 7,500 research workers in the Department of Agriculture and the State experiment stations, active in every field of science bearing upon agricultural problems. The Chief of the Office of Experiment Stations is also Director of Research for the Department, and administrator of the special research fund made available by the Bankhead-Jones Act of 1935.

Each of the States receives from the Federal Government $90,000 annually on an outright grant basis for research in agricultural subjects; and each receives in addition a share proportionate to its rural

population of a lump-sum appropriation under the Bankhead-Jones Act of 1935. This sum amounted to $1,800,000 for the fiscal year 1938 and will reach a maximum of $3,000,000 by 1940. Only the Bankhead-Jones grants are required to be matched by the States, although actually State expenditures for the experiment stations are more than double Federal expenditures. There are currently in progress in the various stations about 7,000 separate research projects, of which some 3,000 annually are reviewed by the Office of Experiment Stations.

In the administration of grant-in-aid funds, the Office of Experiment Stations is responsible, but in the selection and approval of projects the experiment stations frequently consult with the subject-matter bureaus. Through this practice a system of cooperative agreements between the various research bureaus of the Department and the several State experiment stations has grown up which has proved one of the most effective devices for correlation in the whole field of governmental research. The use of these agreements has gone beyond the projects subsidized by statutory grants, and has come to include in many cases all the research of an experiment station in a given field. Similar agreements are also in effect between the bureaus of the Department and various private institutions.

The following excerpts from a memorandum of understanding between the Iowa Agricultural Experiment Station and the Bureau of Plant Industry will serve to show the general form and philosophy of these agreements:

> The Iowa Agricultural Experiment Station and the Bureau of Plant Industry recognize that cooperation is a matter of working together to a common end, rather than one of financing, each agency contributing what it can to the planning, conduct, and interpretation of the experiments as a whole, and furnishing such facilities and funds for particular experiments as is practicable. To this end it is mutually agreed that all investigations on the production and improvement of cereals and the control of cereal diseases undertaken by either agency in the State of Iowa will be deemed to be cooperative. Nothing in this broad understanding is to be construed as interfering with the basic responsibilities of either party, and it is recognized that successful operation can be only through mutual helpfulness.
>
> The specific object of these cooperative investigations is to improve the status of cereal production through (1) developing better cultural practices, (2) producing varieties superior in yield and quality and more resistant to disease and other factors adversely influencing production, (3) studying the diseases of cereals and determining methods for their control, (4) developing and applying methods for utilizing and maintaining quality seed stocks, and (5) determining the underlying principles concerned in the biology of cereal plants, including research and genetics, cytology, and physiology.
>
> It is understood that both the Iowa Agricultural Experiment Station and the Bureau of Plant Industry are interested in fundamental research, the Bureau of Plant Industry being concerned primarily with the results having regional application, and the Iowa Agricultural Experiment Station with the results having local application.

A specific division of the field to be covered follows, with the responsibilities of each party itemized; and the agreement concludes with arrangements for disposition of findings, furnishings of supplies and equipment, and financial responsibility.

The advantages of such cooperative understandings have been well summarized by a former Chief of the Bureau of Plant Industry:

> Under its system of cooperative relations, the Bureau has laboratory and other facilities available that cannot be surpassed by any other agency engaged on similar problems. Not only does it have its own excellent facilities in Washington and vicinity, it also maintains field stations and, finally, it can negotiate cooperation with institutions, State or otherwise, having facilities superior for any specific purpose.
>
> The cooperative nature of the Bureau's undertakings is one of its greatest assets and contributions, and suggests what might perhaps be the most important single contribution that the Federal Government could make to research in other fields. Research requires funds. Even more than this, however, it requires brains. Research brains are born, not made, and occur in insufficient quantities. A large appropriation for research in any field by the Federal Government may do little to promote research along the given line if the money is expended merely to take proven researchers off one salary roll and place them on another, without perhaps giving them much in the way of superior facilities and help. Grants-in-aid by the Federal Government must in general be made on a prorata basis of one kind or another without reference to the relative merits of the institutions to which the funds are allocated. Cooperative undertakings, on the other hand, with able administrative leadership in the Federal agency permits attack on the various phases of any problems at those institutions where these particular phases may be prosecuted most efficiently by outstanding men in the given field, and with coordination and integration achieved through the Federal agency.

The Chief of the Office of Experiment Stations is a member of the Committee on Experiment Station Organization and Policy of the National Association of Land-Grant Colleges and Universities, and of the joint committee of the Association and the Department of Agriculture on Projects and Correlation of Research. These committees act in an advisory capacity with respect to policy in the administration of research under the grant funds. Advisory assistance in connection with individual problems or research projects is secured from personnel of the subject-matter bureaus and from research personnel in the States.

In addition to supplementary grants to the States, the Bankhead-Jones Act sets up a special research fund, one-half of which is for the establishment and maintenance of research laboratories in the major agricultural regions of the United States. In establishing and administering each of these laboratories, use is made of two advisory groups, one administrative and

one technical. The administrative committee consists of the directors of the agricultural experiment stations in the region and the chiefs of the subject-matter bureaus concerned with the work of the laboratory; and its functon is to advise the Secretary, through the Office of Experiment Stations, on the selection of a laboratory project, the scope of the research, the location of the laboratory, and relationships of Federal and State agencies. The technical committee is made up of one representative from each of the State experiment stations in the region, the director of the laboratory, a representative from each of the subject-matter bureaus concerned, and a representative of the Office of Experiment Stations. The technical committee is responsible for the development and annual review of a research program, including research by the individual experiment stations, within the scope of the laboratory project. The recommended program for each year is subject to approval by the administrative committee in the light of available funds.

The Chief of the Office of Experiment Stations, through his administrative responsibility for the federally-aided programs of the experiment stations and his jurisdiction over the regional laboratories, is able to coordinate the agricultural research work of the States both internally and with the program of the Department of Agriculture. As Director of Research for the Department and administrator of the special research fund he is charged also with the task of coordinating the research programs of the subject-matter bureaus and has general direction of the planning and development of the research program of the Department. In practice the program grows out of numerous conferences and discussions, considerable latitude being left to the bureaus, and the Director's function becomes primarily one of eliminating duplications and resolving conflicts.

At the same time the various subject-matter bureaus of the Department maintain close contact with private organizations carrying on research along similar lines. The Bureau of Animal Industry, for example, cooperates with livestock and trade organizations where access to material or facilities of value to the Bureau may be available; and agreements are entered into with individuals or companies where special facilities exist for solving a problem of general interest. The Bureau of Dairy Industry works with producers and processors of dairy products, and the Forest Products Laboratory serves producer, manufacturer, and consumer alike.

Industrial Coordination for National Defense

The War and Navy Departments exemplify another form of coordination of research on a national scale. In time of war, military supplies and equipment would have to be furnished in quantity by private industry. Military and naval technicians must therefore know what each factory can produce and must have plans available for turning all industrial facilities to military uses. This coordination is accomplished through the Army and Navy Munitions Board, set up under an amendment to the National Defense Act in 1920. The Munitions Board cooperates closely with the Joint Army and Navy Board which has responsibility for formulating war plans, and in time of war would be assisted by the Committee on Army and Navy Affairs of the National Research Council.

Coordination of research in the interest of national defense thus takes the form of close observation of developments in pertinent fields of industry and makes use of these whenever possible. Modifications or changes of military benefit are occasionally suggested to industry, and financial support is given to outside agencies where necessary. The essential point is that the War and Navy Departments must know what industry is doing and can do, and must so organize their own research programs that they complement rather than duplicate the activities of private agencies.

By way of illustration, the chairman of the liaison committee on naval research distinguishes four fields of interest to the Department from a research point of view, in each of which a different procedure is followed depending on the degree to which industry penetrates the same field:

(1) That field of endeavor necessary to the successful prosecution of the Navy Department's activities that is paralleled by a well-established industry, the problems and technical objectives of which are closely similar to the Department's objectives. In this field the Navy Department habitually is able to find the answers to its problems either in the primary research output of the industry or in the byproduct output of that research which it is able to apply directly to its purposes. In other words, daily progress of research in the industry in this field approximately suffices the meeting of the Department's needs.

(2) A field that has specialized objectives in which an industry with quite similar objectives exists but is without adequate research establishments, research personnel, or funds for conducting the necessary research. In this case the Department must supplement the abilities of the industry by the use of its own facilities, by the efforts of its own personnel, by the extension of the use of its facilities with outside agencies, or by grants of funds either directly or indirectly.

(3) Industrial and governmental needs closely parallel, though highly specialized, and in a narrow field in which the industry is provided with adequate research capabilities. In this case there is no need for supplementing the facilities or personnel of non-Government research organizations but there is need for the determination and clear statement of a specialized problem in this field and the provision of funds for carrying on the research in a form or with an objective slightly modified to meet the Government's need as distinguished from

the usual form in which industry may require further development.

(4) That field of the Navy Department's endeavor in which research is required, the field and the supporting research being a wholly naval field and entirely without industrial or commercial application. In this field the coordination of the various phases of the research activities must necessarily rest with the Navy Department and many of the individual phases of the research must likewise be conducted by the Navy Department with its own facilities, personnel and funds, utilizing such collateral research results in parts of the problem as may be available in the literature or in outside research agencies.

The Navy utilizes all four of the procedures above in the research agencies of the various bureaus. The procedure selected to handle a given research problem would depend upon the type of test, objectives, facilities, and also upon the type of personnel which should be available for maintaining the proper coordination between research and design considerations and service applicability.

It is constantly necessary to carry on research with naval facilities to find new materials for naval use, and to adapt new methods, materials, devices, equipage, etc., in solving naval problems.

As a general rule the Navy endeavors to perfect itself in the habit of taking advantage of nongovernmental research facilities in so far as practical, in order to take advantage of the fact that the research facilities of the country are much more numerous than those of our possible adversaries.

In certain fields the Navy's limited research experts can best be used as liaison between the administrative officers and the outside non-Government agencies, in keeping these abreast science, and in assisting with specifications looking to solutions to our particular problems. The Navy has excellent contact with industrial research, and is constantly improving its contact with university research.

Centralization of Aeronautical Research

The third form of coordination of research on an extensive scale is best illustrated by describing the procedure of the National Advisory Committee for Aeronautics, already referred to in another connection. In this field the Federal Government has exercised its leadership by setting up and liberally supporting a central research agency to "supervise and direct the scientific study of the problems of flight, with a view to their practical solution," and to "direct and conduct research and experiment in aeronautics." The method in this case is neither cooperation with non-Federal agencies nor a division of the field between Government and industry but amounts to a complete centralization of the function, under a committee representing both Government and industry.

The membership of the Committee includes nine representatives of the governmental agencies concerned and six recognized aeronautical authorities appointed from private life. The interested agencies of Government are the War and Navy Departments, the Civil Aeronautics Authority, the Bureau of Standards, the Weather Bureau, and the Smithsonian Institution.

The War and Navy Departments and the Civil Aeronautics Authority, concerned with military, naval, and commercial aeronautical development, do not conduct fundamental scientific research in aeronautics, but as a result of their equal voice and membership on the National Advisory Committee for Aeronautics and on its subcommittees, refer to the N. A. C. A. all of their scientific problems in aeronautics. Problems arising in each agency are usually in some measure related to the needs of other agencies. The necessary scientific laboratory investigations are conducted by the N. A. C. A. in one central governmental laboratory at Langley Field, Va., and the results are made available to all agencies interested. This procedure obviates the need for separate scientific aeronautical organizations in each of those three Departments and makes possible the meeting of the research needs of those Departments without duplication.

The results of the N. A. C. A. investigations provide the fundamental data on which the design of American aircraft, civil and military, is based. This has resulted in continuous American leadership for the last decade in the technical development of aircraft, which leadership is universally acknowledged. The output of the N. A. C. A. is incorporated in all American aircraft and American principles of design have been copied in the aircraft of many other nations. The contributions of the N. A. C. A. have made possible the high efficiency, performance, and safety of the modern airplane, both military and commercial, and have been used by all nations.

Coordination of research by Federal agencies is less complete in other fields, but the forms used are essentially the same as those described above. The system of cooperative agreements so extensively used by the Department of Agriculture has also found favor with such organizations as the Bureau of Mines and the Geological Survey, although in these cases the grant-in-aid is not used. A similar arrangement might well be employed to coordinate industrial research through the Bureau of Standards.

Mention must also be made here of a new type of coordination exemplified by the Tennessee Valley Authority, where research in many fields, including both natural and social sciences, is carried on by a single agency and pointed toward a single goal. The goal in this case is the planned development of a region rich in natural resources, with the research program designed to integrate social and technological advances.

Recruitment and Classification of Personnel

If the scientific work of the Federal Government is to compare favorably with that of other agencies, it must be made possible to secure and retain a uniformly high quality of personnel.—Governmental research, with a few outstanding exceptions, is done by good average men, under a system of selection and promotion which is not conducive to securing or retaining the services of men much above the average. The present system may in fact operate to force the appointment and subsequent retention of men of definitely mediocre abilities.

Recruitment of Personnel

Scientific positions are filled by selection from among the first three eligibles on the civil service register for the particular class and grade of position, eligibility being determined by competitive examination. Veteran's preference may influence relative standings, and the requirement that all positions be apportioned among the States may restrict the choice still further; but a more serious criticism lies in the method of grading itself. As expressed by one bureau chief in the Department of Agriculture,

> The most important difficulty inheres in the gross fallacy that anyone earning a rating of 70 is good enough for Government employment. This seems to carry forward from the system of grading that is followed throughout our educational system. A rating of 70 means mediocrity, and yet a restricted list of eligibles, a few declinations from the top, and preferences of one kind or another from the bottom frequently necessitate either appointing an individual with a low rating or leaving the position open. The civil service procedures should be modified so as to reject a much larger proportion of applicants than at present is the case.
>
> The system is particularly obnoxious in its current administration in that lists of eligibles when established are continued unduly long. Thus, when the one, two, or three outstanding folks have been picked from a list of eligibles, or have declined appointment, the register remains active under present practice and one must elect either to take the less capable or leave the position vacant, even though other capable people might be included in a new list. If the Federal Government wishes really high-grade personnel, the passing grade should be raised from 70 to 80 or even 85, or a much stricter grading should be followed to give an equivalent result.

The difficulties experienced in recruiting competent personnel through the civil service procedure affect the scientific bureaus in various ways, but differences are of degree rather than of kind. The older agencies, such as the Geological Survey, seem to have less difficulty than the more recent ones in this respect, probably in part because of greater experience in drafting job specifications, and in part because of a prestige and opportunity which attracts desirable candidates. Another type of agency, exemplified by the Bureau of Entomology and Plant Quarantine, has comparatively little trouble with civil service appointments because the agency is the largest and most important employer of research workers in the particular field.

The recruitment problem is most acute in those agencies which must compete with industry for personnel. Even in the lower grades, where Government salaries compare favorably with those on the outside, the long lapse between the giving of an examination and the making up of a list of eligibles—a lapse often of 6 months to a year, and in some cases even longer—means that the more desirable candidates have already accepted industrial positions by the time Government appointments may be offered them. Since 1929 the problem has been intensified by general unemployment which has led unusual numbers to take civil service examinations, many of them the less competent who were first released when industrial staffs were cut down. As expressed by the Bureau of Mines:

> Present eligible lists are made up largely of applicants that are below the average qualifications desired for Bureau of Mines work. The Civil Service Commission staff is inadequate to handle the increased needs of the Government and consequently they are unable to give new examinations and discard the old "picked over" lists of eligibles. Too commonly the eligibles available on a civil service register are the residuum of an examination given years previously; * * * in the meantime a steady stream of desirable competent men seeking work but who are not on a civil service register and are unable to get on because no examinations have been called, leads any bureau to seek its new employees through transfer or promotion from other bureaus where competence and desirability are already demonstrated. Examinations for civil service are held only infrequently and do not always attract a representative list of technical men of the higher characteristics with respect to intelligence. A portion of this difficulty can be remedied by a better distribution of information about civil service and more frequent examinations, properly advertised.

Another source of difficulty under the civil service recruitment system is most in evidence in those agencies in which administrative functions are indistinguishable from scientific functions. To some extent this is true in such regulatory agencies as the Food and Drug Administration, but the best example is the Office of Experiment Stations. The effectiveness of the Office depends on its ability to maintain satisfactory personal relationships with those who are conducting research in Washington and in the field—that is to say, on a factor of personality which is not discoverable by competitive examination.

Suggested improvements in the recruitment procedure all tend in the direction of greater latitude in selection on the part of the appointing agency; and there is general agreement that higher salaries should be paid in the more advanced positions. An important drawback in connection with the latter proposition is the popular attitude that public employees are unproductive tax-consumers, to be tolerated but not encouraged. It is worthy of note, however, that the salaries paid by the Federal Government are lower for similar classifications than those paid by New York City. Some advantages might also be gained by filling a larger number of positions in the higher grades by original appointment rather than by promotion within the given agency, though the same result might be achieved by a more liberal use of consulting specialists on personal service contracts.

Classification of Personnel

Although some improvements have been made, classification of scientific personnel still follows too closely

the mechanical parallelism in effect for administrative purposes. Bureaus are made up of numerous divisions and subdivisions, with a single head for each unit or section. The section leader has a higher classification and receives a higher salary than others in the same unit, and his duties are largely administrative. Thus a showing of administrative responsibility has come to be required for promotion to the higher grades, and "there is a great temptation to leave research for the more remunerative executive positions."

The problem can be solved only by classifying positions in accordance with the importance of the work done and the standard of performance in the doing, rather than in terms of the number of subordinates over whom authority is exercised. Such a solution would often mean that a research specialist might hold a higher position and receive a higher salary than his immediate administrative superior; but this should not be a serious objection. The system must also provide for promotion in grade and salary whenever these are clearly deserved, without long enforced delays until a "vacancy" occurs.

The inadequacy of the classification system now in force is evidenced by the turnover of scientific men in the more advanced positions. Again this is primarily true in fields in which industry competes, but that includes many Government agencies, such as the Army and Navy, the Bureau of Standards, the Bureau of Chemistry and Soils, and the Reclamation Service. The latter Bureau states the case conservatively:

> Opportunities for advancement in the Bureau's research divisions are relatively infrequent. Consequently the younger engineers often resign to accept employment with nongovernmental agencies who are able to pay higher salaries.

It is not meant to imply that all Government salaries are too low. Only those for professional and scientific work are being considered here, and adequacy can be judged in any event only in comparative terms. Generally speaking, the entrance salaries and top salaries in Government are higher than those paid by universities for comparable positions with the intermediate salary range less satisfactory. Industrial salaries, on the other hand, are considerably higher than those of Government except in the lowest professional grades, and this disparity tends to make certain Federal bureaus, through no will of their own, into training schools for industry. Interchange of personnel between Government and industrial or academic establishments may be mutually advantageous, but only if it works both ways, and if it does not take place on such a scale as to disrupt the scientific program of either agency.

Opportunities for promotion, and even salary scales for comparable work, vary between agencies, which adds another factor to the personnel problem. Thus the Bureau of Fisheries—

> not only competes with and loses valuable employees to the industry, but it must meet the competition of other Government agencies. There are several recent examples where highly trained personnel of this Bureau have transferred to other Government agencies at two professional grades higher in salary than their positions in this Bureau. In some cases this transfer did not involve more responsible duties or require more ability.

It is hardly surprising to find that loss of personnel to other agencies, public and private, is "entirely too rapid for the best interests of the Bureau's work."

Permanence of Tenure

The same permanence of tenure which undoubtedly attracts to the Government service a certain number of high-caliber scientific men also attracts, and for the same reason, a type whose ability is below the average. Through failure to keep the registers active, a certain number of these are appointed, and many of them manage to survive the probationary period. They are then virtually irremovable in practice. Though the civil service rules permit discharge for cause, little use is made of the privilege, partly because of inertia and partly because the appeal in such cases is too often through the familiar channel of the spoils system. A private establishment would be free to weed out the mediocre, but under the civil service such a course is slow and difficult.

The security offered to the civil service employee is undoubtedly one of the most important and most desirable features of the Federal service, but it must be carefully safeguarded or it will become, as to some extent it has already become, a means of perpetuating incompetence instead of attracting ability. Both more careful selection of candidates for appointment and a longer and more closely supervised probationary period are indicated.

The Public Health Service now uses a commissioned personnel as well as employees from civil service lists, and has maintained high standards among the former by requiring examinations for promotions, with the alternative in the lower grades of separation from the service. The mixture of commissioned and civil service employees in the same agency, however, does not always work out satisfactorily. The Bureau of Construction and Repair of the Navy, for example, relies on commissioned officers to direct its laboratories, but the number of officer specialists is limited and rotation of duties makes them often unavailable because of pressure of other work. "Thus the effects of this shortage of specialized officer personnel for research work are most keenly felt when shipbuilding work is most active, i. e., when the answers to research problems are most

urgently needed." The Bureau of Engineering has mitigated this difficulty by designating capable officers for engineering duty only. Another side of the question is exemplified in the Coast and Geodetic Survey, where the higher rank personnel hold naval commissions. The commissioned personnel not only receive higher retirement pay, but there is a tendency to develop a social caste system not in the best interests of the agency.

Quality of Personnel

It is particularly difficult to judge the quality of Government scientific personnel in comparison to that of research workers in other agencies because of the differing emphasis with respect to which the work is carried on. The concern of Government with the natural sciences is not primarily with the advancement of science as such but lies rather in practical applications—in putting science to work for the public welfare. Some comparison with industrial laboratories, which are similarly concerned with applied science, may be possible; but the research foundations, and to a somewhat lesser extent, the universities, are concerned with science for the sake of science.

Judged by membership in the National Academy of Sciences and by the starred lists in *Men of Science*, there are proportionately fewer outstanding scientists in Government work than in university research.[2] In part this is undoubtedly a result of the recruitment system, and in part it may be traced to the present classification procedure, whereby a man who has attained the experience and shown the ability which would lead to such recognition has long since been "promoted" to administrative duties and is no longer active in research. The failure of the Academy to elect and of *Men of Science* to star any extensive number of Government scientists may also to some extent reflect an unrealistic scale of values, in terms of which the development of a disease-resistant strain of corn or a cheap and effective gas mask are less significant contributions to science than the discovery of a new planet or the smashing of an atom.

Training of Personnel

Where specialized fields of research are pursued, it must be made possible to secure special training for the more promising employees.—Research agencies of the Federal Government, with the notable exception of the War and Navy Departments, must depend on the colleges and universities for training before appointment those who make up their scientific staffs. No such institution, however, is able to give more than a grounding in more or less generalized scientific fields, while the work of most Government agencies, like that of industry, is highly specialized and often cuts across the lines dividing one science from another. The more highly specialized the work is, the more difficult it becomes to recruit personnel already adequately trained, and the more essential is it to provide some form of in-service training if high standards are to be maintained.

Training on the Job

In most of the scientific agencies an informal training program is carried out by assigning junior staff members to work under the immediate supervision of those more experienced in the problems facing the agency. The Bureau of Mines, for example, gives thorough instruction to new recruits, and the first years in the Bureau are considered "as a liberal training course in technical and scientific procedure and writing." The Geological Survey, and many other bureaus, follow a similar practice.

In other cases, formal classes are organized within the agency, with the various specialists on the staff serving as instructors. After-hours courses of graduate status have been given in the Bureau of Standards for 25 years, and similar courses are given by numerous other bureaus. The Coast and Geodetic Survey has found that "young engineers entering the service from college through competitive examinations are not sufficiently familiar with the specialized work of the Bureau until they have had considerable training"; and a selected number of employees of the Weather Bureau spend their full time for 2 or 3 months in the "study of technical procedures for air mass and frontal analyses of synoptic maps, kinematic and thermodynamic analyses of maps and aerological data, and practical applications to weather forecasting." These classes are supplemented by practice forecasting, daily map conferences, and monthly meetings of the technical staff.

Present Practice Inadequate

Extensive as its in-service training program is, however, the Weather Bureau offers an outstanding example of the inadequacy of such methods to cope with the problems of a rapidly changing science. Technological developments of the last few years in the field of meteorology have rendered obsolete much of the training and experience of a majority of Weather Bureau scientific personnel; and it remains legally impossible to send these men for special courses to any of the two or three universities now giving graduate instruction in air mass analysis. Neither is it possible, under present civil service procedures, to recruit in competition with the air lines younger men already trained in the new methods. The technique of weather forecasting,

[2] See tables in appendix to Section 6, pp. 191–193.

and in consequence the value of the weather service, could be greatly improved in a comparatively short time by permitting the detail of Bureau scientists to universities for special training.

The basis of the prohibition on sending Government scientists to educational institutions for special study is a decision of the Comptroller General rendered July 9, 1926, in response to a letter from the Secretary of Agriculture.[3] The reasoning is that the practice in question is specifically authorized by statute in the case of Army officers and enlisted men[4] and must therefore be similarly authorized by statute before any other branch of the Government may make use of it, however beneficial it may be. The decision provides a loophole in that the granting of leave of absence for educational purposes is left to "administrative discretion subject to statutory limitations"; but the lack of appropriation for the purpose serves as a sufficiently real limitation.

Efforts to Solve the Problem

The Department of Agriculture has tried to mitigate the force of this decision by setting up its own graduate school in which courses are taught after hours by specialists from the research bureaus, but this cannot take the place of the intensive training under authorities in particular fields which is possible at the universities. To a limited extent, also, individual bureaus with complex requirements, such as Plant Industry and Agricultural Engineering, have secured special training for staff members at the land-grant colleges where cooperative projects are under way, but this method is likewise of limited application. The Biological Survey is solving its particular training problem by establishing cooperative wildlife research units at various land-grant colleges and taking steps to encourage conservation education at other universities, thus laying the foundation for a future staff of suitably trained workers.

Policies differ markedly in the matter of encouraging employees to take courses after hours in local institutions; but there would no doubt be more emphasis on this type of training if better facilities were available in scientific fields.

The War and Navy Departments, with respect to personnel, are in a definitely superior position to that of other governmental agencies in that each maintains its own school of collegiate rank. The officer personnel, which directs all the research activities of both services, is recruited before rather than after college training and is instructed at Government expense in the special fields required. Military training is, of course, paramount at both academies; but those graduates who show most aptitude for scientific work may be given advanced training, either at civilian universities or at numerous special service schools such as the Army Industrial College or the Naval Medical School.

Even with these advantages, however, the research units of both services have found it necessary to give special training to civilian employees, who are not eligible for detail to educational institutions. The case is summarized by the Ordnance Department of the Army:

> The salary scale of the Government is frequently not sufficient to attract men already developed or to hold them if specially qualified and recognized by industry as preeminent in their field. It is therefore generally necessary for the Department to employ qualified young men and to train them on the job.

No general solution for the problem of specialized training seems to be necessary. The scientific bureaus can solve it for themselves if they are given authority to do so.[5] Several of the numerous suggestions made, however, are worthy of consideration. An effective arrangement is understood to be in use in Canada, under which the Canadian Research Council sponsors the assignment of staff members of the Dominion Department of Agriculture to universities for special study. An apprenticeship system similar to that of the Social Science Research Council would be endorsed by many bureau chiefs; and a system of federally supported graduate fellowships at selected universities might also serve the scientific needs of Government.

Publication of Research Findings

If the research of the Federal Government is to be of maximum value, findings must be promptly published or otherwise made available for general use.—Scientific research is undertaken by the Federal Government for utilitarian ends. It is therefore patently absurd to

[3] The official summary of the decision reads as follows:

As there is no statutory authority to detail employees of the Department of Agriculture to educational institutions for courses of instruction as part of their official duties, the employees are not entitled to compensation for the time spent during regular office hours in attendance at educational institutions whether or not the employees are required to work compensatory time after regular office hours.

The establishing of part-time positions in the Government service to perform services the nature of which requires the whole time of other employees, for the purpose of permitting such part-time employees to attend educational institutions, is not authorized.

The granting of leave of absence with or without pay for the purpose of permitting employees of the Department of Agriculture to attend educational institutions for courses of instruction is a matter within the administrative discretion subject to statutory limitations. (6 Comptroller General 15.)

[4] United States Code, title 10, paragraph 535.

[5] This authority appears, at least in some measure, to have been granted. Section 8 of Executive Order Number 7916, dated June 24, 1938, provides that the Civil Service Commission "shall, in cooperation with operating departments and establishments, the Office of Education, and public and private institutions of learning, establish practical training courses for employees in the departmental and field services of the classified civil service, and may by regulations provide credits in transfer and promotion examinations for satisfactory completion of one or more of such training courses."

spend large sums for research without providing adequate sums for publishing research findings. With the exception of projects of secret nature bearing on the national defense, governmental research fails to achieve its purpose insofar as findings are unavailable to those who may be interested in them.

Printing Funds Inadequate

Though the volume of research conducted under Government auspices has materially increased in the last two decades, funds for printing have not increased in proportion, and in some cases have actually been reduced despite rising costs. The Division of Scientific Inquiry of the Bureau of Fisheries, for example, reports that:

> With the expansion of the scientific program in recent years and the addition of new technical personnel has come a curtailment of the Budget for printing the results of new work thus undertaken. Many researches, therefore, of considerable theoretical and practical significance are completed and the results are buried in the files without serving the purpose for which the taxpayer's money was spent.

Put more concretely, the total maximum appropriation to the National Park Service for all printing needs was cut 3 years ago from $50,000 to $26,000, while the administrative load was increased. As a result, most of the available printing fund goes into forms and letterheads, with not more than $2,500 left for printing research findings. The Bureau of Standards printing fund was similarly cut from $75,000 in 1932 to $33,000 in 1937, although the same research functions are being carried on.

As long as publication funds remain inadequate, masses of valuable data accumulate for which there is no satisfactory outlet. Many of the data prepared by the Division of Geodesy of the Coast and Geodetic Survey, for example, "are now sent out in photostat form at the expense of the applicant or in letter form requiring considerable time for typing. If these data were available in printed form they would be used by thousands of engineers who do not now know of their existence." Publication of material now in the files of the Division would cost about $75,000 at Government Printing Office prices. The annual sum available for printing, however, is approximately $3,300.

The enormous growth of scientific functions without provision for increasing the published output is best illustrated by the experience of the Office of Experiment Stations. The *Experiment Station Record* is issued monthly for the purpose of making generally available brief summaries of the current publications of the experiment stations and the Department of Agriculture, the contributions of workers in these institutions appearing in scientific journals and other channels, and a considerable volume of other literature pertaining to research in agricultural science or otherwise of interest in this field. The technical staff of the office reviews approximately 100,000 titles annually, abstracting for the *Record* between 6,500 and 7,500 articles. This obviously inadequate coverage is the result of an annual space limit of 1,800 pages imposed in 1911.

> At that time the aggregate income of the State experiment stations was less than $4,000,000 annually and their scientific staffs numbered less than 1,600 workers. In 1936 approximately 3,800 members of the staffs were engaged in research part-time or whole-time and the aggregate expenditures totaled about $16,000,000. The station output in publication has been greatly increased both through stations' series and through scientific journals. Other research agencies in the field of agriculture and home economics, including the Federal Department of Agriculture, have shown a similar increase in activity, and such subjects as agricultural economics, rural sociology, agricultural engineering, genetics, and home economics have made practically their entire development during the past quarter of a century.

Publication Unnecessarily Slow

Even where reasonably adequate appropriations for publication are available, the printing service is often much too slow to permit the release of timely information through Government channels. This is due to a combination of circumstances, among them being the over-crowded conditions in the present Government Printing Office building and delays in the departments in checking, verifying, correcting, and returning proofs to the Government Printing Office. Lapses of as much as 18 months are not uncommon; and where funds are curtailed, publication of manuscripts may be held up for 5 or 6 years, if indeed they reach the public at all. Even those agencies which issue periodicals, such as the *Journal of Agricultural Research*, the *Journal of Research of the National Bureau of Standards*, and the *Reclamation Era*, experience delays in getting research findings before the public. As in the case of the *Experiment Station Record*, publication facilities have not kept pace with expanding research programs, and in some cases, such as that of the *Monthly Weather Review*, they have been materially cut down.

A part of the delay in printing is no doubt attributable to the precautions taken to insure accuracy. There is a tendency on the part of the general public to accept implicitly the pronouncements of governmental agencies; and there is therefore a very definite responsibility, not only to be right, but to be sure the findings are presented without possibility of misinterpretation. Where the academic scientist may submit a paper embodying his findings to two or three of his colleagues before publishing it, the report of a scientist in the Department of Agriculture is routed for criti-

cism through every bureau in the Department before it is released. Even if no changes whatever are made, the process is time-consuming.

Another factor which may interfere with prompt publication of scientific findings is pressure to use printing funds for popular reports, or reports having publicity value.

Publication Through Nongovernmental Channels

The general inadequacy of publication funds and the delays incident to Government printing have led in many cases to the selection of second choice media for the publication of scientific articles. If the Government's scientific output is less impressive than it was a generation ago, it is perhaps because to an increasing extent important findings are released through technical societies and nongovernmental scientific journals. The Bureau of Chemistry and Soils is speaking for governmental research agencies generally when it reports that "most of the technical papers prepared in the Bureau appear in outside publications."

While this method of disseminating research findings is certainly superior to nonpublication, and in some fields may be the best means of presenting scientific data, it has certain drawbacks which have been well summarized by the technological branch of the Bureau of Mines:

> In the first place it is difficult, if not impossible, to earmark these publications as coming from the Bureau, which seriously handicaps Bureau morale. Further, it provides none or insufficient reprints for answering inquiries and finally it orients the staff toward the technical societies and technical editors who take the place of the supervisory staff in passing on the quality of the work done by the staff.

Reproduction of research materials by processes other than printing may be used in some cases as a partial solution of the publication problem, but it is a solution which will remain of limited application until a legally acceptable definition of the term "printing" has been agreed upon.[6] The only genuinely satisfactory solution lies in congressional appropriations for research which include adequate sums for printing research findings. It is hoped that congestion in the Government Printing Office will be relieved by completion of the present building program, probably early in 1940.

Coordination Within the Government

Coordination between Federal research agencies is essential in the interest both of science and of efficiency.—Coordination between research agencies serves both an administrative and a scientific purpose. The administrative purpose is that of programming research activities to avoid duplication and to carry on service functions more effectively. The scientific purpose is to allocate research functions to those agencies best equipped to prosecute them, to keep workers in any given field informed of the activities of others in the same field, and to bring to bear on any specific problem the resources of all the sciences capable of contributing to a solution.

Although the scientific work of the Federal Government is departmentalized and subdivided among numerous bureaus and offices, these functional divisions should not, and in the main do not, prevent concentration upon a single problem of the resources of many agencies. As the functions of the bureaus have become specialized, the machinery for cooperation and collaboration has grown up to a point of high operating efficiency. By means of joint committees or informal discussions, agencies dealing with similar problems avoid duplication and make more effective use of facilities and accumulated knowledge; by formal contract, often involving transfer of funds, specialized phases of a more general research problem may be investigated by one agency for another; and by loan or exchange of personnel, those scientific workers who are best fitted to conduct a given investigation may do so under the auspices of some bureau other than their own.

Interbureau Committees

The interbureau committee or less formal discussion of program between bureau chiefs is extensively used to coordinate the work of agencies dealing with a similar problem from the point of view of different sciences or circumstances. The best examples are the committees of the Department of Agriculture which, under the Director of Research, coordinate the program of the Department as a whole; and the interdepartmental committees which coordinate the scientific work of the Army and Navy.

The committee organization may be permanent and formal, like that of the National Advisory Committee for Aeronautics; it may take the form of standing subcommittees within a single department, such as the interbureau committees for land-use coordination and for correlation of soils research within the Department of Agriculture; or it may amount to no more than a division of the field to be covered, through informal discussion among responsible officials. For example, the Bureau of Plant Industry is concerned with the development of wheat which will grow under certain specified conditions and will have certain desired properties. The Bureau of Chemistry and Soils

[6] In this connection see the *Report of a Special Committee on Methods of Production and Distribution of Printed and Duplicated Material*, April 6, 1938.

is concerned with processes of milling the wheat so developed and with determining the properties of the resulting flour: and the Bureau of Home Economics is concerned with the nutritional value of the baked goods made from the flour. Broadly considered, the whole process is one experiment, but the responsibility of each Bureau is determined in advance by informal discussion so that it may go on as several different experiments without overlapping or omitting any step.

As between departments, the Army and Navy are both concerned with such items as gun forgings and smokeless powder, and secure uniformity by the use of joint specification boards. Examples of standing committees for interdepartmental or interbureau cooperation are the Advisory Committee of the Public Health Service, on which War and Navy medical services, the Bureau of Animal Industry, and the profession at large are represented; the Interdepartmental Committee on Health and Welfare; and the Federal Board of Surveys and Maps.

More informal arrangements exist between the Census Bureau and various other agencies interested in tabulation of statistical data, such as the Bureau of Mines and the Forest Service.

Contractual Arrangements

Where some phase of a more extended research project requires the use of equipment or the application of specialized knowledge not readily available to the agency undertaking the project, a contractual arrangement is frequently entered into with some other better equipped agency. A substantial part of the work of the Bureau of Standards, for example, is done under contract for other agencies of the Government, including the National Advisory Committee for Aeronautics, the Bureau of Air Commerce, the air services of War and Navy Departments, and the Geological Survey. The Food and Drug Administration receives funds from the Post Office Department and from the Federal Trade Commission for making various scientific tests; and the Bureau of Chemistry and Soils has from time to time received funds under contract from the State Department for investigating damage to agricultural lands in Washington from smelter fumes originating in British Columbia.

Contracts of this type may cover only a single item, or may apply to a fairly broad field. A specific sum may be allocated for the purpose, or the agreement may simply call for reimbursement for actual expenses incurred.

The allotment of funds under contract has been much extended in recent years through disbursement of emergency funds in this way by the Works Progress Administration.

Loan of Personnel

A third method of cooperation between agencies of the Federal Government is the loan or temporary transfer of research personnel between bureaus, or the more or less permanent assignment of employees of one bureau to work in the laboratories of another. The basis of the arrangement in the case of actual transfer may be purely informal, or it may, as is more often the case, involve reimbursement of salary.[7] The purpose may be to make expert knowledge available to the borrowing agency for the duration of a specific investigation, or it may be to make certain specialized equipment or facilities available to an agency which is already possessed of the requisite skill.

An example of the means frequently employed in making a joint attack on problems of common interest between two bureaus is given by the Forest Service:

> Constant and widespread cooperation is maintained between the Forest Service and the Bureau of Plant Industry, the Bureau of Entomology and Plant Quarantine, and the Bureau of Biological Survey. The Bureau of Plant Industry maintains offices of forest pathology at four of the regional experiment stations and also has a group of pathologists working at the Forest Products Laboratory on problems of decay of forest products. Forest entomologists are working in direct cooperation with seven of the experiment stations, and the Biological Survey has wildlife specialists at four stations. The problems on which representatives of these agencies are engaged are decided upon in consultation with the experiment station director, and priority is given to study of pathological, entomological, or biological phases of projects occupying the attention of the forestry staff.
>
> In most instances representatives of these bureaus share headquarters space and are supplied with a limited amount of clerical help by the Forest Service. They are encouraged to make as much use of the experimental forests and ranges as is consistent with the character of their work. They are, however, administratively independent of the experiment station, reporting direct to their respective divisions in Washington. In the northeastern region the number and variety of pathological and entomological problems have led to the establishment of independent offices by the two bureaus concerned, each occupying a separate building through cooperation with Yale University. The Office of Forest Pathology has a staff of six people, and the Forest Insect Laboratory has eight men on the technical staff and one clerk.

Coordination Requires Understanding

Coordination at those points where the activities of the various agencies converge depends as much on a mutual understanding by bureau officials and personnel of each other's functions, however, as it does upon formal administrative machinery. The instruments of coordination exist in adequate variety, and failure to make use of them is largely inadvertent. The Forest Service, for example, recently made an extensive collection of range grasses, catalogued them, and threw

[7] See James Fesler, *The Loan of Expert Personnel Among Federal Agencies*, National Resources Committee, 1935.

them away, without thinking of the possibility of analyzing them for nutritive properties until a similar study for nutrition purposes was undertaken by the Bureau of Animal Industry. In another instance, the Bureau of Standards and the Bureau of Chemistry and Soils each undertook research on a substantially identical problem with reference to certain properties of leather, but divided the field amicably when they became aware of each other's interest in it.

The Department of Agriculture, through its uniform projects system, has done much to eliminate inadvertent duplication among its own bureaus by keeping a detailed and accurate record of all work in progress. While other agencies may consult these records to find out what research is being carried on in the field of agriculture, there is no equally convenient way of finding out what other departments are doing in research short of consulting individual bureaus and probably also their subdivisions.

A central record of all Federal research on the pattern of that used by the Department of Agriculture might well be considered as a means of enabling any agency before it undertakes a new project to learn what is being done by others in the same field. Such a record might be reduced to card index form and widely distributed among universities and other nongovernmental research agencies in addition to being made available to all Government bureaus.

Some form of service club for professional and scientific workers on the order of the familiar faculty clubs of our universities might also serve to bring about, through closer contact, a better understanding of each other's problems on the part of Governmental personnel.

There is no doubt that interbureau jealousies of one sort or another also operate to inhibit coordination and lead to some measure of duplication. This is probably unavoidable, however, as long as it remains legally impossible or administratively inexpedient to combine similar functions carried on by more than one agency.

Administration of Research

Administrative techniques employed by the scientific agencies of the Government are conditioning factors in the success of their research programs.—Government research is essentially a group product. It is carried out on a large scale, with many individuals working toward the same ends in each field and on each project. The organization of these workers so as to achieve maximum returns with as little friction and overlapping as possible is an administrative problem, on the solution of which depends much of the effectiveness of governmental efforts in scientific as well as in other fields.

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The various executive departments having scientific functions have approached the administrative problem each in its own way, and in more circumscribed fields, the bureaus and divisions of these departments have worked out their own forms of organization within the departmental pattern.

Navy Department

The closely knit, highly centralized form of organization is typified by the Navy Department. All of its activities are pointed toward the single end of national defense, and the action and research functions are carried on simultaneously in the same bureaus. The research program is determined by the needs of the service with respect to materials, equipment, or design, as the case may be, and is coordinated through the regular line organization. A liaison committee on naval research, including representatives from each bureau, meets about once in three months or on call, to consider research problems on which individual bureaus wish assistance; and if suitable aid cannot be found in the Department, the problem is referred to the Naval Research Committee of the National Research Council.

Administrators are naval officers selected for their qualifications in specific fields, but with broad training and general experience as to the requirements of the Department as a whole.

Department of Agriculture

The Department of Agriculture presents a very different form of organization, unique among the executive departments in that scientific research rather than administration or regulation is its original and primary function. A director of research for the Department coordinates the program as a whole, and the research functions of the bureaus are kept as distinct as possible from their other duties.

Within broad or restricted statutory limits fixed by organic laws and appropriation acts relating to the Department and to the individual bureaus, the research program is administratively determined by the Secretary and the bureau chiefs. The Secretary, by virtue of his Cabinet office, is in position to interpret public policy as it may reflect upon agricultural research, while the heads of the scientific bureaus are directly in contact with and are presumed to know the requirements of particular fields of activity. In practice, each bureau makes up its own program, subject to approval by the Secretary.

The need for work on any particular research problem is considered by a bureau in the light of its expected practical value to agriculture or its fundamental nature with regard to other research problems, its comparative urgency, the progress already made toward a solution, and the activities of research workers

outside of the bureau on the same or a related problem. The probable returns from the research are weighed against the estimated cost.

Inauguration of work on a new research problem may result from a special act of Congress directing that such work be done and providing funds for the purpose or from a specific order by the Secretary of Agriculture. New investigations may be stimulated also by the request of another Government agency or of an association of producers or consumers of agricultural products, by the suggestion of some scientist within the bureau, or by letters from a large number of individuals requesting unavailable information on a particular subject.

The usual procedure in formulating a research project is for the chief of the bureau to call into conference the chiefs of divisions directly and indirectly concerned in the proposed research, other administrative officials of the bureau, and representatives of such other Government agencies and nongovernmental organizations or groups as may be interested. The scope of the problem, the phases first needing attention, possible methods of attack, and the feasibility of undertaking the work are discussed; and if the proposed research is cooperative in nature, the conditions of cooperation are agreed upon. Before work is actually started, this agreement is usually confirmed by memoranda of understanding or formal agreements or contracts. If the proposed research is approved by the chief of the bureau, it is formulated as a project with statements as to historical background, objectives, procedure, and estimated cost. This must be approved by the Department's office of budget and finance, and ultimately by the Secretary of Agriculture. If legal authority for the work does not exist already, or if additional funds will be required, the proposed research must be approved by the Bureau of the Budget and must await Congressional appropriation. If there is legal authority and funds are available for the work, the project may be started immediately after approval by the Secretary.

The execution of a research project, or of one bureau's part in a cooperative project, is usually made the responsibility of a single division of a bureau, although other divisions may assist in some phases of the work. The operating unit is a work project, which is usually broken down into research line projects, each of which covers a particular phase of the work and is designed to be completed within a limited time. As research line projects are completed, new research line projects are started, after approval by the bureau chief. Incidental investigations requiring more than two weeks for completion may not be undertaken without first having them approved as research line projects by the bureau chief. The direct leaders of research line projects or work projects may work independently or with the assistance of other scientists, under the supervision of the division chiefs. The latter are required to make quarterly and annual reports to the chief of the bureau on the progress of the work, to account for the money expended and obligated, and to submit estimates of the funds required for continuation of the work.

The administrative arrangements within the various bureaus differ. Some, like the Forest Service and the Soil Conservation Service, conduct research largely through regional field laboratories; while others, such as the Bureau of Chemistry and Soils and the Bureau of Plant Industry, rely more largely on the state experiment stations for field studies and have their major laboratories in and near Washington. The function of the bureau chief, however, is essentially the same in each case, so that the analysis offered by the Bureau of Animal Industry may serve for all.

In effect, the chief of the bureau carries the responsibility for activities in the field of investigation allocated to his bureau. He stands between the investigators, with their suggestions for problems, methods of attack, or requests for financial allotments, and the demands for researches on the part of the interested public or other bureaus of the Department of Agriculture. He presents the needs of the bureau to the appropriating agencies. Through his administrative personnel he reduces as much as possible the routine of personnel matters, and the necessary accounting that must surround the handling of public money and property. In these matters he generally depends upon his division chiefs or section heads for recommendations so that they carry the immediate responsibility.

It is characteristic of the Department of Agriculture, as of most scientific agencies of the Government, that those directly responsible for the administration of research are themselves scientists. Insofar as administrative ability as well as scientific achievement is a factor in the choice of bureau heads, the arrangement has much to commend it, and as it usually works out in the particular department here being considered, it is generally successful. The reason, however, lies less in the scientific qualifications of the administrator than in the fact that he has with some exceptions risen to his executive position from the lower ranks in the same bureau, and has acquired the necessary knowledge of governmental procedure in the process.

Because he is responsible for the scientific program of his bureau, the bureau chief must have wide knowledge of its field of operations; but he must also justify its program to the Secretary, to the Bureau of the Budget, and finally to Congress. He must, therefore, possess not only technical qualifications, but also considerable skill as a salesman. When he appears before Congressional committees on appropriations he must justify his program not in terms of scientific advancement but on the basis of the public benefits that will result from it.

Procedural Limitations

Present procedures with respect to authorizing and financing research projects tend to limit rather than to promote intelligent consideration of the Government's scientific program as a whole.—Administrative procedures, and to a greater or lesser extent the efficiency of the research itself, are necessarily affected by the fact that any particular bureau is only a small segment of a very large governmental organization. The administrative requirements of the larger organization inevitably operate to curtail the autonomy of any single division, which must conform to general rules with respect to purchasing, travel, and a variety of other items. Though such regulations may in some degree hamper the conduct of a research program, they are the necessary conditions under which bureaucracies exist. They differ only in degree from restrictions imposed by any large organization upon the freedom of its component parts.

Restrictions on Funds

The general type of restriction imposed may be illustrated by a few random examples. The 1938 appropriation for the Bureau of Mines limited purchase of scientific books and periodicals to $3,000, or "about one-half of what might be considered a reasonable sum in proportion to the number of technical workers and their geographical distribution." Technical books and periodicals are essential tools of modern research, and the proportion of funds spent for their purchase might well be left to the judgment of the individual agency. The Interior Department, of which the Bureau of Mines is a part, is an exception to the general practice in this respect.

In a slightly different field, the Bureau of Entomology and Plant Quarantine reports that Government purchasing procedure—

> occasionally makes it impossible to secure the particular type of equipment desired on a certain project, and, although it may be possible to prepare specifications which result in the needs of the work being adequately met, there is frequently a long delay involved which reduces the efficiency of the research work in many instances. It is frequently impossible to anticipate needs long enough in advance to provide sufficient time to meet all the fiscal requirements in the purchase of equipment and materials without seriously hampering the effectiveness of the work. Although there can be no questioning of the soundness of the principle involved in awarding Government business to the lowest bidder meeting specifications, a great delay in satisfying the numerous requirements surrounding purchasing is frequently unavoidable under the present system of procurement.

Similarly, restrictions on travel and on attendance at conventions and scientific meetings have been found by many agencies to handicap their research programs. As explained by the Bureau of Mines:

> Presentation of the results of scientific research at meetings of technical and scientific societies and at trade association conventions is essential to efficient operation of any research agency. It is among the most effective methods of placing the results of the investigations in the hands of that part of the public that is competent to make use of them and develop them further for the benefit of the general public. Attendance of technical personnel at scientific meetings has a stimulating effect in raising the general standard of the work accomplished.

Discussing the same problem, the Chemical Warfare Service suggests that necessary flexibility might be achieved "by charging of travel, including attendance at scientific meetings, to the appropriation for research and development with corresponding increase in that appropriation."

A rigid limitation on funds available for travel is a still more serious handicap for agencies like the Coast and Geodetic Survey where the extent of field work depends largely on requests which may be received subsequent to the appropriation.

Budgetary Procedure

The present process of appropriating funds for research tends to force consideration of the program of each department, and in many cases of each bureau, in isolation rather than as a part of an over-all scientific program for the Government as a whole. The needs for the fiscal year are planned by the chiefs of the various scientific bureaus in collaboration with their technical staffs. With few if any exceptions, those who make up the research programs for the bureaus have a full appreciation of the proper balance between research and service functions and are in a better position than anyone else to appraise the needs and estimate the costs in their respective fields.

The extent to which these research programs have received a sympathetic hearing by the Bureau of the Budget has in the past depended very largely on the ability of the individual bureau chief to convince officials who were more concerned with economy than with scientific needs that his particular research program was necessary; and the vigorous complaint of one bureau chief that his carefully prepared estimates, based on exhaustive study and intimate knowledge, were "ruthlessly and arbitrarily 'shot to pieces' without rhyme or reason by those in control of budgetary matters" may at times have been less than overstatement. With a material increase in its staff and resources, however, there is every reason to believe that the Bureau of the Budget will hereafter more nearly fulfill the constructive function for which it was created.

The scientific functions of the Government are continuing functions. They cannot be carried out one year and dropped the next, but must be planned on a fairly long-range basis if they are to be of maximum benefit.

This long-term aspect is one of the most important features of governmental research in comparison to work done by many other agencies. Because it has a fixed research fund amounting to a percentage of its annual construction appropriations, the Bureau of Public Roads was able to carry on highly important investigations in soil mechanics which failed to yield positive results until the experiments had been continued for 10 years. On their annual budgets, however, few other agencies of Government can continue research projects for long if significant results are not achieved.

The yearly budget also affects adversely the field work of various agencies. As the Coast and Geodetic Survey points out, detailed plans—

> cannot be made until the amount of an appropriation is known; appropriations are not regular from year to year; they frequently have not been passed by the Congress until a few days before July 1, so that parties in the field are uncertain whether the work they are engaged upon will suddenly cease near the end of June or be expanded. As fewer field parties are employed during the winter it would be more efficient if the amount of the annual appropriation were known on January 1. Still further efficiency would result from appropriations being made for periods of 2 or more years.

At the same time, the necessity under present practices of preparing budget estimates a year or more in advance means in rapidly developing fields that the need for certain projects may have passed by the time funds are available and new problems may have arisen which are more urgently in need of solution. Only a greater degree of administrative latitude than now prevails will ameliorate this situation.

A further criticism of the procedure is offered by the Forest Service:

> Another aspect of the financial problem is the inordinate and increasing amount of time which must be devoted to appropriation matters. The volume of work involved in preparing Budget estimates, supporting these with concise and convincing statements, preparing material for hearings and justifying recommendations to a chain of officials and committees can hardly be appreciated by anyone who has not actually had contact with the process.

While the problem of appropriating for research work in such a way as to provide a balanced over-all program for Government as a whole can not be solved without much more detailed study than has been given to it here, various suggestions have been offered which are worthy of consideration. One scientific agency suggests the appointment of an advisory committee for each of the technical bureaus, these committees to be responsible to some general advisory body whose function would be to review the scientific programs of all the bureaus and to make recommendations to the Bureau of the Budget. Such a general advisory council would, of course, have to represent both the natural and the social sciences.

Another proposal would supply the Bureau of the Budget with staff advisors in specialized fields. Under such an arrangement, the research program of any agency would be passed upon by experts in the particular science or sciences with which it dealt but who, by virtue of their responsibility to the Bureau of the Budget rather than to an operating agency, should be in position to consider the broad scientific needs of the Government without regard to departmental lines.[8]

It is also essential that when cuts are made by the appropriating authority they should be lump sum rather than itemized cuts. It should be left to the scientific staff to determine where financial reductions can best be made so as to preserve the most necessary features of the program.

Stimulus to Nongovernmental Research

Governmental research serves to stimulate and to catalyze scientific activity by nongovernmental agencies.—On numerous occasions and in many fields governmental research has served a pioneering function. New lines of research are often expensive, and returns may be small or long delayed. Industry cannot afford to enter such fields unless there is reasonable prospect of definite financial gain within a predictable future; and it is under such circumstances that Government agencies may lead the way. When the pioneering work is done, industrial laboratories are established (not infrequently being staffed by men who began the particular line of research under Government auspices) and further refinements are made.

For example, no other research was done in the field of nitrate fertilizer until the Bureau of Chemistry and Soils had given 10 years to the work, during which period costs were reduced by two-thirds. When profitable methods had been developed, the industry established nitrate laboratories, hired the Bureau's nitrate specialists at three to five times their Government salaries, and set about commercializing the process.

Governmental research may thus be regarded as stimulating industry to enter new fields. Generally speaking, the question of competition does not arise because, with the exception of findings of a secret military nature, the results of governmental research are freely available for industrial use. Thus, studies by the Bureau of Mines of scale formation in steam boilers and of the embrittlement of boiler steel have led to new methods of conditioning boiler water in industrial practice, and new industries have grown out of research by the Bureau of Fisheries on fish oils and fish liver oils.

More spectacular and of still more far-reaching significance has been the influence of the Navy Depart-

[8] See pp. 77–78.

ment on the development of the American steel industry. In 1881, when steel plates were being used only for locomotive fire-box and boiler construction, a naval board recommended the construction of steel battleships; and the first contract was awarded in 1883 to John Roach, of Chester, Pa. The specifications were such, however, that no steel manufacturer would undertake to supply the plates, and Roach was forced to build his own mill. Though great pressure was brought upon the Department to modify its specifications, it was successfully resisted, and as a byproduct of the Navy contracts, American manufacturers learned how to make good steel plate.

Similarly, large steel castings were first made in this country to meet naval requirements, the first being delivered in 1887; and at about the same date hydraulic forging equipment was introduced through the efforts of naval engineers who secured permission to use British patents. In the chemical field, experiments with a smokeless powder invented by an employee of the naval torpedo station about 1891, led to the development by the American chemical industry of a whole series of nitrocellulose products such as lacquer and fabricoid.

Numerous other examples could be cited to show the influence of governmental research on the development of industrial processes, but enough has perhaps been written on the subject to serve the present purpose. Other governmental agencies whose research has been of importance in the development of particular industries are the Bureau of Standards, the War Department, the Forest Products Laboratory, the Bureau of Mines, and the Biological Survey. The latter has contributed extensively to the $50,000,000 American fur industry.

In addition to applying to industrial uses processes developed by Government, provision has been made for research associates employed by industry to make use of governmental laboratories on the same basis as regular Government personnel. These associates conduct investigations of particular interest to the agencies sponsoring them, but work under the auspices of the appropriate Government bureau. The Bureau of Standards has had as many as 100 research associates at one time, and currently has about 60 working in its laboratories. Others are attached to the Bureau of Chemistry and Soils, the Bureau of Fisheries, and the Public Health Service.

Patent Policies

There is no uniform policy on the part of the Federal Government with respect to patents growing out of the work of the research agencies.—Patent policies with respect to inventions by Government employees should be such as to further so far as possible the purpose for which the given line of research resulting in the invention was undertaken. The whole question is an old one for which there are varying solutions among different agencies. The present law [9] provides that the Government shall have free use of any patent developed in its laboratories by any of its employees, but commercial rights may be retained by the inventor unless he was specifically assigned to solve the problem to which his invention is the answer. Application of this law, however, presents certain difficulties which have led to administrative modification and statutory exceptions.

Retention of Commercial Rights

The War and Navy Departments adhere to the letter of the law as rigorously as possible. Progress in the technical phases of national defense depends very largely on new inventions and discoveries, and as the Army Signal Corps points out, the possibility of personal gain from commercial rights serves "as a distinct incentive to employees to develop new ideas and protect them by patents." Additional income from patent rights may also in some measure compensate the more able employees for the comparatively low salaries paid by Government. The same agency, however, is well aware of the difficulties inherent in the policy:

> It is difficult to repress explorations of technical personnel into fields that appear attractive from a patent viewpoint to the neglect of their assigned work in less attractive fields * * * In another way patents are troublesome. An employee granted a patent in strict compliance with the law not infrequently finds himself called upon to pass official judgment upon contracts involving his patent and although he may not profit directly therefrom, his action nevertheless may serve as the stimulus for commercial application from which he may profit.

In certain cases Navy employees have made inventions of so confidential a nature that patents have not been taken out for fear of disclosing the devices to potential enemies. Under such circumstances, the Secretary of the Navy is empowered [10] to reward civilian employees for "beneficial suggestions," and in a few instances further awards have been made by act of Congress. In these cases, and in others in which national defense is involved to such an extent that the Government has retained all rights, it is doubtful if commercial rights would prove of great value.

The close relations maintained between the military services and private industry open the way for misunderstandings with respect to patents. It is understood, for example, that one of the large commercial

[9] United States Code, title 35, paragraph 45.

[10] United States Code, title 5, paragraph 416.

laboratories claims prior rights to certain ideas patented by Navy personnel detailed to the laboratory.

Public Service Patents

The Department of Agriculture follows a very different policy. The various research bureaus of the Department have been responsible for a number of inventions; but these are invariably protected by public service patents for the free use of the public, or by patents assigned to the Secretary for manufacture under license but without charge. The employee responsible for the invention retains no rights in it and secures no compensation from it. A typical procedure is that of the Bureau of Chemistry and Soils, which regards its function as accomplished when a new process has been developed to a point where commercial use is practicable. The process is then made freely available to industry and the Bureau ceases to be interested in it.

The principle is, of course, subject to variations, such as that employed by the Bureau of Public Roads in the case of a recently devised automatic traffic counter. The principle of the device was worked out in the Bureau, but the mechanism was left to the manufacturer, a contract for supplying the Bureau with counters using the principle being awarded to the lowest bidder on this basis. In such cases the device is not patented and is not patentable.

Other agencies of the Government follow one or the other of these two major forms of patent policy. The Geological Survey and the Bureau of Reclamation, for example, follow the same practice as the War and Navy Departments, while the Bureau of Standards and the Bureau of Fisheries have made use of both the public service patent and the patent assigned to the inventor, with shop rights reserved to the Government. Instruments devised by the Coast and Geodetic Survey have not been patented.

Neither Policy Adequate

The disadvantages of the policy which permits retention of commercial rights by the employee have already been pointed out by the Signal Corps. A pertinent discussion of the public service patent comes from the Bureau of Mines, which has made use of both methods:

> Dedication of a patent is not necessarily to the public's best interests. To serve the public the invention must be put in use. A patent at the time it is issued by the Patent Office may be far removed from the status of a commercial success. The first consideration is to establish its validity. Second, the process or device may be described only in general terms in the patent and the practical limits still have to be determined. Third, since the process or device probably is a new departure from previous usage, expenditure of a considerable amount of money usually is required to educate potential users to the advantages of the new process or device.
>
> Close association of the inventor in nurturing the invention to full maturity usually is salutary because of his keen interest in seeing his idea develop into commercial importance, but the most direct interest is a financial one. However, unless an entrepreneur has some protection such as an exclusive license to the patent, he will not be inclined to spend the money for such development of the patent and its potential market for the benefit of others.
>
> Therefore, unless a patent is issued in such a way as to provide for exclusive licenses, it is likely to languish. Dedication to the public apparently does not provide for such licensing.

Assuming that the function of a Federal patent policy is to further the same ends which governmental research itself seeks, it would seem necessary that the policy in question should provide for the widest possible application of the processes or inventions patented, except where these are concerned with national defense. Whether either of the general policies now in use satisfactorily fulfills this function is doubtful. The whole question of patent policy both for Government and for the universities is difficult and complex. A thorough study of the whole problem should be made.

Conclusion

The research activities of the Federal Government in natural science and technology are based in part on the necessity for supporting administrative and regulatory functions with scientific findings, and in part on the superior facilities available to Government for conducting research in various fields of national interest. The prestige and authority of Government may also be used to coordinate research in fields in which many agencies are active.

There are certain limitations upon governmental research which are inherent and unavoidable, arising from the nature of Government itself. There are others, however, which may be attributed simply to failure to appreciate the problems involved, and these may be removed. They may be grouped as problems of organizing and administering research; problems of recruiting, classifying, and training scientific personnel; and problems of appropriating, budgeting, and allocating funds for research.

In spite of these limitations, the standard of performance in governmental scientific work is generally high, and the output compares favorably with that of other agencies engaged in similar work. It may be made more effective by considering the scientific program of the Government as a whole, and by modifying procedures with respect to personnel and budgeting.

SECTION 2
SUMMARY OF MEMORANDA ON THE RESEARCH OF THE FEDERAL GOVERNMENT IN THE SOCIAL SCIENCES

Contents

SECTION 2. SUMMARY OF MEMORANDA ON THE RESEARCH OF THE FEDERAL GOVERNMENT IN THE SOCIAL SCIENCES

By Charles H. Judd

Introduction

The materials for this report were secured from a number of the bureaus in the executive departments of the Federal Government and from several of the independent agencies of the Government. In each case some representative designated by a Federal department, bureau, or agency prepared a statement with regard to the types of research in which the particular bureau or agency is engaged, the problems encountered in conducting research, and the lines along which conditions for research may in the judgment of the writer of the statement be improved. In most cases some member of the staff of this inquiry had interviews with the representatives of the bureaus or agencies supplying statements and in this way obtained information and suggestions supplementing the written statements.

In addition to the materials collected from governmental agencies which will be summarized in this report, there were prepared as a basis for a more complete treatment of social-science research in the Government three special reports dealing with the following subjects: The Legislative Branch of Government and Research; the Bureau of the Census; the Office of Education and Research. The last mentioned of these reports was prepared for the joint use of the Advisory Committee on Education and the Science Committee of the National Resources Committee. These three special reports were prepared by members of the staff of this inquiry. They treat of research activities and of problems relating to research more fully than do the statements secured directly from governmental agencies. They may be regarded as intensive studies of particular situations. Reference will be made in the course of this report to some of the findings of these intensive studies, but no effort will be made here to cover the ground which those reports cover. For the purposes of the final report of the Science Committee the present summary of statements from governmental agencies is to be recognized as only one of four documents dealing with social-science research.

The extent to which there has been increased emphasis on the social sciences in the Federal Government in recent years is shown by table I, which was supplied by the Civil Service Commission.

TABLE I.—*Comparative distribution of permanent full-time, temporary, part-time, vacant, and occupied positions in the departmental service in the District of Columbia, subject to the Classification Act of 1923, and allocated to the professional and scientific service May 15, 1931, and Dec. 1, 1937* [1]

Group	May 15, 1931		Dec. 1, 1937	
	Number	Percent	Number	Percent
Economics, statistics, and political and social science	683	8.75	2,156	17.28
Education	110	1.41	165	1.32
Anthropology and museum history	26	.33	39	.31
Agricultural and biological science	622	7.96	871	6.98
Physical science	1,175	15.05	1,162	9.31
Medical science	250	3.20	311	2.49
Dental science	8	.10	8	.06
Veterinary science	45	.58	51	.41
Engineering and drafting	2,230	28.56	3,113	24.95
Law	1,515	19.40	3,149	25.24
Patent examining	772	9.89	791	6.34
Art	7	.09	17	.14
Library science	320	4.10	581	4.66
Personnel research and examining	45	.58	63	.51
All groups	7,808	100.00	12,477	100.00

[1] This table represents a count of the positions under the Classification Act of 1923, recorded in the files of the Personnel Classification Division, U. S. Civil Service Commission. It does not include positions in agencies not under the Classification Act, nor positions in the field service.

The figures reported in table I do not include social scientists who are in the employ of the Government but are not subject to the Civil Service Classification Act of 1923. Many emergency agencies, notably the large agencies, the Public Works Administration and the Works Progress Administration, have social scientists in their employed personnel who are not included in table I.

The materials collected from the Federal agencies will not be reviewed in this report with a view to presenting anything like an exhaustive list of the particular research projects on which work is being done. Certain typical research undertakings will be cited by title or will be described very briefly, and the problems on which Federal agencies make comments will be reported for the purpose of showing the scope and character of social-science research in the Federal Government and for the purpose of drawing attention to the problems which such research encounters.

A study of all the statements received from Federal agencies leads to the following generalizations.

Scope of Statistical Data

The fundamental statistical data on which the social sciences depend are in general, national in scope. The

collection of data national in scope is increasingly recognized as a function of the Federal Government.—There are, it is true, agencies outside the Federal Government which collect and analyze data national in scope. The American Federation of Labor and the National Industrial Conference Board, to use only two examples, have data on employment and unemployment. The latter has data on national income. Other like examples can be cited, but it is at once evident that the collection of all kinds of census data is so comprehensive an undertaking that only the central Government commands the resources and the authority adequate to the performance of the task. When the census was taken in the early years of the national history of the United States, its purpose was solely to supply the facts necessary for the adjustment of representation in the lower House of the Congress. Gradually the function of collecting data has expanded until today some phase of this activity is an important part of the work of such agencies as the Department of Agriculture, the Department of Labor, the Social Security Board, the Bureau of Internal Revenue, the Office of Education, and the Bureau of Foreign and Domestic Commerce.

It has frequently been assumed that a great deal of duplication existed in the work of the various census-taking agencies and that consultation among the various agencies would reduce this duplication. It is true that some cases of duplication have been found and dealt with. In the main, however, waste due to duplications is insignificant. The advantages which result from cross checking and the necessity in a rapidly moving civilization of securing census figures more frequently than once in 10 years fully justify the collection of statistics by more than one agency.

Examples of the importance of securing data at short intervals are to be found in the information which the Bureau of Labor Statistics collects on such topics as "trends of employment and pay rolls," "hourly earnings, average per-capita weekly earnings, and average hours of work," "labor turn-over," and "building permits"; the estimates made of the national income by the Bureau of Foreign and Domestic Commerce; the various educational statistics collected by the Office of Education; and the statistical materials gathered by the Bureau of Mines.

In many of the cases where information is collected at short intervals the sampling method is employed. The accuracy of the particular sample canvassed is best determined by checking from time to time the sample figures with either over-all census figures or other sampling data collected in related fields.

There is one general problem which arises in connection with census taking which is repeatedly brought up in the statements supplied by Federal agencies. The form in which this problem is commonly presented is a plea for expansion of the facilities for analysis and interpretation of census data. One of the leading statisticians in the employ of the Government put the problem in these terms: "Our Bureau is not interested in mere figures; it is interested in people. I was appointed because of my insistence on interpretation of all statistical data. If we were not to analyze and interpret the statistics which we gather the chiefs of my staff would not be here. Most of them are economists."

On the other hand, it is the expressed belief of certain leading social scientists outside the Government that the chief function of Federal agencies is to collect statistical data. These agencies, it is contended, should perform only a very limited analysis of the data collected, and should leave the interpretation of the data to individuals who are wholly detached from policy-making authorities. The reason for the position thus taken is that association with policy-making authority is believed to bias analysis and interpretation.

It is generally admitted even by those who object to extended analyses and interpretations that the refinement of the data collected requires a certain degree of analysis. The difficulty of drawing a sharp line is evident. There can be very little doubt that, whatever the academic distinctions urged on one side or the other of this discussion, the Federal agencies should go as far in analysis and interpretation as their energy and resources permit. An examination of the publications of the Bureau of Labor Statistics and the Bureau of Agricultural Economics leaves no doubt on this issue.

Authority to Secure Information

The Federal Government has authority, and on occasion exercises its authority, to collect information which is inaccessible to nongovernmental agencies.—Striking illustrations of the exercise of authority in the collection of information are found in the researches of the Federal Trade Commission, the Interstate Commerce Commission, and the Bureau of the Census. Each of these agencies is authorized by law to demand information. It is stated by administrators and investigators that in most cases there is no occasion to exercise authority. For example, the industrial and commercial corporations with which the Federal Trade Commission has dealings have in general been willing to open their records to inspection without hesitation. Whether this willingness is due to interest in the outcomes of investigation or to knowledge that authority exists is perhaps an impossible question to answer. Some governmental agencies report that where they have depended on cooperation rather than compulsion

they secure more complete returns and more valuable suggestions which aid them in understanding the returns than they secure when compulsion is applied. Governmental agencies have a certain prestige which makes it possible for them to secure information even when they are not specifically granted authority by law to demand access to records.

Whatever the possibility of securing data through cooperation, the fact remains that the Congress has found it desirable to provide in a number of recent enactments creating Federal agencies that these agencies shall have power to summon witnesses and examine records. Provisions of this kind appear in the legislation creating the Federal Reserve Board, the Tariff Commission, the Securities and Exchange Commission, the Communications Commission, and the agencies mentioned in the preceding paragraph.

It is evident that authoritative information on which conclusions with regard to industrial and commercial operations can be based is of the first importance to the social sciences. The natural scientist can usually secure his basic data by direct personal observation of the materials about which he seeks information. The social scientist cannot depend on personal observation. He uses data which are derived from a broader survey of social conditions than he can himself make. Research in the social sciences is therefore always a cooperative enterprise. In many cases the contributions which government alone can make are indispensable. These contributions must be as complete and valid as they can be made, not merely because information is needed by government itself but also because basic data are essential to the development of the social sciences.

Governmental Contact With Social Sciences

Government is in close contact with all the major problems with which the social sciences deal.—One statement which is repeatedly made with regard to research in the Federal Government is that it is directed to the solution of urgent and immediate problems. Negatively stated this comment often takes some such form as the following: Governmental research agencies do not undertake on any large scale fundamental, or pure, research.

It is undoubtedly true that there are many urgent problems of government which occupy the attention of governmental scientists. The anthropologists of the Office of Indian Affairs are constantly called upon to determine who is an Indian. The successive enactments of the Congress give discordant definitions of an Indian, and the financial problems which arise in distributing the wealth belonging to certain tribes involve expert inquiry and consume much time and energy. The appearance of a disease engages the immediate attention of the Public Health Service. The Department of Justice is constantly dealing with emergencies. The Department of State must render prompt decisions on the interpretation of treaties. The Farm Credit Administration, the Reconstruction Finance Corporation, and the Securities and Exchange Commission are in close contact with a great many people and with conditions on which heretofore Government has had little or no information. Whether the inquiries which are involved in meeting the immediate demands of government are to be classified as research or not is a question on which the curious may exercise their dialectic. It is quite certain that, if the action of the Government is to be wise and just, there must be at hand agencies which will give legislators and administrative officials reliable information. The process of securing this information calls for a high grade of trained ability to find materials which are buried in the archives or are obscure because human nature is complex and inaccessible to direct observation. For the purposes of the present discussion it is convenient to use the term "research" rather than some longer and clumsier phrase, such as "scientific inquiry" or "intelligent investigation."

While it is true that there are a great many urgent problems which research workers in the Government have to answer and while some agencies are in fact overwhelmed with such problems, it is true that these very problems ultimately compel the prosecution of fundamental, or pure, research. For example, the Department of State, which is not thought of by the ordinary citizen as a research department, is concerned on a very large scale with fact finding and fact recording, which are certainly as profound as much of the material which appears in the books commonly accepted as examples of political science at its highest level. This Department has divisions which collect information about every section of the world and are prepared to give information to the executive officers of the Government and to legislative committees on conditions in all countries.

The Bureau of Agricultural Economics had for years before the depression been collecting and analyzing statistics on the prices of farm products. When legislation was pending with regard to these prices and later when it became necessary to administer laws affecting prices, it was possible to draw on a large body of factual material in the possession of the Bureau.

The emergency-relief agencies have been obliged in order to direct their own activities to secure data regarding the people of the United States which have changed the thinking of the people of this country with regard to social conditions and with regard to

the responsibility of the Nation for the welfare of its individual citizens.

The Department of Labor in both the Children's Bureau and the Bureau of Labor Statistics has continuous records covering a number of years which must be thought of as fundamental materials in the social sciences. These agencies have analyzed the facts which they have collected far enough so that they can properly be described as scientific agencies, not merely servants of administration.

Commissions and special investigating committees of Congress and of State legislatures, and State constitutional conventions have in a number of conspicuous cases gathered and made available materials which are of a fundamental type. A few conspicuous examples of Congressional commissions which through their inquiries and publications have added largely to the social sciences are the following:

The Industrial Commission created by act of June 18, 1898.

The Immigration Commission created by act of February 20, 1907.

The National Monetary Commission created by act of May 30, 1908.

The Industrial Relations Commission created by act of August 23, 1912.

The Joint Commission on Agricultural Inquiry created by concurrent resolution of June 7, 1921.

Each of these commissions has to its credit a long list of publications which are the results of elaborate inquiries carried on by technical experts who brought to the service of the Government scientific equipment of a superior order and prepared for the Government and for social science reports which can properly be classified as contributions to pure research.

Members of governmental research agencies who have been consulted by members of the staff of this inquiry are convinced that fundamental research in the social sciences is greatly stimulated by contact with administrative agencies. They point out that there is a certain sterility in much of the academic treatment of social problems in courses given in universities because of the lack of contact on the part of students and members of the faculty with the problems which research must solve. It is frequently stated by those who are responsible for the appointment of university graduates in the bureaus of the Government that these graduates are lacking in realistic understanding of the problems of social organization.

Facilities for Collecting Social Science Data

The Federal Government has facilities, many of which are not now fully utilized, for collecting materials useful to the social sciences.—The recent Census of Partial Employment, Unemployment, and Occupations utilized the mail carriers of the post offices of the United States to gather information from every family of the Nation. The Department of Agriculture through the county agents and through the land-grant colleges is in direct contact with the rural population of the United States more completely than any other agency, private or public. The Foreign Service of the Government is now used and could be used even more largely in securing various types of information. The Works Progress Administration is in intimate contact throughout the States with industrial and social conditions. The Social Security Board has in its files information about the employed population which is now of unlimited importance and will in the future be even more complete and significant. The Tennessee Valley Authority knows intimately the conditions in the areas which it covers. The Securities and Exchange Commission utilizes the research results of such agencies as the National Bureau for Economic Research and of such private concerns as investment banks. The agents of this Commission frequently have conferences with brokers and others who have knowledge of financial transactions and conditions.

These and other examples which might be cited make it clear that the Federal Government has unparalleled possibilities of collecting information through individuals who are now qualified or with very little training could readily be prepared to bring to the services of social science the information necessary for fundamental studies that are much needed and are quite beyond the reach of any other agency. There is need for a better organization of these potential sources of information. It is altogether conceivable that the decennial census could be taken more efficiently and far more economically than at present if certain of the persons in the field whose services the Federal Government has a right to command were employed in collecting data. The appointment every 10 years of a large number of census enumerators who serve for a short time in a service for which many of them have very limited preparation has opened the way, as history shows with unmistakable clearness, for interference by spoils politics with scientific work to a degree which has rendered the study of population figures difficult and in some important respects invalid. It should be possible, however, to correct most of the defects which the employment of persons of inadequate training introduces into the factual basis for the study of social problems without involving the Government in any additional expense. What is needed is organization.

Status of Governmental Records

The Federal Government has vast collections of records which are in danger of neglect because of lack

of proper follow-up analysis.—A striking illustration of the truth of this statement is the fact that the Works Progress Administration in its effort to furnish employment to white-collar unemployed individuals contributed through regular Federal agencies to the collection of a great deal of information about the expenditures of families in different parts of the country and in a great variety of typical situations. It is estimated that $5,000,000 was expended in the collection of these data. The question now arises: How are these data to be used? The analysis and the interpretation of the items of information collected were not possible through the field agencies which collected them. Tabulation and expert study had to be provided in order to take full advantage of the investment.

There are in the files of the Government valuable documents which were collected during the life of the National Recovery Administration and were subjected to critical study after that Administration ceased to function. A large sum of money was invested in this critical study, and the information which it gathered is of such value that failure of publication must be regarded as a serious waste.

A more hopeful positive example is to be found in the fact that Congress, becoming aware of the great importance of governmental records, established the National Archives Council and has provided a building and a staff to classify and make available the records of the Government. The housing and cataloging of these materials are steps in the direction of scientific use of data which will be recognized in the future by the whole Nation as highly intelligent. At the present time the significance of what has been done is understood by a comparatively small group of specialists but is not generally appreciated by the people of the country.

Another positive example of the collection of materials for the encouragement and promotion of research is to be found in the Library of Congress. Illustrations may be pointed out to show how the Library of Congress supplies the means for scientific study in special fields. The Library has the largest collection of Chinese literary materials outside Peiping. It has a collection of music scores which attracts scholars from all parts of the world. These and other special collections are being continually increased in value. As an aid to scholarly work, the Library has an inclusive union catalog showing where books can be found in other libraries as well as in its own collection, which is now one of the most extensive and valuable in the world. The example of the Library of Congress has led to the collection and housing in Washington of a number of public and private collections, with the result that Washington is today a center for books second to none.

Congress recognizes the Library as an important adjunct to the legislative branch of the Government because it constantly uses the legislative reference service and its other services for its own purposes. The Library furnishes the documentary materials which are essential as the basis for legislative discussions at the same time that it makes possible through its resources scholarly work in all fields.

If research workers in the social sciences were informed about the rich resources of available raw material in the possession of the Federal agencies, there would be established at once a more intimate relation between scientific workers within and without the Government. There are possibilities of new run-offs from the cards now on file in some of the governmental agencies which would willingly be paid for by research workers and even by business concerns if it were known that such run-offs could be made. It has been suggested that the cards in the files of the Bureau of the Census would be far more extensively used than they now are if means could be devised for making them accessible.

The analogy is not misleading if one states that the Government now has buried in its files as much in the way of intellectual resources as there are natural mineral resources buried beneath the soil of the North American continent. The isolation of social science as cultivated in separate university centers from the actual materials which might be made available results in incalculable waste. To spend millions of dollars in collecting information and then to let it remain inaccessible is altogether unintelligent.

The suggestion has been made from time to time in one form or another that a center be established under governmental auspices where scholars may work in Washington in close contact with the materials which are in the archives of the Government. The Library of Congress has taken steps in the direction of making provisions of this kind. In the annex to the Library building a series of rooms has been set aside supplementing largely the limited number of rooms now available for scholars in the main building.

Cooperation Between Agencies

The great number of research agencies within the Federal Government is an advantage in that it provides each agency with large possibilities of securing cooperation and a disadvantage in that communication between a given agency and others with which it might cooperate becomes cumbersome.—It is quite impossible to give any exact account of the cooperation in research which results from informal personal conferences between members of the bureaus and independent agencies of the Government. Frequent exchanges of infor-

mation are effected through such conferences, and the ground is often prepared for later, more formal cooperation.

It has been seriously suggested that the Government might very advantageously stimulate interagency associations by helping to organize, in addition to the cafeterias now provided in the various buildings, a central club for employees of the Government where members of different branches of the Government might come in contact with one another.

Examples of Effective Cooperation

There are numerous examples of effective cooperation. An extensive study of consumer practices was conducted by the Works Progress Administration in cooperation with the Bureau of Labor Statistics, the Bureau of Home Economics, the Central Statistical Board and the National Resources Committee.

The following paragraph quoted from the statement made by the National Park Service continues the exemplification of the relation between the administrative and scientific activities of the Government which is discussed in preceding paragraphs and at the same time illustrates the advantages which are derived from cooperation between Federal agents.

Other Government agencies which help solve problems for the National Park Service:

> Public Health Service details two men to help with sanitary problems.
>
> Bureau of Plant Industry details one man to help with plant disease problems.
>
> Bureau of Entomology studies and makes recommendations on all forest insect matters.
>
> Bureau of Public Roads surveys and builds all major road projects.
>
> Bureau of Fisheries operates fish hatcheries and furnishes fish for planting.
>
> Geological Survey in the past studied and mapped many park areas. Water Resources and Topographic Branches have been most helpful.
>
> Forest Service on occasion has loaned grazing experts and timber-survey experts for special projects.
>
> National Museum has detailed experts to help solve individual archeological and museum problems.
>
> Bureau of Chemistry and Soils.
>
> Weather Bureau.

The United States Tariff Commission makes the following statement:

> Under section 334 of the tariff act, the Commission cooperates with other Government departments, in both the giving and receiving of information. Such cooperation has been with the Departments of State, Agriculture, Commerce, and Labor, the Treasury, etc. As explained above, the Tariff Commission cooperates closely with these departments in connection with the trade-agreements program (through the Executive Committee on Commercial Policy, the Trade Agreements Committee, and the numerous country committees—all of which are interdepartmental) and informally on numerous occasions in connection with its daily work.

Examples of Lack of Coordination

On the other hand there are examples which show that cooperation is not complete. The Bureau of Foreign and Domestic Commerce and the Tariff Commission, both dealing with importation and exportation of commodities, employ different methods of inquiry and appear to have different purposes in mind for their researches. The traditions of the Bureau of Foreign and Domestic Commerce have been largely promotional, and it is only within the last 5 years that the need for and value of basic economic research in both foreign and domestic commerce has been recognized. Of similarly recent origin is the cooperation at present in effect with respect to trade agreement work and foreign trade statistics.

A type of incoordination between Federal agencies which has been commented on of late is that which appears when the activity of some emergency agency seems to invade the established area of operation of one of the regular bureaus of the Government.

The Office of Education and many of the educators of the country were of the opinion that the efforts made by the Government to discover the needs of young people should have been channeled through the Office of Education. The Office of Education was in process of conducting a survey of young people out of school when the relief agencies began to make inquiries in this field for the purpose of adjusting the administrative activities of relief.

It can be argued that relief measures in an emergency should be assigned to a special agency in order to leave the established bureaus of the Government undistracted from their regular duties. The established bureaus, on the other hand, are unduly sensitive with respect to their resources and prestige, and sometimes resent the assignment of funds for research and administration to a temporary agency.

Methods of Fostering Cooperation

To one who observes a disagreement with respect to policy such as that described it seems evident that in many cases incoordination is a result of size and lack of proper facilities for communication. The solution of conflicts and the establishment of cooperative relations involve, however, in some cases personal relations which it is extraordinarily difficult to adjust. The method of meeting difficulties of this kind is not easy to prescribe. It is to be hoped that some day research agencies will be able to assume an attitude sufficiently scientific to make cooperation rather than competition universal. In the meantime, the general principle pointed out by the President's Committee on Administrative Management seems to be worth keeping in

mind for research agencies as well as for other divisions of the Government.

Government is a going concern, not a static institution. Each activity therefore has its period of initiation and development, its period of normal operation, and in some cases also its period of decline and liquidation. While this does not change the principles of organization, it does alter profoundly their application in individual cases.

New activities should be organized rather completely on the basis of purpose so that that purpose may be the central driving force of the organization. They should be freed from intereference by departments organized on the basis of process. They should also be given virtually complete freedom, or extensive autonomy, within existing departments. In the nature of the case, new purposes cannot be carried out without broad freedom to experiment. To tie a totally new activity either to the regular bureau pattern or to the regular controls may defeat its purpose entirely.

When, however, an activity is organized, its major policies established, its purposes accepted and understood, and its work in the main placed upon a routine basis, then the time has come to bring the activity into the normal structure of organization and under the normal controls. To do so will not endanger the objectives of the organization as such, nor hinder its worker, but will rather increase its efficiency, improve not only its own work but also the whole work of government through better coordination, and render it more truly subject to democratic control.

Particular attention needs to be given to the period of decline and liquidation because departments and bureaus like to keep themselves alive and because they and the pressure groups back of them are incapable of estimating their value. There is among governmental agencies great need for a coroner to pronounce them dead, and for an undertaker to dispose of the remains. Both of these processes are advanced when agencies approaching discontinuance are deprived of their independent status by being brought into large departments and are made subject to the regular controls through the Budget, central accounting, and personnel administration.

In addition to the steps recommended in the foregoing quotation it will undoubtedly be necessary to establish communication between the permanent agencies so that they also will be brought into cooperation. The organization of the Central Statistical Board was a long step in the direction of promoting cooperation. There still remains much to be done in a positive way to initiate cooperative activities rather than merely adjust the undertakings of the various bureaus and independent agencies to one another.

Smithsonian Institution.—A unique device for securing coordination of certain lines of research within the Government and also between the Government and outside agencies is to be seen in the Smithsonian Institution. This Institution has a small endowment and receives funds from Congress. It has a Board of Trustees which manages its affairs and gives it a type of freedom to inaugurate and conduct research in ways that are impossible in most governmental agencies. The latitude in research and in establishment of cooperative relations enjoyed by the Smithsonian Institution is denied to many of the agencies wholly within the Government. There is another reason why research, if it is to be productive in maximum degree, must frequently have the possibility of readjusting itself while in progress. Scientific research often turns up productive leads which could not be anticipated at the time that the particular research project was first planned.

The freedom of the Smithsonian Institution to cultivate all kinds of cooperative relations is indicated by one paragraph from the statement submitted by that Institution. This paragraph is one of several of like kind included in the statement.

In connection with its work the Department of Anthropology of this Institution has been greatly assisted through extensive cooperation with various organizations and has also aided other organizations as indicated by the following few examples:

(1) With the National Geographic Society on the excavation and restoration of Pueblo Bonito in New Mexico.

(2) With the Rockefeller Foundation and the Peking Medical College on the study of the origin of American aborigines.

(3) With the Soil Conservation Service on phases of early Indian agriculture.

(4) With the National Park Service in the historical excavation of Jamestown Island, Va.

(5) With State organizations and the Federal Civil Works Administration in extensive archeological excavations in Florida, Georgia, Tennessee, California, and the Carolinas.

(6) With the Bureau of Indian Affairs on old Indian weaving techniques.

(7) Cooperation with individuals, organizations, and other Government departments on the identification of specimens through their comparison with material now in the national collections. Cooperation of this type is a continuing process reaching to all quarters of the globe. Practically every university and museum in this country has been extended cooperation of this kind.

(8) Close cooperation with numerous Government agencies such as the War Department, National Park Service, Department of Agriculture,[1] the Geological Survey,[2] Bureau of Standards, Bureau of Indian Affairs, Patent Office, and others.

Recruitment and Training of Personnel

The Federal Government has difficulty in securing highly competent research workers with whom to staff its scientific agencies. It seems quite certain in view of the extensive development of research activities within the Government that attention will have to be given to the special training of research workers, especially in the social sciences.—The Federal Government has depended in the past on the universities to provide it with properly prepared personnel. The universities have little difficulty in preparing research workers for Government laboratories in the physical and bio-

[1] This Department maintains many research workers in entomology and botany who work continually with the collections of the National Museum.

[2] The Survey has many research workers occupied with the collections of the National Museum.

logical sciences and for engineering positions. The natural sciences deal with materials which are the same in Washington and in regions remote from the seat of Government. With respect to some of the fields of applied natural science the situation is different. For this reason the Department of Agriculture has developed a graduate school where its employees are given special educational preparation for the particular duties which they are to perform. The Departments of War and Navy have so many special problems to solve that they have more than any other agencies of the Federal Government established educational courses and institutions of various grades for the preparation of personnel.

Research in the social sciences can be prepared for in some of the courses provided in the universities, but far more than in the natural or applied sciences the novice in social-science research must have experience in close contact with the problems of social organization. The social-science branches of the Federal Government are conscious of the necessity of devoting energy to the preparation of young members of the staff. A system of internship is eagerly desired by many of the agencies. The recent adoption by the Civil Service Commission of the plan of admitting to governmental agencies young people in the rank of junior civil-service appointees has been welcomed in many of the social-science divisions of the Government. The juniors are assigned to regular members of the staff under whom they work and by whom they are trained. One difficulty with the present arrangement, as pointed out by the Bureau of Labor Statistics and other agencies which have undertaken training of juniors, is that, when a well-prepared junior presents himself for final classification by the Civil Service Commission, he finds that the experience which he has gained in the service of the Government is not credited as would be study in university classes. The junior candidate is believed by his superiors to have in many cases qualifications far better than those which could be gained anywhere outside the Government service, but this judgment is ineffective in the face of civil-service regulations as they now stand.

Furthermore, there is a universal recognition in the higher branches of governmental services that the exemptions granted to veterans tend to break down completely the merit system which is essential to the procurement of competent research workers. Immediately after the World War, when there could readily be drawn from the ranks of veterans individuals of high or average ability, exemptions were not as calamitous as they are now and will be increasingly later. The longer the period since the war, the poorer the selection of veterans who offer themselves for service in the Government becomes.

Other difficulties frequently mentioned in the statements made by governmental agencies seeking to appoint high-grade research men are the infrequency of civil service examinations, the delays in ranking candidates, and the long-continued standing of registers after they are once established. It is recommended in the statements supplied by governmental agencies that all registers be renewed at frequent intervals, that the requirements be made more severe so that only high-grade men shall secure positions on the registers, and that credit be given for training which juniors have received in governmental offices.

Coordination of Educational Institutions

The Federal Government is handicapped in securing suitable personnel because of lack of knowledge on the part of many academic teachers of the opportunities offered in Government service to research workers of ability.—It is a well-known fact that there is little enthusiasm in many American universities and colleges for Government service. It is regarded as true by many teachers of science that Government service is less free than are university and school positions. In the general attitude toward Government, European institutions of education are altogether different from American institutions. The ambition of many of the best students in English and continental schools and universities is to secure positions in Government. The civil service examinations in England and some of the leading continental countries are of the severest type.

The comparative lack of encouragement of students in American institutions to seek places in the Government is due in part to a failure on the part of Government and academic institutions to maintain intimate contacts. Academic men frequently do not know the amount or character of highly interesting scholarly study and research going on in the Government. Governmental agencies do not utilize as fully as they might the intellectual resources of the Nation. There is a lack of intercommunication which is deplorable and should be corrected, especially in the fields of the social sciences, where, as pointed out several times in this report, the data for scientific generalizations must be secured in very large measure by the Government.

One area in which intimate relations between the Government and universities have been established far more than elsewhere is in agricultural economics and rural sociology. The long contact between the land-grant colleges and the Department of Agriculture has facilitated an exchange of men and services which has been mutually advantageous and has promoted the interests of rural and national life in a great many ways. There is nothing equally effective in the sphere of business.

Business schools and business research agencies have been established and conducted by private enterprise in this country primarily for the purpose of training managers in practical affairs and of protecting and promoting the interests of business enterprises, especially large businesses. The research which would keep the whole Nation fully informed about business has not been developed to anything like the level reached in agriculture. The members of the staff of this inquiry have sought diligently to discover the reasons for the comparative inadequacy of research in business in the program of the Federal Government. They have been told that the spirit of competition is much stronger in business than in agriculture, that the agencies in Government which might undertake business investigations are much less generously supported by Congressional appropriations than are the agencies which carry on research in agriculture, and that the schools of business are far less mature and far less helpful in promoting researches in business than are the institutions which are responsible for research in agriculture.

It seems clear that research in business requires encouragement and promotion. The small business man can no more support research than can the farmer. It is true that in recent years a number of trade associations have been organized through which business concerns which are too small to conduct researches independently have pooled their interests and secured the advantages of cooperative action in the development of applied science. It seems clear, however, that more will have to be done in the future than has been done up to the present time. The Government of England has subsidized the activities of the trade associations organized in that country.

There is widespread agreement among students of business that elaborate investigations are needed in order that more may be known than is now known about business cycles and the conditions that lead to depressions. There is here an area of research quite as important as the areas which are recognized by everyone as belonging to Government with respect to hurricanes and flood control.

The closer coordination of the educational institutions of the country, including the schools of business, with governmental research, is a matter deserving of the most careful consideration. Advisory committees are organized by many of the governmental agencies. These bring to the seat of governmental activities, usually only for short periods, some of the members of university faculties and leaders in lines of activity other than education. The contacts thus maintained have the double advantage of stimulating activities in the institutions in different parts of the country and of bringing to the service of Government valuable counsel and sympathy. Advisory committees do not seem to suffice. The people of the United States are convinced of the importance and practical usefulness of research in agriculture. This fact is to be explained in part by the existence in each commonwealth of an institution which not only contributes to knowledge about agriculture but keeps the legislature informed about problems of the State and otherwise serves the people of the State. There is at the present time no such popular confidence in research in business.

Appropriations for publication made to many agencies of the Federal Government are inadequate. Not only so, but the skepticism with regard to the propriety of issuing published material, especially published material that is attractive in form, manifests itself in unfavorable comments made in congressional hearings and in congressional debates.

There are examples which can be cited in support of the statements made. The reports which accompany this as partial reports on social science research show beyond the possibility of dispute that the Bureau of the Census and the Office of Education are now in possession of much valuable manuscript material which would be of great use if it could be published. The results of the investigations which were made by a large staff that studied the experience accumulated during the operations of the National Recovery Administration now lie in the files of the Federal Government unavailable alike to legislators and business men because there is no money to publish what cost great sums to accumulate. When the officers of the emergency relief agencies brought out an informing and attractive pamphlet, vigorous criticism of the publication was voiced.

Quotations from several of the statements submitted by Federal research agencies are as follows:

> Recently, two very important reports of this Commission were made public, but they have not yet been published.
>
> A greater embarrassment by far has been the inadequacy of opportunity to publish manuscripts. There is always a series of worthwhile papers awaiting publication and sometimes 5 or 6 years go by before they can be issued.
>
> Practically no funds for the publication of research findings.

Publication Facilities

The facilities for communication of scientific findings secured by governmental research to the people of the Nation are limited.—It is sometimes argued by those who do not regard it as wise to appropriate public funds for publications, that many of the manuscripts prepared by the scientific agencies are obscure in language. That there is ground for this position must be admitted. Scientific men are in the habit of writing for their colleagues rather than for the gen-

eral public. Furthermore, the refinements of scientific reports often depend on the use of mathematical formulas and technical terminology which are not readily understood by the non-technical reader. The needs of the Nation will not be met nor will the ordinary citizens be satisfied until far more readable information on the social sciences than is now published by the Government is made available. That there is great eagerness for information on all social problems is evidenced by the consumption of reading material in newspapers and magazines and in serious books which far surpasses what was common in earlier periods. The research agencies of the Nation ought to be aware of this demand for popular presentation of social science materials. The social scientists of the country ought to realize that any exclusiveness or aloofness on the part of social scientists is sure to operate to the disadvantage of social science itself.

Need for Widespread Dissemination of Information on Social Problems

Research has always been stimulated by the appearance of conditions that need to be changed. The agricultural investigations which have been referred to several times in this report as extensive and well-supported resulted directly from recognition of the distress in the agricultural areas of the country. There is some indication that investigations in the social fields will be greatly stimulated by the present-day problems of industry, business, and family life. If these indications are accepted at their face value, it follows as an inescapable corollary that this is a period when the social scientists should devote much effort to both the extension of their fields and the rendering of their findings available for general consumption.

The obligation of the Federal Government in the premises is undoubtedly to provide for widespread dissemination of information on all social problems. The distribution of the population, the industrial and population conditions of different parts of the country, and the biological facts about human life are as important for the people of this country as the facts with regard to livestock and plant life.

The Works Progress Administration has organized in a number of typical counties of the United States investigations of all the social conditions and possibilities in these counties. A coordinator familiar with the problems of a given area has been appointed. Usually this coordinator has been a member of the faculty of one of the educational institutions in the area. He has been supplied with a plan of operation carefully prepared in the Washington office of the studies. He has also had the assistance of white-collar workers on relief.

The effectiveness of this organization is seen in the discoveries which have been made of unused industrial and recreational facilities in the areas. Above and beyond anything that has issued immediately from the studies, however, is the awakening of a consciousness in the people of the communities in which the studies have been made of the possibility of scientific attack on their social problems. Materials have been accumulated which will be of value during a long period to come.

SECTION 3
FEDERAL EXPENDITURES FOR RESEARCH, 1937 AND 1938

Contents

SECTION 3. FEDERAL EXPENDITURES FOR RESEARCH, 1937 AND 1938

By Edward R. Gray[1]

INTRODUCTION

Purpose of a Report on Expenditures for Research

Research is an integral part of the activities of any agency that is trying to do efficient work. Consciousness that changes occur in the conditions affecting its work should be sufficient incentive to any organization to keep informed of these changes and to devise improved procedures for dealing with them. Especially in a governmental organization, whether a single bureau or the Federal Government as a whole, economy and efficiency are made possible by collection and analysis of information needed to plan work more effectively, and by the habitual investigation of possible improved techniques or of promising new devices. On the other hand, failure to undertake such investigation may be justly criticized as a dereliction of duty and signs of probable extravagance, inefficiency, and increasing obsolescence. Hence, a survey of research activities has particular pertinence in giving prima facie evidence of the existence of vitality and progress.

There are three possible devices for surveying Federal agencies to discover the extent and distribution of research activities. One device is an annotated inventory of the nature and purposes of research projects in process or recently completed within each agency. While such an inventory would yield more information about research activities than any other kind of summary, the services of specialists in several different fields would be required to comprehend and describe effectively the activities enumerated, and the results could not be conveniently summarized or used for inter-agency comparisons. A second device is a summary of research positions or research personnel among the different agencies or their constituent activities. A limitation to the usefulness of this approach is its implication that "research" is coexistent with the activities of persons having certain types of specialized training or recognized professional ability. A third device, which is the basis of this report, is a tabulation of research expenditures. By this method, comparisons between the agencies surveyed are possible, in fact, too easy, as there is danger of quick conclusions that are not valid when the diverse concepts and methods used in obtaining only roughly comparable data are known. For a quick survey, however, this method is fairly satisfactory, especially if considerable latitude is allowed for the inevitable differences in the concept of "research" held by the several budget officers in making their estimates.

Difficulties in Estimating and Analyzing Federal Expenditures for Research

Data on research expenditures, especially when interagency comparisons are involved, should be used with some understanding of the qualifications implicit in such data. The more important factors affecting the comparability of research expenditures reported by the different Federal agencies may be summarized under the following headings:

Research May Be for Internal or for External Service

Some Federal agencies are concerned primarily with service to particular economic or social groups such as farmers, exporters, home owners, educators, consumers of power, investors in securities, etc. Such agencies usually have comparatively large research programs in order to keep abreast of changes affecting the respective groups of citizens benefited, and to work out methods of meeting more effectively new demands for service. On the other hand, some Federal agencies are concerned largely with administration of a routine function or with service to other parts of the Government. For example, most of the State, War, Navy, Justice, and Post Office Departments, and such organizations as the Public Debt Service in the Treasury Department, need research largely to keep their own internal administrations efficient, without, of course, neglecting frequent appraisals of external factors that might change the scope or nature of their work. This latter type of agency would presumably have a smaller percentage of research expenditures than would be found where service to particular groups of citizens is the primary function. Many important bureaus and independent agencies, however, cannot be classified conveniently in either group. As they serve both some particular

[1] In addition to aid and advice received from many budget officers and research directors in the different Government agencies, the comprehensive assistance of Virginia Mendenhall Gray, the stimulating suggestions of Dr. R. M. Hughes, and the painstaking office aid of Mrs. Helen Shaw, are gratefully acknowledged.

outside group of citizens and also the Federal Government, their research has both major purposes.

Differences in Definition of "Research"

To estimate the cost of research in a Federal agency requires, first, a demarcation of activities that may be designated as "research," and, secondly, an allocation, usually somewhat arbitrary, of expenditures for such activities. One difficulty in making comparisons between agencies is, therefore, the lack of definiteness in the term "research" and differences in its application to the work of the respective organizations. For this study of research expenditures, the following explanation of the definition adopted by the Committee has been used in letters to agencies:

"Research" has been defined to comprise investigations in both the natural and social sciences, and their applications, including the collection, compilation, and analysis of statistical, mapping, and other data that will probably result in new knowledge of wider usefulness than aid in one administrative decision applying to a single case. By this definition, for example, "research" would include the work of a statistical division collecting and compiling operating data on corporations reporting to a Federal regulatory agency, and also a study by the Navy of the resistance of armor plating to high explosives, since knowledge so acquired might be applicable to uses other than the immediate administrative decisions for which the work was initiated.

Organizational lines that are roughly coterminous with research activity have been respected in compiling the expenditures data, so that the entire work of an organization has been considered "research" if nonresearch duties are comparatively few and usually incidental. All expenses connected with research inquiries such as clerical assistance, printing, transportation, etc., and an allocated amount of general administrative overhead within the bureaus and independent agencies have been included.

For purposes of this survey "research" excludes, in addition to the more obvious nonresearch activities, testing, regulation, promotion, informational service, education, legal counsel, accounting, and routine administration. However, such activities are necessarily included so far as research is carried on as an aid to more efficient accomplishment of such purposes, or where some of these non-research operations are carried on as incidental aids to research investigations in the same bureau or independent agency.

No unanimity was found among experienced research directors as to the kinds of work that should be included as "research" in this study. For example, some scientists would exclude the reports of both the Bureau of the Census and the Weather Bureau; while on the other hand a classification by a Government agency about 15 years ago listed these two bureaus as the only Government agencies whose entire work was "research." While preparing data for this study, the chief of a technical office reduced his estimate of research expenditures from $140,000 to $25,000 after a reconsideration of the application of the identical definition to the existing activities of his office.

The principal conflicts of opinion about the definition used in this study have revolved around the inclusion of the following activities as "research":

1. The collection and tabulation of basic data, especially in the social sciences; where, in contrast with the natural sciences, analysis is usually carried on separately from collection and initial preparation of the material.
2. Economic and social studies of all kinds.
3. Mapping and surveying.
4. Aids to research, such as library and archival services.
5. Highly specialized and secret techniques for military purposes.
6. Studies, otherwise clearly "research," that are specifically required by an act of Congress under another name.
7. Studies not specifically enumerated in an act of Congress but necessary to carry on authorized work efficiently.

In an agency where research had been almost eliminated in the previous year by a cut in the appropriation originally requested, there was a noticeable effort to define "research" as narrowly as possible. On the other hand, the attitude of most budget officers toward the research function and its definition was aquiescent and understanding, if not sympathetic. One experienced administrative officer, not himself engaged in research, suggested the following definition of "research," which has not been improved by inclusion of more detail: "Research is the attempt to know the facts in order to do our work and serve the public better."

Part of the difficulty with the adopted definition of "research" is due to attempts to distinguish between what might be designated as the "higher" and "lower" orders of research without admitting the use of those concepts. Research ability of the "higher" order is required to devise and improve the methods for preparing compilations of data in useful form, and to analyze the results obtained from such compilations. A lower order of research ability, and sometimes almost none, is required in the personnel carrying on the routine collection of information and its tabulation and presentation according to general specifications. However, both types of activity are "research" within the definition adopted for use in this report. For the effective collection of data, research of the higher order must necessarily precede and follow the routine task, and in most cases planning and analysis becomes an integral and continuing part of the whole operation.

In connection with the study of research expenditures, it would probably be instructive to obtain separate estimates for these two "orders" of research, especially in the case of economic or sociological statistics, which furnish the bases for most analytical research in the social sciences. However, such a separation has proven impracticable because of the budgetary indivisibility of the two types of research processes. While analysis of compiled data is often

carried on by organizational units separable from the collecting, tabulating, editing, and publishing units, the research involved in planning the survey, altering its scope, improving the techniques used, and editing the questionnaires and preliminary results is usually done on a part-time or spare-time basis by persons primarily concerned with the more routine processes of collection and compilation.

Inseparability of "Research" and "Administration"

"There are * * * a great many activities which, even though partially of an administrative character, nevertheless specifically contribute to research work," wrote one agency in commenting on its estimate of research expenditures. Another agency commented, "We find it difficult * * * to know where (medical) treatment leaves off and study begins." Still another office, generally considered an excellent example of a Governmental organization engaged in analytical research work, states that its "product is action rather than information" and its researches are to determine policies, not to disseminate knowledge.

Research in the Federal Government is usually an auxiliary part of an activity that is authorized and carried on for an immediate objective quite distinct from the increase in the store of human knowledge. Such immediate objectives may be, for example, promotion of the welfare of a category of producers, regulation of certain types of corporations, collection of taxes, preservation of Government records, conservation of recognized natural resources, or printing of Government documents.

The differences in organizational breakdowns as found in the respective agencies also give rise to difficulties. Unless the budget officers in the individual agencies are to be burdened with the time-consuming task of splitting functions and allocating time of personnel, rough approximations must often be accepted, calculated either on the basis of an estimated percentage or by including or excluding from the categories of "research" the entire activities of an organizational sub-unit, such as a section, branch, or division.

For these functional and organizational reasons, it is sometimes unusually difficult for budget officers to draw the line between research and administration, and it is only with warnings of the arbitrary nature of their estimates that definite figures have been sent to the Committee. Nevertheless, such data have been carefully prepared, usually after lengthy discussion of the definition of "research," and the results are believed significant, at least for compilation into totals for the Government as a whole, if not for detailed inter-agency comparisons.

Differences in Terminology and Tradition

Some incomparability in estimates from different agencies is undoubtedly due to discrepancies in terms used for similar types of investigations, and to the scientific tradition of the agency and its directing personnel. For example, the representative of a bureau dominated by an engineering tradition was almost incredulous at the suggestion that the bureau's incidental social surveys should be called "research." Again, there was a marked divergence of opinion in the mapping agencies as to where the line should be drawn between mapping that might be called "research," if any, and mapping that should certainly be excluded. Even the customary terms used within an agency for classifying its inquiries may affect the amount of research expenditures reported, when the words "investigations," "surveys," "tests," etc., are used for some inquiries in contrast with "research" or "experiments" applied to others.

"Window Dressing"

The data on research expenditures are based largely on reports from the respective Governmental agencies to the Bureau of the Budget prepared almost solely to justify requests for appropriations of the amounts desired for the coming year. Hence the data are presented in the form which is supposed by the agencies' budget officers to be most conducive to favorable action by the Bureau of the Budget and congressional appropriation committees. Such "window dressing" may result in either an increase or a decrease in the amount reported for research activities. Where the agency is authorized only to perform certain specified administrative functions, research items are likely to be minimized or concealed under captions denoting these functions, a practice which cannot be criticized because the research activities are planned and carried on for the purpose of efficient performance of these very functions. In some cases, research seems to be purposely hidden through fear of adverse criticism from particular outside groups. On the other hand, in agencies where research is well established and commendation has been received from groups of influential citizens directly benefited by the results of investigations, the research expenditures become a source of pride and, in informational budgetary presentations, may also include amounts for somewhat distantly related expenditures. The contrasting methods of reporting research in these two types of agencies are likely to accentuate the differences in amounts shown for research between internal service and external service agencies, as explained above. In extreme cases, the differences may be pronounced enough to result in "touchiness"

in one case and "pride" in the other concerning the research work undertaken and the expenditures for such purposes.

Transfer of Research Investigations to Specialized Agencies

Some Federal agencies are especially qualified by equipment, personnel, and experience to undertake research for other organizations. Hence they conduct investigations on a reimbursement basis at the request of other Government agencies. The outstanding examples, but by no means the only ones, are the National Bureau of Standards, which carried on some research for more than 14 other agencies in the fiscal year 1937; and the Bureau of the Census, which received working funds from 7 other agencies in addition to reimbursements for work not formally provided for in advance. Transfers of one undertaking may even be multiple, as the following heading in the Budget illustrates: "Working Fund, Commerce, Coast and Geodetic Survey (Public Works Administration, Allotment to Interior, Soil Erosion Prevention, Transfer to Agriculture, Transfer to Commerce, Coast and Geodetic Survey)."

In the data given in the present report, such reimbursable expenditures are usually included under the organization actually doing the work, except in the case of an agency that specifically requested otherwise.

Expenditures Not a Measure of Value of Research

There is, of course, no necessary relationship between the size of an appropriation for any given research project and the usefulness of the results obtained from it. Such a relationship is sometimes assumed by proponents of a specific research undertaking. Aside from the obvious qualifications concerning direction, personnel, time factors, etc., the amount of research per dollar of expenditure varies with the kind of techniques used. For example, economic studies adequately planned, reviewed by outsiders, and replanned through an extended period of time by experienced research people in long-established agencies, are apt to be carried out much more efficiently than studies hurriedly undertaken by new personnel in a recently established governmental unit. When a factor extraneous to research proper comes into the picture, as was the case of finding work quickly for the white-collar unemployed, the discrepancies between the amounts of expenditures and the value of the results obtained may have been greater than in the case of a project carried out solely for research purposes and by purely research methods.

Unfortunately, it might also be said that, in spite of the best efforts of the guardians of the Treasury, amounts for some periodic research may not always terminate when the particular need has passed. If the amounts have been appropriated annually for many years, the presumption is usually that the same appropriation should be continued.

There are at least two distinguishable values, and in most cases three, emanating from any research activity. First, there is the value to the public, which may sometimes be roughly related to the amount of expenditures on the study, since more generous funds may secure a larger sample of data to analyze and, hence, there may be a greater likelihood that variations in different localities will be adequately treated. However, even in this case the point of diminishing returns is often rather quickly reached so that a small sample may be almost as satisfactory as a somewhat larger one obtained at considerably greater cost, although the difficulty of determining the size of an effective yet economical sample in advance of the project may be insuperable. The value of a research project to the general public may, of course, be quite different from the value to a specific group for the immediate benefit of whom the project was undertaken.

A second value of research projects is the benefit to the administrative efficiency of the organization undertaking the research work. Since research activities constitute the planning and critical functions of the agency, the existence of research within an organization not only energizes the agency as a whole, but also the individuals who are in immediate contact with it, provided they have enough perspective to see the significance of the result obtained. For this reason, some organizations decentralize their research activities as far as feasible rather than concentrate them in specific research sections or divisions, although there are obvious advantages in such segregation. For our present purposes, it is enough to note that the energizing influences of research within the agency bear no necessary relationship to the funds available for carrying on the investigatory activity.

The third possible value of a research program lies in the usefulness of results obtained to the Federal Government itself, either directly to the administrative process involved in the research or to policy formation. It is here perhaps that the relationship between the amount of expenditures and the results obtained shows the least direct correlation.

Previous Estimates of Federal Expenditures for Research

Estimates of research expenditures of the Federal Government have been made several times in the past. Some of these compilations have been confined to the natural sciences and technology, and some have used a concept even broader than the one employed in the present study. These differences in definition make the re-

sults incomparable with those of the present study, and prevent their use in analyzing trends, excepting where estimates have been made by the same person or organization through successive years.

A comprehensive functional analysis of Federal expenditures was made by the late Edward B. Rosa of the National Bureau of Standards, who reported in one functional category expenditures for "research, education, and development" for each of the years 1910 to 1920, inclusive. These estimates were continued by the Bureau of Efficiency for the years 1921 to 1924. Later, a compilation of similar character was prepared by Marjorie Van de Water and Watson Davis, of Science Service, for the years 1910, 1915, 1920 to 1933, inclusive, and 1936, with supplementary estimates for research only, for the fiscal years 1923 through 1931, and for research in natural sciences only, for 1923 through 1932, and 1934 through 1937.

A series of annual estimates carried back to the year 1915 was prepared by the Bureau of the Budget from 1921 to 1933 for its functional classification of Federal expenditures. One of the functions for which expenditures were calculated was designated first as "science and research" and later, without change of methods, as "science and research, general." The amounts, however, did not include all research expenditures but only those not classified by the Bureau under more specific functional headings.

Several single-time compilations have also been prepared. W. J. McGee, formerly of the Geological Survey, prepared a table of appropriations for "scientific bureaus" in 1902 (see Table E in Appendix). Ralph B. Ward, then of the Brookings Institution, compiled *Expenditures and Budgeted Estimates 1930, 1933, 1935, for the Support of the Work of Scientific Bureaus and Independent Offices*, which was confined to natural sciences and technology.

A consolidated table of totals reported in these previous studies is included in the Appendix of this report.

I. THE FACTS ABOUT FEDERAL EXPENDITURES FOR RESEARCH

Limitations of Data on Research Expenditures

An attempt to estimate Federal expenditures for research involves setting down precise figures to represent processes that cannot be consistently defined and that usually constitute integral parts of administrative or other noninvestigatory activities, such as promotion of commerce or collection of the revenue.[2]

In addition to such general deficiencies inherent in the data presented in the following sections, some omissions are probable in spite of the systematic efforts to obtain complete reports. There were several instances where data were finally obtained for a research activity personally known by the writer to exist, after a supposedly final official statement omitting the activity entirely had been received from the agency concerned. Lack of personal knowledge probably prevented discovery of other cases of similar omission. In one instance, an agency officially transmitted the report of one of its sub-units stating that it had no expenditures for research, but afterward a representative orally expressed disappointment in the decision of the sub-unit and described some of the pioneer investigations of particular promise that were being carried on.

Particular efforts have been made to apply the criteria of "research" as uniformly as possible to the varied investigations in different bureaus and offices. Allocation of the costs of personnel, supplies, printing, travel, and general administrative overhead between research and non-research activities has usually been left to the agency concerned, although in this respect also, attempts to keep the results as comparable as possible have been made through discussions with budget officers or research administrators, who supplied or reviewed the information.

Total Amounts of Research Expenditures Fiscal Years 1937 and 1938

Total Amounts from General and Emergency Funds

In the fiscal year ended June 30, 1937, the Federal Government spent on research about 124 million dollars, or nearly $1 for each person in the United States. About 70 million dollars came from regular funds and an additional 54 million dollars from emergency funds. If Federal contributions and grants for research carried on by non-Federal agencies are deducted from these amounts, the expenditures for research within Federal agencies for the fiscal year 1937 would be about 64 million dollars from regular funds and approximately 11 million dollars from emergency funds.

The corresponding figures for the fiscal year 1938 show increases of about 8 million dollars from regular funds, and a decrease of nearly 24 million dollars in emergency expenditures, for research purposes. The resulting net decrease from the previous year brings the total expenditures for research to about 108 million dollars for the fiscal year 1938. Of this amount about 78 million dollars came from general funds and about 30 million dollars came from emergency appropriations (see table 1).

[2] For a statement of the principal difficulties in preparing and using such estimates the reader is referred to the Appendix and the second section of the Introduction.

TABLE 1.—*Federal expenditures for research compared with total Federal expenditures—regular and emergency funds—fiscal years 1937 and 1938*

[Amounts in millions of dollars]

	Total regular and emergency funds	Regular funds			Emergency funds
		Total	Operating expenses [1]	Payments and real property [2]	
Total obligations: [3]					
1938	9,362.6	7,700.7	2,805.9	4,894.8	1,661.9
1937	9,104.4	6,562.5	2,690.5	3,872.0	2,541.9
Research obligations:					
1938	[4] 108	78.4	71.5	6.9	[4] 30
1937	[4] 124	70.3	63.9	6.4	[4] 54
Percentage of research to total obligations:					
1938	1.2	1.0	2.5	.1	1.8
1937	1.4	1.1	2.4	.2	2.1

[1] "Current expenses," plus "plant and equipment," as used in *Budget of the United States Government, 1939*, Table 4, pp. 852-853.
[2] "Fixed charges," "acquisition of property" other than "plant and equipment," "payment of debt," and "payments for rights and obligations," as used in *Budget, 1939*, table 4 (op cit.).
[3] From *Budget, 1939*, table 4 (op. cit.).
[4] Partly estimated.

Research Expenditures Compared With Total Expenditures

Research has never been a large factor in the expenditures of the Federal Government and still remains insignificant in the work of many Government agencies. Research activities accounted for about 1.4 percent of the total Federal obligations for all purposes (exclusive of those for the District of Columbia) in the fiscal year 1937, while the corresponding figure for the fiscal year 1938 was 1.2 percent. If only the regular funds are considered and payments such as for grants, pensions, refunds, retirement of debt, and acquisition of land and buildings, are excluded from the calculations, the percentage of the remaining operating expenses used for research becomes approximately 2.4 percent for the fiscal year 1937 and 2.5 percent for the fiscal year 1938 (see table 1).

Comparison of these percentages, showing the importance of research in the Government's operating expenses, with corresponding estimates for industry and universities are of some interest. Some of the larger industrial concerns are known to be spending from 4 to 6 percent of their gross income for research, while according to a recent estimate about 25 percent of the expenditures of 20 leading universities are for research.[3] It must be remembered, however, that industrial research is largely pointed toward internal efficiency; while universities carry on research partly for its own sake, and partly as a training technique. By contrast, a large part of the Government's investigations is carried on to promote more effectively the welfare of certain industrial and social groups among its citizens, rather than to improve its own internal efficiency or to train research workers.

[3] By Dr. R. M. Hughes, in materials prepared for the Committee on Survey of Governmental Relations to Research. See p. 177, below.

Research Expenditures Compared With Costs of Other Functions

A few comparisons and contrasts are made for illustrative purposes in table 2 between the magnitude of research expenditures and some other Federal expenditures from regular funds. The amount expended for research is approximately the same as the cost of collecting the revenue (including both internal revenue and customs duties). In the fiscal year 1937, the total expenditures of the Department of the Interior were approximately the same, disregarding emergency funds, as the cost of the research activities of the Federal Government. For purposes of contrast, the expenditures for the Department of State and the Veterans' Administration may be cited. The total budget of the Department of State is less than one-quarter of the amount spent by the Government for research; while, on the other hand, the budget of the Veterans' Administration, including pensions, was over 15 times that amount (see table 2).

TABLE 2.—*Research expenditures compared with some other Federal expenditures—regular funds only*

[In millions of dollars]

	1937	1938 (estimated)
1. Research, including payments and real property [1]	70.3	78.4
2. Research, excluding payments and real property	63.9	71.5
Illustrative similar magnitude expenditures		
3. Collecting the revenue	71.7	78.1
4. Department of the Interior [2]	68.7	91.4
Illustrative smaller expenditures		
5. Department of State [3]	16.6	17.6
6. Department of Labor [3]	22.3	25.1
Illustrative larger expenditures		
7. Repairs and alterations [3]	115.1	104.7
8. Interest on public debt [2]	866.4	927.0
9. Veterans' Administration [3]	1,128.1	573.7

[1] Research amounts on obligations basis, "Payments and real property" include grants and contributions and a small amount for land and buildings acquired.
[2] From *Budget of the United States Government, 1939*, Statement 2, pp. A28 (Veterans' Administration), A54 (Interior), A58 (Labor), A63 (State), A65-66 (Collecting the revenue), A69 (Interest on public debt).
[3] Obligations basis, from *Budget, 1939*, table 4, p. 852.

Research Expenditures Distributed by Agency

Number of Agencies Reporting Research

There are approximately 250 agencies in the Federal Government, where research [4] would seem an appropriate activity, if the bureaus and major offices in the departments as well as active independent establishments are counted separately as "agencies," and liquidating, superseded, ex officio advisory, subsidiary,

[4] For definition of "research" as used in this study, see pp. 62-63.

honorary, international, and temporary celebration-fostering organizations are excluded. Of these 250 agencies where research might reasonably be found, 126 have reported expenditures from regular funds for some form of scientific research during one or both of the fiscal years 1937 and 1938. Seven additional organizations operating solely on emergency funds bring to a total of 133 the number of Federal agencies with research activities. The distribution of these organizations among the departments is shown in table 3. The remaining agencies which conduct no scientific investigations number over 100, exclusive of offices such as those enumerated above.

TABLE 3.—*Number of agencies reporting research in 1937 or 1938, by departments*

	Number of agencies
Total	133
Department of State	16
Treasury Department	13
War Department	8
Department of Justice	3
Post Office Department	1
Department of the Navy	9
Department of the Interior	12
Department of Agriculture	20
Department of Commerce	7
Department of Labor	7
Independent agencies [1]	37

[1] Includes 7 agencies reporting use of emergency funds only. For names of agencies, see tables 11 and 12.

A list of the 126 agencies carrying on research from regular funds, together with the research expenditures of each from such funds, is included in table 11. Table 12 supplements table 11 by showing the seven independent agencies having research activities that operate solely with emergency funds. Many of the agencies included in tables 3 and 11 as having research expenditures from regular funds also receive supplementary aid from emergency funds for their research programs. In some cases the use of emergency funds provided a flexible element in the program and permitted expenditures for printing, travel, equipment, and other purposes previously difficult to finance. However, this report does not show separately for each bureau and independent office the amounts of research expenditures from emergency funds, as the verification of these separate amounts from the several emergency funds has proven too time-consuming an undertaking to complete.

Concentration of Research Expenditures Among Agencies

The Department of Agriculture accounts for approximately 31 percent of all the Federal research expenditures, exclusive of grants and contributions and emergency obligations. If grants and contributions are included in the calculation, the Department of Agriculture would be the beneficiary of over 35 percent of the Federal research expenditures financed from regular funds. Five of the Departments (Agriculture, Commerce, War, Interior, and Navy) expend, in the aggregate, approximately three-fourths of all the regular funds for research. The numerous independent offices, although in some cases important individually, account for only about one-sixth of the research expenditures from regular funds (see table 4).

TABLE 4.—*Research expenditures from regular funds by Departments, showing bureaus and independent agencies spending $1,000,000 or more for research, fiscal years 1937 and 1938*

	Amount of research expenditures (in thousands of dollars)		Percentage of all Federal research expenditures	
	1937	1938	1937	1938
Grand total [1] [2]	63,892	71,547	100.0	100.0
Department of State [1]	324	519	.4	.4
Treasury Department	3,354	4,152	5.3	5.8
Public Health Service	2,119	2,863	3.3	4.0
Other offices	1,235	1,289	2.0	1.8
War Department	7,342	6,855	11.5	9.6
Air Corps	4,540	3,878	7.1	5.4
Ordnance Department	1,360	1,360	2.1	1.9
Other offices	1,442	1,617	2.3	2.3
Department of Justice	91	103	.1	.1
Post Office Department	20	20	(3)	(3)
Department of the Navy	5,691	9,087	9.0	12.7
Bureau of Aeronautics	2,628	3,621	4.1	5.1
Bureau of Engineering	1,010	2,875	1.6	4.0
Other offices	2,053	2,591	3.3	3.6
Department of the Interior	6,473	7,978	10.1	11.2
Geological Survey	3,739	4,000	5.9	5.6
Bureau of Mines	1,602	1,745	2.5	2.4
Other offices	1,132	2,233	1.7	3.2
Department of Agriculture [2]	19,867	22,043	31.1	30.9
Agricultural Economics [4]	2,221	2,385	3.5	3.3
Animal Industry	1,272	1,390	2.1	1.9
Chemistry and Soils	1,383	1,425	2.2	2.0
Entomology and Plant Quarantine	2,053	2,214	3.2	3.1
Forest Service [4]	1,910	2,118	3.0	2.9
Plant Industry	4,460	4,876	7.0	6.8
Soil Conservation Service	1,511	1,541	2.4	2.2
Other offices [4]	5,054	6,094	7.7	8.7
Department of Commerce	7,612	8,308	11.9	11.6
Bureau of the Census	2,219	2,271	3.5	3.2
Coast and Geodetic Survey	2,721	2,792	4.3	3.9
Bureau of Foreign and Domestic Commerce	1,377	1,459	2.2	2.0
National Bureau of Standards	862	1,076	1.4	1.5
Other offices	433	710	.5	1.0
Department of Labor	1,862	2,030	2.9	2.8
Bureau of Labor Statistics	966	1,004	1.5	1.4
Other offices	896	1,026	1.4	1.4
Independent agencies	11,256	10,452	17.6	14.7
Civilian Conservation Corps	1,292	749	2.0	1.1
National Advisory Committee for Aeronautics	1,241	1,442	1.9	2.0
Tennessee Valley Authority	2,016	1,699	3.2	2.4
Other agencies	6,707	6,562	10.5	9.2

[1] Excludes contributions to international conferences.
[2] Excludes grants to States.
[3] Less than 1/20 of 1 percent.
[4] Figures for this agency include some amounts for activities which are considered "research" according to the definition used in this study, but which have not been included in the official amounts for research published by the Department of Agriculture.

Range and Percentage of Research Expenditures by Agencies

A few agencies in the Federal Government are devoted almost solely to research for the immediate benefit of specific groups of citizens. Other agencies carry on research primarily to improve their own internal administration. The relative proportion of the two contrasting functions of outside service and internal improvement within any one bureau or independent office is the most important reason for the wide variations in amounts and percentages of total expenditures devoted to research by the different agencies.

There are 20 bureaus or offices in the 10 Cabinet departments and 3 independent agencies which expended more than a million dollars a year for research in either one or both of the fiscal years 1937 and 1938. Only the Office of Experiment Stations spent (in grants) as much as $5,000,000 a year for research. Three bureaus spent over 3½ million dollars a year each, and eight others spent over 2 million dollars each in either one or both of the fiscal years 1937 and 1938. Tables 4 and 5 show the amounts spent for research by each of these major research agencies, although table 4 excludes grants made through the Office of Experiment Stations, which are included in table 5. Table 5 shows that one-fourth of research expenditures from regular funds is from 4 bureaus, while one-half of the total is from 12 bureaus.

In tables 6 and 13 the Federal agencies reporting research are distributed according to the percentage of regular operating funds expended for research purposes in the fiscal year 1938. The summary in table 6 shows that 31 Federal agencies use more than half their financial resources for research, and an additional 35 use more than one quarter of their funds for this purpose.

TABLE 5.—*Research expenditures from regular funds by 23 bureaus and independent offices, fiscal years 1937 and 1938*

[Arranged in order of research expenditures in 1937]

	Amount of research expenditures (in thousands of dollars)		Percentage of all Federal research			
			Simple		Cumulative	
	1937	1938	1937	1938	1937	1938
Grand total, including grants and contributions	70,264	78,468	100	100	100	100
BUREAU						
1. Office of Experiment Stations (Agriculture) [1]	5,850	6,464	8.3	8.2	8.3	8.2
2. Air Corps (War)	4,540	3,878	6.5	4.9	14.8	13.1
3. Bureau of Plant Industry (Agriculture)	4,460	4,876	6.3	6.2	21.1	19.3
4. Geological Survey (Interior)	3,739	4,000	5.3	5.1	26.4	24.4
5. Coast and Geodetic Survey (Commerce)	2,721	2,792	3.9	3.6	30.3	28.0
6. Bureau of Aeronautics (Navy)	2,628	3,621	3.7	4.6	34.0	32.6
7. Bureau of Agricultural Economics (Agriculture) [1] [2]	2,224	2,385	3.2	3.0	37.2	35.6
8. Bureau of the Census (Commerce)	2,219	2,271	3.2	2.9	40.4	38.5
9. Public Health Service (Treasury)	2,119	2,863	3.0	3.6	43.4	42.1
10. Bureau of Entomology and Plant Quarantine (Agriculture) [1]	2,053	2,214	2.9	2.8	46.3	44.9
11. Tennessee Valley Authority	2,016	1,690	2.9	2.2	49.2	47.1
12. Forest Service (Agriculture) [1]	1,910	2,118	2.7	2.7	51.9	49.8
13. Bureau of Mines (Interior)	1,602	1,745	2.3	2.2	54.2	52.0
14. Soil Conservation Service (Agriculture)	1,511	1,541	2.2	2.0	56.4	54.0
15. Bureau of Chemistry and Soils (Agriculture)	1,383	1,425	2.0	1.8	58.4	55.8
16. Bureau of Foreign and Domestic Commerce (Commerce)	1,377	1,459	2.0	1.9	60.4	57.7
17. Ordnance Department (War)	1,360	1,360	1.9	1.7	62.3	59.4
18. Civilian Conservation Corps	1,292	749	1.8	1.0	64.1	60.4
19. Bureau of Animal Industry (Agriculture)	1,272	1,390	1.8	1.8	65.9	62.2
20. National Advisory Committee for Aeronautics	1,241	1,442	1.8	1.8	67.7	64.0
21. Bureau of Engineering (Navy)	1,010	2,875	1.4	3.7	69.1	67.7
22. Bureau of Labor Statistics (Labor)	966	1,004	1.4	1.3	70.5	69.0
23. National Bureau of Standards (Commerce)	[3] 862	[3] 1,076	1.2	1.4	71.7	70.4
All other bureaus and independent agencies	19,999	23,221	28.3	29.6	100.0	100.0

[1] Expenditures are principally grants to State agricultural experiment stations.
[2] Some activities defined as "research" for this study have not been included as such in the annual figure for research published by the Department of Agriculture.
[3] Exclusive of amounts reimbursed for work carried on for other agencies.

TABLE 6.—*Number of Federal agencies by percentage of operating expenses (from regular funds) used for research purposes, fiscal year 1938*

Percentage of operating expenses (regular funds) used for research	Total	Number of agencies	
		Bureaus, etc., in Departments	Independent agencies
Agencies reporting research	[1] 122	93	29
99 to 100 percent	16	14	2
90 to 99 percent	1	1	0
80 to 89 percent	3	3	0
70 to 79 percent	3	2	1
60 to 69 percent	2	2	0
50 to 59 percent	6	4	2
40 to 49 percent	2	2	0
30 to 39 percent	6	5	1
20 to 29 percent	11	11	0
10 to 19 percent	15	14	1
1 to 9 percent	36	21	15
Less than 1 percent	21	14	7

[1] For names of agencies, see table 13. Excludes 4 agencies counted in table 3, for which research expenditures are included in table, as follows: A bureau and an independent agency having research expenditures in 1937 but none in 1938; and miscellaneous work in the general administrative organization of 2 departments for which no comparable percentages were feasible.

Research Expenditures According to Subject and Purpose

Classification by Subject

The possibility of classifying Federal activities into subject fields was tested briefly. A comprehensive classification proved impracticable. Opinions differed sharply among competent persons working in the same field about the proper classification of specific investigations. Furthermore, most inquiries would have to be classified under several categories, some of which might not be readily apparent even when accurate and comprehensive titles were carried by the studies.[5] To divide expenditures for such inquiries artificially into amounts applicable to each subject would be absurd, and to list the total amount under each possible heading would involve extensive multiple counting. Either method would require preparation of material for a complete subject catalog of research projects. The attempt to compile research expenditures by a systematic subject classification was therefore abandoned.

[5] The study *Family Disbursements of Wage Earners and Salaried Workers* is a case in point.

TABLE 7.—*Research expenditures by broad fields of research and by Departments, regular funds only, fiscal years 1937 and 1938*

[In thousands of dollars]

Department	Total		Natural science		Social science and statistics		Surveys and mapping		Unallocated library, etc., aids to research	
	1937	1938	1937	1938	1937	1938	1937	1938	1937	1938
State:										
Excluding contributions	324	519	44	116	280	403				
Contributions to international commissions	752	688	192	192	560	496				
Treasury	3,354	4,152	2,051	2,786	1,235	1,301	68	65		
War	7,342	6,855	7,039	6,549			303	306		
Justice	91	103			91	103				
Post Office	20	20	20	20						
Navy	5,691	9,087	4,830	8,210			802	823	59	54
Interior	6,473	7,978	1,305	1,831	1,076	2,042	3,792	4,105		
Agriculture:										
Excluding grants[1]	19,867	22,043	15,652	17,632	2,774	2,857	762	843	679	711
Grants to State experiment stations	5,620	6,233	4,496	4,986	1,124	1,247				
Commerce	7,612	8,308	1,262	1,749	3,629	3,767	2,721	2,792		
Labor	1,862	2,030			1,862	2,030				
Independent agencies	11,256	10,452	3,887	3,665	4,684	4,306	1,132	770	1,553	1,711
Total, excluding grants and contributions	63,892	71,547	36,390	42,558	15,631	16,809	9,580	9,704	2,291	2,476
Grand total	70,264	78,468	41,078	47,736	17,316	18,552	9,580	9,704	2,291	2,476

[1] Some activities defined as "research" for this study have not been included as such in the annual figure for research published by the Department of Agriculture.

Research Expenditures by Broad Fields

Nevertheless it seemed desirable to make some attempt to distinguish between the amounts spent for research in the broad fields of the natural sciences and technology on one hand and the social sciences and statistics on the other. In addition, two categories of activities that are not easily labeled either "natural" or "social" science are included in the definition of "research" adopted for purposes of this study. The first of these categories consists of surveys for basic inventory or mapping purposes and the second group is made up of aids to research through library, archival, or administrative service that cannot be easily allocated to either the natural or social sciences, nor prorated arithmetically. Allocation of research funds among these four fields was attempted, although arbitrary classifications were sometimes necessary.

Table 7 gives a summary of the results of the attempt to classify research expenditures from regular funds into these four major groups. These data were compiled from the amounts by agency shown in table 11. A similar distribution of research expenditures from emergency funds was found impossible except for an approximation for the Government as a whole, which is given in table 8. In addition, table 12 lists the amounts spent on research by seven independent agencies financed wholly from emergency funds.

Aside from possible usefulness in comparing the importance as measured by cost of these broad subject fields in Federal research programs, tables 7, 8, and 11 will permit a rough recomputation of "research expenditures" for anyone who objects to including one or more of these four general fields within that term.

In the fiscal year 1937 the natural sciences and technology accounted for about 58 percent of the Federal research expenditures from regular funds, and increased in the fiscal year 1938 to about 60 percent of the total. If expenditures for surveys and maps, and unallocated library, archival, and administrative aids are subtracted from the total, the cost of research in the natural sciences and technology would become over 70 percent of the remaining amounts spent for research from regular funds in each of the fiscal years 1937 and 1938.

TABLE 8.—*Percentage distribution, by broad subject fields, of estimated research expenditures from regular and emergency funds, fiscal years 1937 and 1938*[1]

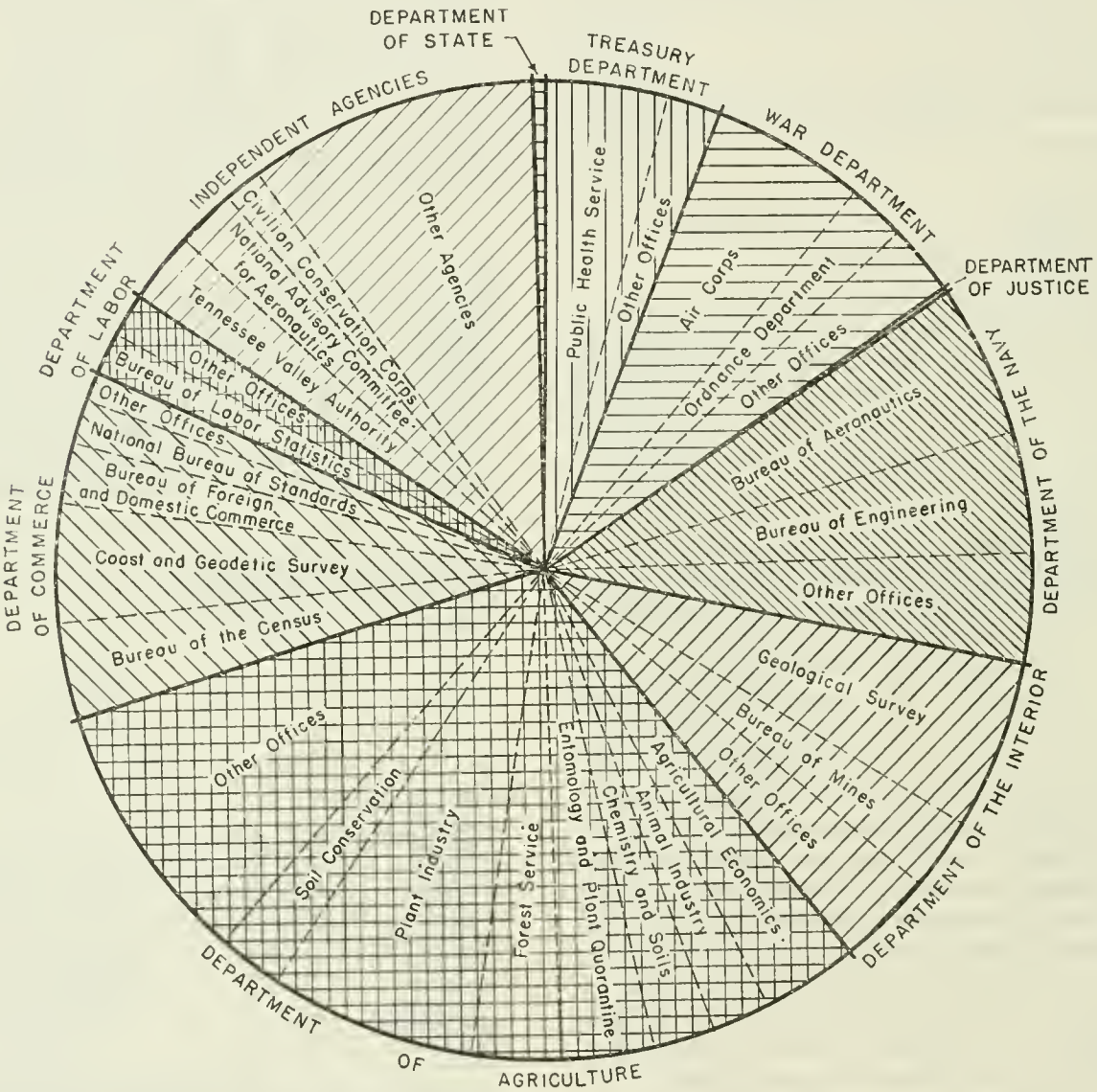
	Estimated amounts (in millions of dollars)		Percentage distribution	
	1937	1938	1937	1938
Regular and emergency funds	124	108	100	100
Natural sciences	51	52	40	48
Social sciences	53	41	44	38
Other	20	17	16	14
Regular funds	70	78	100	100
Natural sciences	41	47	58	60
Social sciences	17	19	25	24
Other	12	12	17	16
Emergency funds	54	30	100	100
Natural sciences	10	5	18	17
Social sciences	36	22	67	73
Other	8	3	15	10

[1] Estimates for amounts and distribution of emergency expenditures are based on (1) published data in *Budget, 1939*, (2) special reports from the Works Progress Administration and (3) direct reports from 14 other Federal agencies.

While research carried on from regular funds is largely in the field of the natural sciences and technology, the social sciences are the chief beneficiaries of research from emergency funds. The estimates in table 8, pieced together from several fragmentary sources, indicate that not less than two-thirds of emergency funds were expended for research in the field of social

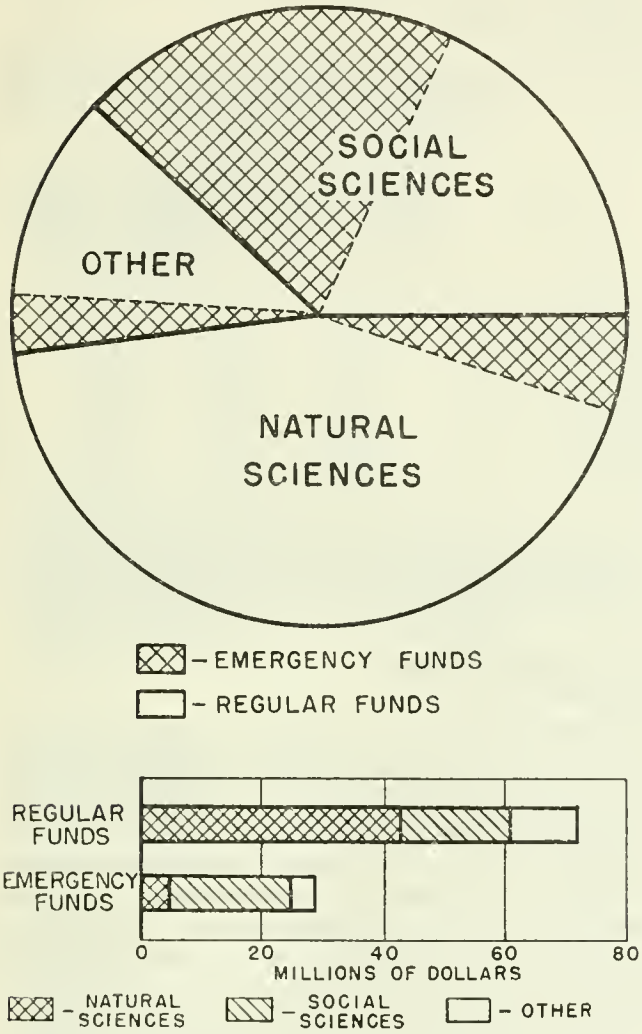
PERCENTAGE DISTRIBUTION OF RESEARCH EXPENDITURES FROM REGULAR FUNDS BY DEPARTMENTS

SHOWING BUREAUS AND INDEPENDENT AGENCIES SPENDING OVER ONE MILLION DOLLARS FOR RESEARCH—1938



POST OFFICE DEPARTMENT - LESS THAN 1/20TH OF ONE PERCENT

ESTIMATED PERCENTAGE DISTRIBUTION, BY BROAD SUBJECT FIELDS, OF RESEARCH EXPENDITURES FROM EMERGENCY AND REGULAR FUNDS - 1938



sciences and statistics in the fiscal years 1937 and 1938. If these estimates of research expenditures from emergency funds are combined with corresponding data from regular funds, it appears that research in the natural sciences accounted for about two-fifths of all Federal research expenditures in the fiscal year 1937, and for nearly one-half of such expenditures in the fiscal year 1938. As the total amount spent for research from emergency funds decreased from 1937 to 1938, and the amount from regular funds increased, the natural sciences gained both absolutely and in relation to social sciences in terms of dollars expended.

About 60 different bureaus and independent offices are responsible for research projects in natural science and technology, while about 80 agencies carry on inquiries that would be classed as social science or statistics. Since the category in these tables for "unallocated library, archival, and administrative aids to research" is a residual one, containing only aids to research that have not been classified elsewhere, the distribution of these amounts is of no comparable significance (see table 11). Table 7 shows that 8 of the 10 Cabinet Departments have reported expenditures for research that has been classified as natural science and technology; while 7 departments are represented by social sciences and statistical investigations, and 6 departments carry on some form of surveys or mapping.

Research Expenditures by Purpose

A classification of research expenditures by purpose rather than by field shows that over half of such expenditures of the Federal Government is devoted to either the promotion of agriculture or the improvement of the Army and Navy. Promotion of agriculture, represented by the activities of the Farm Credit Administration and the Department of Agriculture, accounts for 37 percent of total research expenditures in both fiscal years 1937 and 1938. Next in size of expenditure comes military and naval research, which represents 20 percent of the total in 1937 and about 22 percent in 1938. Basic data for these calculations are from table 11.

Recent Trends in Research Expenditures

Quinquennial Data from Illustrative Agencies

Table 9 summarizes the information obtained from agencies in response to requests for readily available data for the fiscal years 1923, 1928, and 1933 that would be comparable to research expenditures given for the fiscal years 1937 and 1938. In a few cases additional information was compiled from the *Budget of the United States Government* for the respective years.

The totals in table 9, which include data for the whole Department of Agriculture and 13 other agencies represented by data for each of the 5 years listed, show that research expenditures rose from about $20,000,000 in 1923 to about $44,000,000 in 1938, an increase of over 120 percent. The corresponding increase for the 13 agencies other than the Department of Agriculture is almost 90 percent. Increases in expenditures by individual bureaus are, with some exceptions, substantial and continuous when viewed by such 5-year intervals.

Importance of the Census in Historical Comparisons

The years used in table 9 to show recent trends in research expenditures were chosen to avoid the periods of the heaviest expense for the decennial censuses. In

TABLE 9.—*Recent trends in research expenditures of certain selected organizations,*[1] *fiscal years 1938, 1937, 1933, 1928, and 1923. Emergency funds of 1938 and 1937 excluded*

Amounts in thousands of dollars]

	1938	1937	1933	1928	1923
Grand total agencies reporting data for each year (excluding agencies marked with (3))	43,905	40,314	35,121	28,454	19,805
Total 13 agencies other than Department of Agriculture, reporting data each year (excluding agencies marked with (3))	17,678	16,689	15,850	12,946	9,365
Treasury Department:					
Coast Guard	112	115	16	22	4
Public Health Service [2]	2,863	2,119	1,128	(3)	(3)
Division of Research and Statistics [2]	285	238	61	56	(3)
Department of the Interior:					
Geological Survey	4,000	3,739	3,203	2,485	1,729
Office of Indian Affairs	250	250	127	102	85
Bureau of Mines	1,745	1,602	1,171	1,164	765
Virgin Islands [2]	35	34	20	(3)	(3)
Department of Agriculture	[4]26,287	[4]23,625	19,271	15,508	10,440
Department of Commerce:					
Bureau of the Census	2,271	2,219	[5]3,725	[5]2,402	[5]2,135
Coast and Geodetic Survey	2,792	2,721	2,148	2,367	2,038
Bureau of Fisheries	391	302	282	175	113
Bureau of Foreign and Domestic Commerce	1,459	1,377	1,995	1,861	953
National Bureau of Standards [2]	1,076	862	(3)	907	(3)
Department of Labor:					
Bureau of Labor Statistics	1,004	966	[6]405	[6]299	[6]264
Independent agencies:					
Interstate Commerce Commission	254	254	231	245	231
Library of Congress	995	947	747	605	406
National Advisory Committee for Aeronautics	1,442	1,241	920	533	211
Panama Canal [2]	110	112	98	86	(3)
U. S. Tariff Commission	903	956	880	686	431

[1] Organizations listed include all of those reporting the amount of research expenditures for any of the years 1933, 1928, or 1923.
[2] Agencies with incomplete data are not included in totals.
[3] Data not available.
[4] Amount given (nearly $2,000,000 less than departmental total shown elsewhere in this report) is comparable with amounts given for prior years in this table.
[5] Budget of the United States, 1935, 1930, and 1925; total obligations plus departmental allocations.
[6] Budget of the United States 1935 (p. 396); 1930 (pp. 815–816); 1925 (pp. 552–553).

the fiscal years from 1920 through 1922, and again from 1930 through 1932, total Federal research expenditures due to the census decennial peak were much larger than for the periods immediately preceding or following. For the work of the fifteenth decennial census, $40,000,000 was provided and it is probable that an even larger amount will be required for the expenses of the sixteenth census. In the first fiscal year of a decennial census, when more than one-half of the total expenses of that census may be obligated, the Bureau of the Census spends nearly as much as, or more than, the entire annual cost of the research program of the Department of Agriculture, or perhaps one-quarter of the research expenditures of the whole Federal Government.

The amounts shown in table 10 for the Bureau of the Census indicate that biennial and quinquennial as well as decennial censuses affect periodically the amount of research expenditures by that Bureau, although those minor periodic fluctuations of from 1 to 2 million dollars a year do not affect appreciably the totals for the whole Government. Similar periodic fluctuations would appear in the research expenditures of a few other agencies. Any year-to-year comparisons of research expenditures, especially when agencies having large scale, infrequent, periodic canvasses are included, should take into account the influence of these recurrent investigations. Table 10 assembles annual data for expenditures of four well known research agencies.

TABLE 10.—*Recent trends in selected research and other scientific expenditures from regular funds*

[Amounts in millions of dollars]

Fiscal Year	Department of Agriculture [1] (research activities only)	Bureau of the Census [2] (wholly research)	National Bureau of Standards [2] (research, tests, etc.)	Bureau of Labor Statistics [2] (wholly research)
1938 (estimated)	26.3	2.1	2.0	0.8
1937	23.6	2.2	1.9	.8
1936	20.9	2.9	1.8	1.1
1935	17.6	4.5	1.3	.7
1934	17.2	1.5	1.3	.4
1933	19.3	3.2	2.2	.4
1932	22.7	6.9	3.1	.5
1931	21.8	15.4	3.1	.4
1930	20.1	14.6	2.8	.4
1929	17.8	2.2	2.4	.4
1928	15.5	2.1	2.2	.3
1927	13.9	2.0	1.8	.3
1926	12.9	2.4	1.8	.3

[1] From annual reports of the Director of Finance, Department of Agriculture, and Eisenhower and Chew, *United States Department of Agriculture* (1934 edition), p. 32. Some types of work are excluded from these data, that are classified as "research" in this report, and included in computing data for other tables.
[2] Expenditures as reported in Statement No. 2 of the Budget for successive years. Amounts in some cases differ from "obligations" used in other tables in this report.

Some Misleading Factors in Historical Tables

Conclusions based on historical tables of identical agencies understate the growth of research due to the large number of new Federal agencies established during the last 15 years. This bias is somewhat offset by the elimination of some agencies formerly in existence and by the additional functions acquired by the older establishments. The increases shown by tables 9 and 10 are, in any case, evidence of the effect on research expenditures by Federal agencies when broader concepts of the functions of a Government and its duty to promote the welfare of citizens prevail more widely.

Historical tables in units of dollars may be misleading unless the influence of price changes is known and allowed for. Changes in purchasing power of Federal expenditures are neither synchronous nor closely correlated with wholesale prices or other price series. A price index prepared for analysis of Federal expenditures from 1915 to 1926 [6] was to have been extended for this study, but the extension is not ready for publication, nor for use in correcting data given in the historical tables above.

Data for widely separated years should also be corrected for changes in the population served, or for increases in wealth and income.

[6] See *Annual Report of the Secretary of the Treasury, 1926*, pp. 32–33.

TABLE 11.—*Research expenditures from regular funds by general fields and by agencies, fiscal years 1937 and 1938*

[In thousands of dollars]

	Total research expenditures		Natural science and technology		Social science and statistics		Surveys and maps and unallocated library, etc., aids to research [1]	
	1937	1938	1937	1938	1937	1938	1937	1938
Grand total	70,264	78,468	41,078	47,736	17,315	18,552	11,871	12,180
Department of State	1,076	1,207	236	368	840	899		
Contributions to international scientific commissions	752	688	192	192	560	496		
Participation in international conferences	74	200	44	116	30	84		
Total, excluding contributions and international conferences	250	319			250	319		
American Republics, Division of	16	16			16	16		
Arms and Munitions Control, Office of	7	7			7	7		
Communications and Records, Division of	42	45			42	45		
European Affairs, Division of	5	5			5	5		
Far Eastern Affairs, Division of	3	3			3	3		
Fiscal and Budget Affairs, Office of	(2)	3			(2)	3		
Historical Adviser, Office of	35	35			35	35		
International Conferences, Division of	(2)	30			(2)	30		
International Economic Affairs, Office of Adviser on	7	9			7	9		
Legal Adviser, Office of	26	30			26	30		
Near Eastern Affairs, Division of	7	8			7	8		
Passport Division	8	8			8	8		
Philippine Affairs, Office of	6	6			6	6		
Research and Publication, Division of	60	63			60	63		
Trade Agreements, Division of	23	40			23	40		
Treaty Division	5	11			5	11		
Treasury Department	3,354	4,152	2,051	2,786	1,235	1,301	68M	65M
Accounts and Deposits, Office of Commissioner of	[4] 5	[4] 6			[4] 5	[4] 6		
Administrative Assistant to the Secretary, Office of	70	70			70	70		
Coast Guard, The	115	112			[5] 47	[5] 47	[5] 68M	[5] 65M
Comptroller of Currency, Office of	79	82			79	82		
Customs, Bureau of	119	119			119	119		
Engraving and Printing, Bureau of	19	21	19	21				
General Counsel, Office of the	12	16			12	16		
Internal Revenue, Bureau of	660	560	6	6	554	554		
Mint, Bureau of the	13	13	4	4	9	9		
Narcotics, Bureau of	3	4	3	4				
Public Debt Service	2	2	2	2				
Public Health Service, Bureau of the	2,119	2,863	2,017	2,749	102	114		
Research and Statistics, Division of	238	285			238	285		
War Department	7,342	6,855	7,039	6,549			303M	306M
Air Corps	4,540	3,878	4,540	3,878				
Chemical Warfare Service	413	380	413	380				
Coast Artillery, Office of the Chief of	76	76	76	76				
Engineers, Corps of	383	386	80	80			303M	306M
Medical Department	16	15	15	15				
Ordnance Department	1,360	1,360	1,360	1,360				
Quartermaster Corps	10	6	10	6				
Signal Corps	545	754	545	754				
Department of Justice [6]	91	103			91	103		
Investigation, Federal Bureau of	30	36			30	36		
Prisons, Bureau of	[7] 41	[7] 42			[7] 41	42		
Post Office Department [8]	20	20	20	20				
Navy Department [9]	5,691	9,087	4,830	8,210			618	877
Aeronautics, Bureau of	2,628	3,621	2,628	3,621				
Construction and Repair, Bureau of	563	763	5 3	763				
Engineering, Bureau of	1,010	2,875	1,010	2,875				
Hydrographic Office	607	624					607M	624M
Medicine and Surgery, Bureau of	19	20	19	20				
Naval Observatory	195	199					195M	199M
Naval Records and Library, Office of	69	54					69LM	54LM
Naval Research Laboratory	300	310	300	310				
Ordnance, Bureau of	310	554	310	554				
Department of the Interior	6,473	7,978	1,605	1,831	1,076	2,042	3,792M	4,105M
Education, Office of	[10] 414	[10] 466			[10] 414	[10] 455		
Geological Survey	3,739	4,000	2				3,737M	4,000M
Grazing, Division of	32	85					32M	85M
General Land Office	3	0					3M	0
Indian Affairs, Office of	250	250	46	46	184	184	20M	20M
Mines, Bureau of	1,602	1,745	1,262	1,445	340	300		
National Bituminous Coal Commission	(11)	[12] 912			(11)	[12] 912		
The Consumers Counsel	10	60			10	60		
National Park Service	54	50	10	10	44	40		
Reclamation, Bureau of	293	341	209	250	84	91		
St. Elizabeths Hospital	42	45	42	45				
Virgin Islands, Government of the	34	35	34	35				

See footnotes at end of table.

TABLE 11.—*Research expenditures from regular funds by general fields and by agencies, 1937 and 1938*—Continued

	Total research expenditures		Natural science and technology		Social science and statistics		Surveys and maps and unallocated library, etc., aids to research	
	1937	1938	1937	1938	1937	1938	1937	1938
Department of Agriculture	25,487	28,276	20,148	22,618	3,898	4,104	1,441	1,554
Grants to States	5,620	6,233	4,496	4,986	1,124	1,247		
Total, excluding grants	19,867	22,043	15,652	17,632	2,774	2,857	1,441	1,654
Agricultural Economics, Bureau of [13]	2,224	2,385	304	381	1,920	2,004		
Agricultural Engineering, Bureau of	405	430	405	430				
Animal Industry, Bureau of	1,272	1,390	1,272	1,390				
Beltsville Research Center	75	75	75	75				
Biological Survey, Bureau of	398	413	398	413				
Chemistry and Soils, Bureau of	1,383	1,425	1,087	1,124			296M	301M
Commodity Exchange Administration [13]	10	15			10	15		
Dairy Industry, Bureau of	644	675	644	675				
Entomology and Plant Quarantine, Bureau of	2,053	2,214	2,053	2,214				
Experiment Stations, Office of [14]	230	231	230	231				
Extension Service [13]	50	66			50	66		
Food and Drug Administration	129	125	129	125				
Forest Service [13]	1,910	2,118	1,569	1,727	91	121	250M	270M
Home Economics, Bureau of	218	245	139	165	79	80		
Land Utilization and Retirement		433		427				6M
Plant Industry, Bureau of	4,460	4,876	4,460	4,876				
Public Roads, Bureau of [13]	951	953	271	310	494	407	186M	236M
Secretary's Office	673	691					673L	691L
Soil Conservation Service	1,511	1,541	1,417	1,443	94	98	([15])	([15])
Special Research Fund	779	1,200	737	1,114	36	66	6	20
Weather Bureau [13]	492	542	462	512			30	30
Department of Commerce	7,612	8,308	1,262	1,749	3,629	3,767	2,721	2,792
Air Commerce, Bureau of	116	303	112	298	3	5		
Census, Bureau of the	2,219	2,271			2,219	2,271		
Coast and Geodetic Survey [20]	2,721	2,792					2,721M	2,792M
Fisheries, Bureau of	302	391	272	359	30	32		
Foreign and Domestic Commerce, Bureau of	1,377	1,459			1,377	1,459		
Lighthouses, Bureau of	16	16	16	16				
Standards, National Bureau of	862	1,076	862	1,076				
Department of Labor	1,862	2,030			1,862	2,030		
Children's Bureau	464	480			464	480		
Labor Standards, Division of	70	86			70	86		
Labor Statistics, Bureau of	966	1,004			966	1,004		
Public Contracts, Division of	17	106			17	106		
Secretary's Office	49	48			49	48		
U. S. Employment Service	125	135			125	135		
Women's Bureau	171	171			171	171		
ndependent agencies	11,256	10,452	3,887	3,665	4,684	4,306	2,285	2,481
Accident Prevention Conference, Committee on	18					18		
Central Statistical Board	83	58			83	58		
Civilian Conservation Corps	1,292	749	657	362	86	49	549M	338M
Farm Credit Administration	524	577			524	577		
Federal Communications Commission	41	61	31	31	10	30		
Federal Deposit Insurance Corp	105	120			105	120		
Federal Home Loan Bank Board (HOLC)	190	189			190	189		
Federal Housing Administration	242	238			242	238		
Federal Power Commission	83	123	7	6	76	117		
Federal Trade Commission	610	206			610	206		
General Accounting Office	[16] 10	[16] 10			[16] 10	[16] 10		
Government Printing Office	[17] 8	[17] 8	[17] 8	[17] 8				
Interstate Commerce Commission	254	254			254	254		
Library of Congress	947	995					947L	995L
Maritime Commission	150	275	50	91	100	184		
National Advisory Committee for Aeronautics	[18] 1,241	[18] 1,442	[18] 1,241	[18] 1,442				
National Archives [19]	606	716					606	716
National Labor Relations Board	4	6			4	6		
Panama Canal	112	110	10	10			102M	100M
Railroad Retirement Board	63	95			63	95		
Reconstruction Finance Corporation	15	3			15	3		
Rural Electrification Administration	26	21		1	26	20		
Securities and Exchange Commission	330	168			330	168		
Smithsonian Institution	595	580	525	510	70	70		
Social Security Board	552	678			552	678		
Tennessee Valley Authority	2,016	1,699	1,274	1,135	261	232	481M	332M
U. S. Civil Service Commission	74	74			74	74		
U. S. Employees' Compensation Commission	25	25			25	25		
U. S. Tariff Commission	956	903			956	903		
Veterans' Administration	84	69	84	69				

[1] Items followed by the letter M in this column represent surveys and mapping; L denotes libraries.
[2] Office established at beginning of the fiscal year 1938.
[3] Not available.
[4] Estimated. Probably somewhat less than 6.
[5] Partly estimated.
[6] Includes estimate for other research conducted in the Department.
[7] Headquarters activities only.
[8] Research conducted for the Department by the National Bureau of Standards.
[9] Also includes research under "replacement of naval vessels" not separately listed. Excludes an indeterminate amount spent for services of regular personnel and ships assigned to special research projects.
[10] Unconfirmed estimate by Committee. Research not separated from other activities.
[11] Commission established April 26, 1937.
[12] Includes $690,000 for field collection and tabulation of cost and invoice records.
[13] Figures for this agency include some amounts for activities which are considered "research" according to the definition used in this study, but which have not been included in the official amounts for research published by the Department of Agriculture.
[14] Excludes payments to States. A small part of these amounts might be allocated to social sciences and statistics.
[15] Conservation surveys to determine extent and distribution of erosion as reported to the Bureau of the Budget are not regarded by the agency as "research" under the definition used in this report.
[16] Estimated. Probably somewhat less than 10.
[17] Estimated. Between 7½ and 10.
[18] Exclusive of construction of laboratories.
[19] Operations of the National Archives are an indirect aid to research.
[20] Includes coastal and land surveys, which have an additional administrative and service value.

TABLE 12.—*Research expenditures reported by independent agencies operating with emergency funds only, fiscal years 1937 and 1938*

[In thousands of dollars]

	Research expenditures (social science and statistics)	
	1937	1938
Total	2,047	[1] 3,109
Census of partial employment, unemployment, and occupations		1,987
Federal Emergency Administration of Public Works	[1] 8	[1] 3
National Resources Committee	992	843
President's Advisory Committee on Education	70	195
President's Committee on Administrative Management	88	
Prison Industries Reorganization Administration	89	81
Works Progress Administration (Internal administrative research and statistics)	800	1,300

[1] Housing statistics only. Data on technological research expenditures not available.

TABLE 13.—*Distribution of agencies according to percentage of total expenditures for research in 1938 (based on obligations for operating expenses)*[1] *regular funds only*

Agencies reporting more than 99 percent of funds for research — 16
- Treasury Department:
  - Division of Research and Statistics.
- Navy Department:
  - Naval Research Laboratory.
  - Naval Observatory.
  - Office of Naval Records and Library.[2]
  - Hydrographic Office.
- Department of Agriculture:
  - Beltsville Research Center.
  - Bureau of Chemistry and Soils.
  - Office of Experiment Stations.
  - Bureau of Home Economics.
  - Bureau of Plant Industry.
- Department of Commerce:
  - Coast and Geodetic Survey.[2]
  - Bureau of the Census.
- Department of Labor:
  - Bureau of Labor Statistics.
  - Women's Bureau.
- Independent Agencies:
  - U. S. Tariff Commission.
  - National Archives.[3]

Agencies reporting 90–99 percent of funds for research — 1
- Department of Agriculture:
  - Bureau of Dairy Industry.

Agencies reporting 80–89 percent of funds for research — 3
- Department of the Interior:
  - Geological Survey.
- Department of Agriculture:
  - Bureau of Agricultural Engineering.
- Department of Labor:
  - Children's Bureau.

Agencies reporting 70–79 percent of funds for research — 3
- Department of the Interior:
  - Bureau of Mines.
- Department of Labor:
  - Division of Public Contracts.
- Independent Agencies:
  - National Advisory Committee for Aeronautics.

Agencies reporting 60–69 percent of funds for research — 2
- Department of State:
  - Office of Historical Adviser.
  - Division of International Conferences.

Agencies reporting 50–59 percent of funds for research — 6
- Department of the Interior:
  - Office of Education.[4]
- Department of Commerce:
  - Bureau of Foreign and Domestic Commerce.
- Department of Labor:
  - Division of Labor Standards.
  - Secretary's Office.
- Independent Agencies:
  - Central Statistical Board.
  - Smithsonian Institution.

Agencies reporting 40–49 percent of funds for research — 2
- Department of State:
  - Division of Research and Publication.
- Department of Commerce:
  - National Bureau of Standards.

Agencies reporting 30–39 percent of funds for research — 6
- Department of State:
  - Office of Fiscal and Budget Affairs.
  - Office of Philippine Affairs.
- Treasury Department:
  - Office of Administrative Assistant to the Secretary.
- Department of Agriculture:
  - Bureau of Agricultural Economics.
  - Bureau of Entomology and Plant Quarantine.
- Independent Agencies:
  - Library of Congress.[5]

Agencies reporting 20–29 percent of funds for research — 11
- Department of State:
  - Office of the Adviser on International Economic Affairs.
  - Division of Near Eastern Affairs.
  - Office of Arms and Munitions Control.
  - Division of Trade Agreements.
  - Office of Legal Adviser.
- Treasury Department:
  - Public Health Service.
  - Office of the Comptroller of the Currency.
- War Department:
  - Office of the Chief of the Chemical Warfare Service.
- Department of the Interior:
  - National Bituminous Coal Commission.
  - Consumers' Counsel, National Bituminous Coal Commission.
- Department of Commerce:
  - Bureau of Fisheries.

Agencies reporting 10–19 percent of funds for research — 15
- Department of State:
  - Division of American Republics.
  - Treaty Division.
  - Division of Communications and Records.

[1] Excluding: (1) All emergency funds, (2) grants and other payments except for direct compensation for services or materials, and (3) cost of buildings or land. In the case of credit dispensing agencies, percentages are based on administrative expenses.

[2] Includes coastal and land surveys which have an additional administrative and service value.

[3] Aid to research.

[4] Based on unconfirmed estimate.

[5] Mostly aid to research.

Agencies reporting 10–19 percent of funds for research—Con.
- Treasury Department:
  - Office of General Counsel.
- War Department:
  - Signal Corps.
- Department of Justice:
  - Bureau of Prisons.
- Department of the Navy:
  - Bureau of Engineering.
- Department of the Interior:
  - Division of Grazing.
  - Bureau of Reclamation.
  - Government of the Virgin Islands.
- Department of Agriculture:
  - Bureau of Biological Survey.
  - Forest Service.
  - Weather Bureau.
- Department of Labor:
  - U. S. Employment Service.
- Independent Agencies:
  - Federal Trade Commission.

Agencies reporting 1–9 percent of funds for research------ 36
- Department of State:
  - Division of Far Eastern Affairs.
  - Division of European Affairs.
  - Passport Division.
- Treasury Department:
  - Bureau of Internal Revenue.
- War Department:
  - Air Corps.
  - Office of the Chief of Engineers.
  - Medical Department.
  - Ordnance Department.
  - Coast Artillery.
- Navy Department:
  - Bureau of Construction and Repair.
  - Bureau of Ordnance.
  - Bureau of Aeronautics.
- Department of the Interior:
  - Bureau of Indian Affairs.
  - St. Elizabeths Hospital.
- Department of Agriculture:
  - Bureau of Animal Industry.
  - Commodity Exchange Administration.
  - Extension Service.
  - Food and Drug Administration.
  - Land Utilization and Retirement of Submarginal Lands.
  - Soil Conservation Service.
- Department of Commerce:
  - Bureau of Air Commerce.

Agencies reporting 1–9 percent of funds for research—Con.
- Independent Agencies:
  - Farm Credit Administration.
  - Federal Communications Commission.
  - Federal Deposit Insurance Corporation.
  - Federal Housing Administration.
  - Federal Power Commission.
  - Interstate Commerce Commission.
  - Panama Canal.
  - Railroad Retirement Board.
  - Rural Electrification Administration.
  - Securities and Exchange Commission.
  - Social Security Board.
  - Tennessee Valley Authority.
  - U. S. Civil Service Commission.
  - U. S. Employees' Compensation Commission.
  - U. S. Maritime Commission.

Agencies reporting less than 1 percent of funds for research- 1
- Treasury Department:
  - Office of Commissioner of Accounts and Deposits.
  - Bureau of Customs.
  - The Coast Guard.
  - Bureau of Engraving and Printing.
  - Bureau of the Mint.
  - Bureau of Narcotics.
  - Public Debt Service.
- War Department:
  - Quartermaster Corps.
- Department of Justice:
  - Federal Bureau of Investigation.
- Post Office Department.
- Navy Department:
  - Bureau of Medicine and Surgery.
- Department of the Interior:
  - National Park Service.
- Department of Commerce:
  - Bureau of Lighthouses.
- Department of Agriculture:
  - Bureau of Public Roads.
- Independent Agencies:
  - Civilian Conservation Corps.
  - Federal Home Loan Bank Board (including Home Owners' Loan Corporation and Federal Savings and Loan Insurance Corporation).
  - General Accounting Office.
  - Government Printing Office.
  - National Labor Relations Board.
  - Reconstruction Finance Corporation.
  - Veterans' Administration.

II. FINANCING RESEARCH: PROBLEMS AND GENERALIZATIONS

Research Appropriations

The Problem

Persons responsible for research in Federal agencies frequently complain that funds for carrying on research activities are inadequate. The Bureau of the Budget and Congressional appropriation committees are said to look with disfavor upon any form of research. This complaint is given credence by examples of the experience of particular bureaus in particular years. For example, in 1932, a Congressman debating on the floor of the House declared that a certain research activity could be dispensed with. "* * * The point I am emphasizing is this, that the rocks about which these investigations have been made, or are now proposed, have been here for some thousands of years, yea, some millions of years, and their investigation is not, therefore, a pressing duty and function of the Government."

On the other hand, the budget officer of a department that has been relatively successful in expanding its research program, in spite of occasional temporary limitations, stated that there was little difficulty in obtaining reasonable appropriations when the purpose of the proposed research and the needs for it were made clear. Similarly, from a large semiautonomous bureau having both scientific and administrative work comes the statement: "While it has happened in the past that some researches regarded by the Service as urgent have been deferred or abandoned by lack of funds, in general the value of research in (this field) appears to have been well appreciated by the committees concerned" in the Department, the Bureau of the Budget, and the Congress.

Importance of Presentation.

If research funds are harder to obtain than funds for other purposes, the difficulty seems to lie not so much in the research character of the work proposed as in the failure of the person preparing and presenting the proposals to make a convincing case for the particular program. Lack of a clear statement of the function of the research program, and failure to remove specific objections of particular persons who may be under a misapprehension, explain at least some of the rejected requests for new or increased funds, especially when the research proposals are in juxtaposition to well presented plans for other types of work. Conversely, information in easily understood form about the nature of the work and its immediate and ultimate function is usually enough to obtain intelligent consideration of the program by the budgetary and appropriating bodies. Proposals for objectives that are understood and respected receive more favorable consideration and engender fewer doubts than suggestions for activities that are unfamiliar in purpose and need, as well as in method. Exceptions having to do with political influences or individual idiosyncrasies are unavoidable by any procedure or organization.

Since research is an essential function of any vital organization, requests for appropriations should not need to be hidden under the major functions for which research itself is undertaken. The public is becoming acquainted with research and results of research, and it should be necessary no longer, if it ever was, for scientific work to masquerade in budget hearings under the guise of another function, or to be called by a pseudonym.

The foregoing statements assume that researches in the Federal Government have definite and desirable immediate objectives. Whether projects involving pure research, without immediate purpose or incentive other than pushing back the frontier of human knowledge or increasing the nation's prestige, would be possible on a large scale in the Federal Government is a question probably depending largely upon whether such research is also shown to be useful to the nation in the long run, for example, in the potential creation of new industries.

Possible Aids in Presenting Research Budgets

Probably an able research man should not be expected to have the qualifications of a successful salesman, however much he may be interested in his work. Certainly an exceptional combination of qualities is demanded of a research director in a large Federal organization. Not only should he possess the highest degree of scientific imagination and technical competence, but he should also be something of a publicist and an effective organizer and administrator as well. Because such qualities are rarely found together, people possessing all of them can command larger salaries than governmental agencies can usually pay. Hence a research agency is apt to be faced with the dilemma of either obtaining inadequate funds through failure to carry on effective publicity; or on the other hand, of stressing publicity values too much with the result that, although funds may be adequately or even generously supplied and the work expanded, the research activities become routine and devitalized without benefit of progressive imagination or adequate technical criticism. Such a dilemma can be partly or almost wholly met when a research organization has a capable budget officer and administrative aid to present proposed research plans effectively to the Bureau of the Budget and to the Congress, as well as to outsiders. Even in this case, however, the intelligent help of the research director and his staff could not be dispensed with. The research director would at least have the obligation of convincing the willing budget and administrative aids within the agency itself of the value of the proposed research projects. In most organizations, nongovernmental as well as governmental, success in persuasion is an important element in beginning effectively, or furthering the success of, any type of work, and organizations that carry on research are no exception.

To supplement budget officers of research organizations, the Bureau of the Budget and congressional appropriation committees might find it useful to have staff advisers on some important specialized subjects such as engineering, statistics, mapping, etc., who could give disinterested and informal advice in connection with the appropriation requests in their respective fields. As an alternative, a separately organized Research Advisory Council with a small staff of active investigators might be capable of giving advice on desirable priorities in different field of research,

especially if the Council could act both promptly and definitely on specific proposals, and if its advice could be informal enough to be rejected in whole or in part without embarrassment when considerations other than the research program itself make rejection advisable. Such a procedure by a Research Advisory Council would probably depend upon the existence of staff members with sufficient authority to give, without prior formal action by the Council, suggestions that would represent the approximate views of the Council.

Possible Misdirected Criticisms

Part of the complaint that there is opposition to research by the Bureau of the Budget and congressional appropriation committees, and even by the departmental budget officers, is probably due to the fact that the process of budgetary review permits someone else to be blamed by the research personnel when the administrative head of the bureau permits research funds to be reduced. Just as the Civil Service Commission is used as a convenient scapegoat in personnel requests that are, in reality, decided adversely within the requesting agency, so the Bureau of the Budget and the appropriation committees are convenient "bogey men" for use by the agency's own administrative officers, who have not been convinced of the usefulness of a research project but who wish to divert to someone else the onus of a decision based on their beliefs.

Another reason for the complaint of lack of funds is probably the same as the similar complaint from almost every agency and from advocates of nearly every kind of program. Since total governmental appropriations are limited, budgetary control necessarily means curtailment of many worthwhile proposals. Planning for the Government as a whole is as essential for research activities as for other work. Undoubtedly it will always be possible to point to probable errors that have been made in judging the comparative long-time value to the nation of different projects requiring additional funds. It is probable also that curtailment or elimination of nonresearch items may not be brought so forcefully to the attention of a research director as the rebuffs to his own well-considered plans.

Financial Administration of Research Projects

The Problem

Some potential flexibility in a research program, permitting changes in plans as unforeseen contingencies occur, is important for efficient and progressive administration. Federal agencies carrying on research are sometimes said to be seriously hampered in their work by restrictions that prevent the most effective use of funds appropriated, especially in dealing advantageously with unexpectedly favorable opportunities to push forward particular projects. Even retrenchment may be retarded in investigations that have run their course of greatest usefulness, when funds that might be saved by immediate curtailment cannot be transferred to other uses where expansion is taking place.

The complaint of restrictions on freedom of research management is not a new one. Except that the specific objects of complaint are different, the following extract of testimony, before a committee of the House of Representatives in 1902, is essentially the same as the complaint today:

> In every scientific bureau the feeling frequently arises that the auditors' requirements and restrictions, based largely on precedent as they are, tend to obstruct the freedom of action which is requisite to progress in research and in making new applications of knowledge; and it would seem evident that the administration of the scientific work would be simplified and increased in effectiveness if a larger power of interpretation of laws and regulation of studies were vested in the administratives charged with the special work, and if the scrutiny of accounts connected with such work were intrusted to a single auditor, who would naturally come to appreciate the distinctive requirements of these constructive branches of the Government service.[7]

Kinds of Restrictions

There are several kinds of restrictions in the use of appropriations that seem important to research directors. Probably first in importance is the impossibility of shifting small amounts of funds within a single agency from one previously designated appropriation to another. This impediment may be serious when research funds are divided into minute appropriation paragraphs in which the amounts carried must be proposed by the research director from 10 to 12 months previous to the beginning of the fiscal year in which the funds can be spent. In addition, there may be special limitations or prohibitions in the text of an appropriation paragraph which were inserted originally to deal with a temporary circumstance and have been continued from year to year by inertia.

Quite different from transfers between appropriations within the same agency are interagency transfers that enable one organization to ask other specialized Government agencies to perform work within their respective fields on a reimbursement basis. Prevention of such interagency transfers would handicap efficient operations in the Government service and would bring about duplication of equipment and activities.

A third type of restriction on administrative action is caused by limitations or prohibitions on the purchase or hiring of personnel, services, or materials

[7] W. J. McGee, March 31, 1902, *Hearing* (on bills) establishing a Department of Commerce, Labor, Industries, and Manufactures, p. 131.

needed for a study. Aside from restrictions on hiring and discharging of personnel, which is not essentially a financial matter, there are frequent budgetary limitations on the amounts that can be spent for printing and binding, books and journals, travel, per diem compensation for consultants, and purchase of certain articles such as automobiles. Some of these objects of expenditure require specific authorization or mention the language of the appropriation act, or detailed reports on intentions.

Intra-Agency Transfer of Funds

Freedom to transfer funds from one research project to another within the same agency is limited by the scope of appropriation paragraphs. In fact, a rough measure of flexibility in this sense would be the proportion of the agency's total appropriations for research that is contained in an appropriation paragraph, although there would be some qualifications if there were unusual restrictions in language. While in a few instances, especially among the older bureaus, the Congress may have insisted upon separate appropriations for each minute investigation of an agency, the usual congressional procedure at present, under persuasion of the Bureau of the Budget, is to appropriate a lump sum for all the expenses of one rather homogeneous broad function, in the exercise of which several separate projects are proposed to be carried out. Within the broad limits of the total appropriation for the specified function, such as for example, "mineral mining investigations" or "research and development," there is nothing except expediency and the probability of a particularly pointed inquiry at the next budget hearing to prevent the agency from shifting amounts from one previously announced project to another, subject, however, to the limitations or prohibitions on expenditures for certain objects, such as printing, books, etc. Furthermore, the tendency has been for new appropriation paragraphs to become more inclusive, and for older appropriations that were confined to single small activities, to be combined into general consolidated provisions covering wide groups of functions. As a result of this budgetary policy many agencies carrying on research have practically unlimited freedom to transfer funds from one of their research projects to another. Recently organized research agencies especially, are free from the numerous detailed appropriations for narrowly limited purposes, because they have accumulated no debris from previous years.

Flexibility would be achieved for most purposes, with even the most narrowly defined appropriations, if it were possible to transfer small amounts from one appropriation paragraph to another with the limitation that the amount involved would not be more than a certain percentage of the original amount carried in either paragraph. This device is well established in the financial practices of many governments and is not unknown in the Federal budget.[8] However, the principle is not favored by congressional appropriation committees. For example, the bill including appropriations for the Department of Justice for the fiscal year 1939 contained, in addition to the usual permission to transfer a small percentage of funds between penal institutions, a similar provision to be applicable to the amounts for eleven offices and divisions in the Attorney General's office. The new provision was passed by the House but was stricken out in the Senate.

An interesting laboratory test of the use that Federal research agencies would make of a generous allowance for internal transfers was provided during the fiscal year 1933. Section 317 of the Economy Act of 1932 permitted not more than 12 percent of any appropriation for the fiscal year 1933 to be transferred to any other appropriation under the same Department or independent establishment provided that no appropriation was to be increased more than 15 percent by such transfers. The results of this permission to effect internal transfers without separate Congressional approval for each case are shown in a statement appearing in the *Budget of the United States, 1935*.[9] It appears that the research work of only 7 agencies was benefitted by additional amounts in 39 such transfers of research appropriations, and that the gross amount of such transfers was $420,000, of which over half was used by the U. S. Geological Survey. As the fiscal year 1933 was a period of drastic wholesale cuts in appropriations with the probability that research functions were harder hit than other activities, the number of transfers and the total amounts involved in 1933 probably represent an extreme that would not be reached in ordinary years. Interestingly enough, in spite of the frequent complaint about restriction of printing funds, only two transfers were made to increase appropriations for printing and binding, and only one of these was for research publications.

Inter-Agency Transfer of Funds[10]

Transfers of funds between agencies are different, both in purpose and procedure, from transfer of funds within the same organization. Inter-agency transfers

[8] For example, see provisions in *Budget of the United States, 1939*, for the National Park Service, p. 450; Department of Justice, "penal and correctional institutions," p. 506; Office of Indian Affairs, "conservation of health," p. 392; and "irrigation and drainage," p. 372; Social Security Board, grants to States, p. 79; and Department of State, "foreign intercourse," p. 568.

[9] pp. A132–135.

[10] See also introduction, p. 64.

are provided to permit efficiency and economy through specialization of effort and maximum use of specialized equipment. Organizations that are not fully equipped to carry on occasional or incidental work of a highly technical nature may send such work to bureaus specializing along those particular lines. For example, an agency collecting data from a large single-time survey may have no tabulating machines, nor persons trained in tabulating procedures, and hence might ask the Bureau of the Census to undertake this phase of the work on a reimbursement basis. The National Bureau of Standards and the Bureau of the Census are outstanding examples of organizations performing specialized services of this character for other Government agencies. The Congress has made specific provision in recent appropriation acts for such work by the National Bureau of Standards.

There seems to be little difficulty or complaint in arranging for such transfers under the provisions of section 601 of the Economy Act of 1932, which liberalized the previous authorization of the Fortifications Act of 1920. Payment of a lump sum may be made in advance and set up as a "working fund" for a particular purpose, or reimbursement may be made as the obligations are incurred. In either case, the agency performing the work suffers no diminution of funds for its own functions.

Purchases and Payments

The latitude of research directors in using their appropriated funds is carefully circumscribed by statutes and decisions of the Comptroller General. However, research funds are not more hemmed around with restrictions than funds for many other purposes. Furthermore, the existence of such limiting regulations is essential for financial control in a democratic government. Some research directors have suggested that, if research is as important for national progress as they believe, a small fixed percentage of the total amounts appropriated for research in each agency should be left free from any restriction on the object of expenditure, provided a full report is made to the Bureau of the Budget of all disbursements from such unrestricted amounts.

Of the restrictions in choice of objects to purchase or hire, not only for research work but for all Government operations, probably first in importance for research is the limitation on printing and binding which is discussed more fully in a later section. Next may be mentioned the restrictions on hiring, discharging, and use of personnel. There are civil service procedures that must be followed to obtain new employees in most research agencies. There is also a prohibition[11] against payment of Federal funds to a nongovernmental individual or agency for services, except on a contract basis after appropriate bidding. It may be impossible, therefore, for an impatient research director to obtain at once the services of the exact person he wants for a particular study. In some cases, of course, there are legitimate methods of mitigating the severity of such denials. For example, an able university professor may be induced to accept responsibility for a study, without compensation, if Government employees are detailed to aid him in the work and all necessary supplies and materials are provided. One impediment, however, that is an especial hardship to some research organizations, and seems to be without any mitigating loop-holes, is the impossibility of sending staff assistants with full pay to universities or research institutions for special advanced training. Only the Army and Navy have this privilege. In civil agencies, training must be provided by the Government itself, which is sometimes impossible, or the employees may not be able to acquire the techniques that would make their work more valuable to the Government. Safeguards would be necessary if agencies were allowed the privilege of training employees at full pay in universities, probably under a general regulation of the Civil Service Commission so devised as to permit variations in individual cases. The general rule might, for example, limit the number of persons to be trained for any one agency, the length of time of training, and the amount of expenditure for tuition and other expenses; and should also include such provisions as might be considered practicable to insure the continued services of the trainee for a reasonable period after the completion of the training course.[12]

Other restrictions on the latitude of research directors to make certain expenditures include the requirement of specific authorization (usually accompanied by a specified maximum amount) to buy books and newspapers, to use funds for travel, etc.

Some research agencies state that equipment for urgent scientific projects cannot be obtained expeditiously by the usual requisition system devised for the protection of the Government in its purchases. It might be possible to devise a modification of the standard procedure for the purchase of scientific equipment under certain circumstances, but such modification would, of course, also have to be uniform for the protection of the Government against fraud. The frequency and kind of cases in which a scientific agency is handicapped by delay in purchasing equipment might be a proper subject for study, preferably by the Procurement Di-

[11] Revised Statutes, section 3678; 12 Comp. Gen. 516; 14 Comp. Gen. 617; 15 Comp. Gen. 951.

[12] Since this paragraph was written provisions in the two Executive Orders of June 24, 1938, have opened the way for such employee training. See Section 8, Executive Order No. 7916, and paragraph 3 (4) of Rule X of Executive Order No. 7915.

vision of the Treasury Department. If such hardships were important, recommendations could presumably be devised to effect whatever modification in the present procedures might be desirable under certain specified conditions.

Percentage Allocations For Research

A particularly unrestricted kind of flexibility in the use of research funds is possible for such agencies as the Bureau of Reclamation and the Bureau of Public Roads, that supervise construction work on a large scale. In these cases, a certain percentage of the amount appropriated for construction is available for general administration, or specifically for investigations necessary to proper planning of the construction program. A similar provision has been used advantageously for other kinds of work such as, for example, the administration of the public debt, where administrative expenses also depend partly on the volume of work which is to some extent unpredictable.

The experience of the agencies having such funds has not been examined sufficiently to comment on this technique other than to mention the obvious advantage to the agency of flexibility and the equally obvious disadvantage of absence of budgetary or other general governmental control. The flexibility so acquired by the few agencies where this method is possible may, however, be somewhat offset by instability in the research program if violent fluctuations in the volume of new work should occur.

Flexibility in Retrenchment

Since with few exceptions a reasonable amount of flexibility in research programs of the major Federal agencies is quite possible now under normal conditions, the only serious danger from undue rigidity (except perhaps for limitations on publication and certain purchases) seems to lie in the method of applying temporary retrenchment measures, such as the provisions of the Economy Acts of 1932 and 1933. In retrenchment for general economy purposes, the principle of flexibility requires that appropriation cuts, whether expressed as percentages or as lump sums, be allocated to each agency as a whole rather than to separate functions, since the undiminished activity of some functions may be more necessary than appears to the uninformed outsider. The responsible officers of each agency will be able to redistribute the total savings required for the whole agency among different constituent functions or activities in whatever proportions seem most advisable for the work of the whole organization. Certain administrative officers, of course, might redistribute the economy cuts within their organizations unwisely, but such officers would be a handicap under any system.

Uniform Project System

A recent innovation of the Department of Agriculture is a "uniform project system," which has considerable promise for wider adoption as a means of bringing the budgetary procedures within and without an agency into one consistent system. It might also be used as a substitute for any narrowly-limited appropriation paragraphs that remain. Under this system the amounts decided upon for each project by the bureau and department are not only reported for informational purposes to the Bureau of the Budget, but are the work units (with further division into sub-projects) for the department's own internal authorizing, review, coordinating, and control procedures. The only budgetary limitation from the Congress is the appropriation paragraph, which usually covers a group of two or more major projects having the same general function.

For several years the Bureau of the Budget has requested other agencies, for informational purposes, to report their expenditures by projects or functions, in addition to the usual classification by object. However, the projects so reported are not on a uniform basis among organizations and are, so far as is known to the writer, not used for internal control except in the case of the Department of Agriculture. Some agencies furnish no project or functional break-down of their appropriation programs even for informational purposes to the Bureau of the Budget.

Special Research Fund

The Department of Agriculture, in which the bureaus probably have research appropriations for as narrowly defined functions as in any other department or independent office, now has a compensating "special research fund" of $1,200,000, nearly one-half of which can be used to give flexibility to the research activities of the Department, by financing new or supplemental projects. While a lump-sum, supplemental research fund has obvious advantages in creating flexibility of expenditures and meeting contingencies, the method also has possible limitations that may discourage widespread adoption. For example, such a fund might conceivably be used, not so much to inject bona fide flexibility into a research program as to promote new expenditures. New projects, begun by use of the special research fund, might be continued indefinitely by resorting to the special research fund each year until an appropriation is begun for the purpose. A project, once undertaken, is apt to acquire a vested interest, so that pressure groups may become active to have the project specifically provided for in the regular budget. This practice would not be reprehensible, but it would be quite different from the promotion

of flexibility. A fund used solely for research flexibility would, in only exceptional cases, increase the total expenditures of the agency for research purposes, since amounts spent from the fund to supplement appropriations for one object would be counterbalanced by savings in the amounts designated for purposes that would not prove to be of pressing importance. A special research fund might, however, be used to take care of small increases in the amounts known in advance to be needed for particular research projects.

The history of appropriations for "contingent expenses" in the Federal Government indicates that there is another possible limitation on the special research fund method as a means of obtaining flexibility. Appropriations for "contingent expenses" have now become misnomers in nearly every case. Usually such appropriations are used only for routine purchase of supplies and materials and for other routine expenses clearly understood within the agency as well as by the Bureau of the Budget and the congressional appropriation committees. Sometimes the uses are even written into the language of the appropriation paragraph. There is little that could be called "contingent" in such expenditures. By analogy, it seems not impossible that a special research fund may be allowed or forced to become regularly and wholly allocated to some specific continuing purpose for which appropriations are not otherwise provided.

Hence, flexibility for a research program through a special fund has latent limitations as well as obvious present advantages. Even though use of such a fund proves wholly successful when given its first trial by the Department of Agriculture, the results may not justify wholesale imitation, as the Department of Agriculture has been notably successful in its long experience with methods of financial and research administration.

Budgetary Information and Procedure

Comprehensive information on a uniform basis should be available to the public about the expenditures for each activity of the Government. At the present time some agencies give little or no information about their research expenditures to the Bureau of the Budget or to congressional appropriation committees, so that practically nothing is available in published form. Other bureaus give information in rather comprehensive detail. While research men engrossed in their work may feel somewhat irritated by having to prepare information in the exact form and detail specified by a uniform regulation, nevertheless an agency or activity supported from public funds raised by taxation has the obligation to show exactly what its financial program is. The complaint is sometimes heard from scientific agencies that regulations for budgetary procedures are too exacting and divert too much time that should be spent on research. Employment of assistance to prepare under general supervision the forms required seems to be the most usual method of mitigating this difficulty.

The 12-month interval usually elapsing between preparation of Budget estimates for each fiscal year and the beginning of the fiscal year planned for is a necessary evil under present good budgetary practices. Conceivably, the period might be shortened at some time in the future after more rapid reporting and accounting methods have been perfected. The present system, however, does not inconvenience research agencies more than other Government agencies. Since budgetary control is one of the essentials of good government in a democracy, a Government organization cannot expect to carry on research without the ordinary inconveniences of such control. The Government procedures for effecting usefulness of results, efficiency, speed, thoroughness, and legislative and accounting control are necessarily somewhat inconsistent. Each of these legitimate interests limits the others to some extent.

The *Budget of the United States* does not at present contain analytical summaries except by agency, object of expenditure, and to some extent by broad governmental programs. The detailed paragraphs are still far from uniform in scope, content, and informational usefulness, in spite of continuing improvement. While a single appropriation paragraph may cover all the functions of a large independent agency, some relatively small bureaus still receive funds from scores of separate appropriations. Salaries are sometimes segregated in a paragraph by themselves. Printing, traveling, and library expenses may be included in amounts for a particular function of a bureau, or a separate paragraph may concentrate such allowances for the bureau as a whole, or even for the entire department. Though objections have been raised in Congressional appropriation committees to the rearrangement or consolidation of several artificially separated appropriation programs into a more logical and easily understood presentation, such a consolidation would have advantages for control as well as for information, especially when supplemented by comprehensive analytical summaries.

While the Bureau of the Budget is not free under the law to make any changes it wishes, it could nevertheless, if it had the available time and personnel, present informational summaries that would make the Budget document of more use to the general inquirer. It could propose to the Congress the elimination of most of the inconsistencies that remain in the Budget

from year to year. However, the Bureau of the Budget has been distinctly undermanned even for its function of preparing the Federal Budget and keeping itself currently informed as to the financial requirements of the several agencies. In addition to these functions, the Bureau has become the agent of the President in examinining the advisability of proposals for changes in the organization or function of the Federal Government by statute, Executive order, or otherwise that would affect the financing requirements of the agencies involved. As practically every change of function or organization affects the Budget, and the recovery plans have increased the number of such changes, the Bureau of the Budget has found itself with little time for such postponable activities as improving the presentation of budgetary data. Hence an inquirer interested in a comprehensive view of Federal finances is not likely to find all the information he desires readily available.

Probably no one is more anxious to have these improvements take place than the Bureau of the Budget itself. If the often proposed enlargement of the Bureau is effected, informational improvements in the Budget document would be possible, excepting as comparability of data and sufficient analytic detail might be prevented at first by differences in administrative accounting procedures. An interested citizen might then be able to discover readily the total expenditures of the Federal Government for many specific purposes or functions, the amounts involved in using certain techniques or methods, the purchases of the Government by kinds of materials, the importance of different categories of payees, the geographic distribution by States of the initial payments for Government materials and services, etc. The remarkable technique developed under the Commissioner of Accounts and Deposits for the reports of the President to the Congress on the financial status of emergency relief funds suggests that a similar method might be devised for reporting the status of regular funds.

Until the Bureau of the Budget is able to compile information on a comprehensive plan, the various informal and formal coordinating committees and boards could well perform part of this service for the particular activities in which they are chiefly interested. Occasional comprehensive interagency information on expenditures for surveying and mapping of different types, or for libraries, or for statistical compilations, would be of use not only for the summary results but for the interagency relationships disclosed. In each of these cases, as in others that suggest themselves at once, the information to be of most use should be broken down into distinct categories defined as rigidly as circumstances would permit.

Absence of Research in Some Agencies

It is rather startling to find that some governmental agencies either do not have any research within their organization or decline to admit that any research is being carried on. Since research in some form is essential to vitality and certainly to progress, it is disquieting to have representatives of large and important Federal agencies state by implication that their activities are confined to carrying out administrative detail without thought of a long-time plan or the needs for the services that the agency is supposed to supply. In somes cases, of course, the lack of research is more nominal than real, being due to a difference in interpretation of the term "research." In other cases the amount of research is reported as negligible, although a minimum necessary to intelligent direction of the agency's most pressing work is undoubtedly carried on. Nevertheless there are agencies spending a considerable amount of money in administering processes of national significance in which information and experience obtained as a byproduct of the costly administrative activities are neither summarized nor analyzed for the benefit of policy making or the direction of the agency's future activities. One large agency carrying on a Nation-wide activity of major importance disclaims harboring any research within its huge organization, and when questioned in detail on its extensive equipment needs, affirmed that such minimum research activities as were essential were carried on informally by a few persons after office hours. Another agency in which research would presumably effect large economies reports no research expenditures with the comment that individual research or the compilation of statistical data would result in a duplication of effort and expenditure that would be unwarranted under present conditions. Still another agency having regulatory functions, on which the lives of certain groups of citizens depend, spends practically nothing for research and some of its executives seem entirely complacent that even these small expenditures for research are transferred to another agency. By contrast, a similar agency whose work also affects the physical safety of citizens, put up a strong and now partially successful fight to have restored an appropriation for research that was taken away on the ground that an outside agency in a related field could determine safety standards.

A table of research expenditures by agencies, therefore, is significant not only for the names of the agencies that are included but also for the omissions. Requests for inadequate amounts for research are, of course, only a step removed from requesting nothing. While interagency comparisons are dangerous, as explained at some length in the introduction to this re-

port, nevertheless a clue to inadequacy of research activities may be obtained in a few cases from small amounts or omissions in the detailed tables presented in part I of this section.

Duplication in Research Activities

There are sometimes allegations of duplication of research activities of the Federal Government. Usually, however, an investigation of any particular case shows that there is no exact duplication of a significant part of the work of the respective agencies. There may be an overlapping in subject matter so that consolidated or cooperative projects might be carried on with better results or at less expense than the separate investigations. Such cooperative arrangements would be desirable if they could be arranged either through the initiative of one of the agencies (which is usually difficult because of probable consequences if overtures are rebuffed by the other agency), or through the technical intervention of a coordinating organization or advisory committee. The type of duplication which seems most real in Federal research activities, especially in the social sciences, is the duplication of requests to the same respondent for similar information set up in distinctly different ways, or covering different periods, or using different definitions of items. A request to respondents for information exactly duplicating a previous request, would probably be less burdensome, though perhaps not less irritating, than an inquiry that is just enough different to require a complete reworking of the same basic records before replying.

Coordinating boards or advisory committees can often be of considerable aid in discovering cases of incipient duplication and preparing the way for direct cooperation between the agencies concerned. A research advisory council might prove to be of value in this respect as well as in other phases of research problems affecting several Government bureaus and offices. Such a council could act as a clearing house of research projects proposed in the different fields for which it has specialists on its staff or coordinating advisory committees, and would be able to make recommendations about consolidations, alterations, new inquiries needed, priorities, etc. If such a council were to be organized, its relationship to the four existing research councils and the inter-agency technical boards, as well as to the Bureau of the Budget, the Congress and any general planning agency that may be established, should be carefully considered.

Cooperative Private and Government Financing of Research

The use of private funds by a Federal agency for carrying on research work of a cooperative or service nature may be illustrated by grants from the Rockefeller Foundation for research at St. Elizabeths Hospital; the contributions from States and local fruit growers' associations to aid the Weather Bureau in its collection of data for fruit-frost warnings; and receipts of the Bureau of Agricultural Engineering from local districts, canal and ditch companies, mining and hydro-power companies, and even individual farmers, to help finance snow surveying and forecasting irrigation water. In the social sciences, a possible bias in the results of Government research financed partly from private funds may be partially guarded against by publicity of such arrangements. In the natural sciences and technology, a corresponding danger is present when a Government agency makes tests, paid for by private businesses or associations of producers, of products connected with the agency's research work. Whenever secrecy of results is imposed on the Government agency conducting such tests in order to prevent consumers from knowing about adverse reports, the the interests of the public are jeopardized.

Cooperative financing in the reverse direction, that is, use of Federal funds by a non-Federal agency such as a private university, a State government, or a research foundation, for carrying on cooperative research, now exists only in a few specially authorized instances such as the grants to the agricultural experiment stations, and the aid given to approved State highway and social security research programs. Research from emergency funds, however, is largely carried on in local works projects under the immediate supervision, if not the legal direction, of non-Federal agencies.

Some of the Federal research agencies perform minor services for the public on a reimbursement basis; that is, compensation is received for the expenses involved. In some of these cases under present procedure, such minor receipts are covered into the general funds of the Treasury as "reimbursements", "sales of products", and "sales and services", under "miscellaneous revenues"; while expenses for services must be paid out of the agency's appropriation for its own regular work. This arrangement may result in a hardship to the extent that such services are performed. Similar receipts in other agencies have been set up as a special fund for which expenditures for the same purposes may be made in the future under usual budgetary procedure for "earmarked" funds. Uniformity of treatment in such cases, if feasible, might remove a source of minor annoyance and increase the willingness and efficiency of some research agencies in making their incidental services more widely available.

The possibilities for using cooperative Federal-State or Federal-private-institution arrangements for re-

search involving cooperative financing have been little used except in grant-in-aid services such as the agricultural experiment stations, and a few other isolated cases, mostly under Federal agencies originally established under emergency acts. Several outstanding cases of cooperative statistical reporting have been and are now in existence, in which each cooperating agency pays for specific persons, or processes wholly necessary to its work, so that joint financing is nominally avoided. There is, however, at least one case of a series of studies, each of a particular interest to a different region or locality, being carried on by a Federal agency without intimate and active cooperation of the States or local institutions, partly at least on account of the difficulties of joint financing.

Restrictions on Expenditures for Printing

One of the criticisms most frequently heard with respect to present arrangements for financing research is the limitation on funds for printing. The Congress has not specifically limited printing for research more than printing for other purposes, but has implied, by its method of appropriation for all printing, that too much will be authorized by Federal agencies unless the amounts available for this purpose are strictly limited. While there may be some foundation for this judgment, the result has been, in many cases, that the findings of an expensive research project are not made known adequately, and in some cases, almost not at all. Within each agency the specified amounts for printing are apt to be battled over by the different possible users, and the research representatives, who often need large amounts, do not win many skirmishes.

The most obvious result of this policy is the more or less real deprivation of potential beneficiaries of a study, who either do not know of the study's existence or who are not able to consult the research director or read his typed manuscript. Almost equally important, however, is the effect of stopping or postponing subsequent research projects which seem fated for a similar anonymous grave in a Government filing cabinet. In addition, the effect on the morale of the research personnel is serious, since scientists are eager to see their findings in print, and consider publication of their results as a major part of their compensation. Both extravagance and niggardliness can be charged to a policy of spending millions to find out something, but hardly a cent to let the results become known. Lastly, there sometimes results from the limited funds a discrimination between research and more ephemeral activities in favor of the latter. The value of sending current information to citizens is obvious, but the usefulness of disseminating analytical studies, which will be read by few in their original form and will be only gradually digested through others' works into the nation's intellectual circulation, is not always so evident.

To remedy this situation, the suggestion has often been made that no important research activity should be begun without earmarking an adequate amount of funds for prompt publication of the most important results. Such a rule would, however, presuppose the ability of research directors to forecast for each study the approximate time of completion and extent of findings to be published.

The restriction on printing funds, together with the 20 percent priority surcharge of the Government Printing Office for rush work, happens to discriminate against the older research agencies with regular funds as compared with newer agencies financed by emergency funds that are not restricted as to printing. The agencies without emergency funds do not usually have printing funds available to pay extra charges for rush orders. On the other hand, the emergency funds are adequate to permit payment of the priority surcharge for nearly every printing job financed from such funds. Moreover, the bulk of these priority orders is sufficient to take up most of the excess capacity of the Government Printing Office whenever the Congress is in session. Hence, such printing as is possible for the older research agencies is often delayed for many weeks except during a congressional recess.

One of the best known large research bureaus in the Federal Government had its already scanty printing fund seriously cut at the time of the Economy Acts in the early 1930's, so that its periodic reports, containing both current data of immediate importance and results of fundamental scientific studies, were kept going only on a skeleton basis for a short time until the agency became the beneficiary of emergency funds to enlarge its program for recovery purposes. Since the data previously published were important to the new program, it was possible to use emergency funds to reestablish the printing of its reports. Such legal subterfuges should not be necessary if the problem of financing research publications were met specifically and comprehensively.

Comprehensive Economy Drives

Representatives of research agencies seem to have an especial fear of comprehensive economy drives. The argument is, briefly, that research activities suffer especially in any comprehensive move for wholesale reductions in expenditures, because types of activities other than research appear less vulnerable to administrative officers. For example, regulatory functions, where they occur, usually constitute the chief purpose for which an agency was created. Although there may sometimes

be political pressure to eliminate part of the regulatory activities, any regulation usually presupposes a comprehensiveness that does not lend itself readily to severe reduction in scope without political repercussions. Again, routine administrative work such as accounting, personnel administration, correspondence and files, etc., which keep interdependent processes functioning, are difficult to reduce drastically at a moment's notice. Specialized functions, such as military preparedness, construction of public works, conduct of foreign relations, law enforcement, etc., exist, expand, and contract depending upon factors other than the Government's need for retrenchment. There remain the functions of service, promotion, and research. Retrenchments in distinctly service activities are, of course, objected to by the immediate beneficiaries. Promotion and research are left to bear the brunt of the retrenchment, and promotion, which is always vulnerable, is small in amount excepting as it also partakes of the nature of a service. Research activities, especially those without a directly interested, quickly protesting, outside beneficiary, are apt to suffer a disproportionately large part of the retrenchment, unless the agency in which the research is conducted makes an extraordinary effort to protect the research items.

Results of retrenchment in the past have sometimes seemed especially unfortunate to the older research agencies. For example, the recent Economy Acts deprived some of the long-established, well-equipped research agencies of part of the means to carry on their investigations. The Economy Acts, enacted largely to help the Government financially in the emergency, were followed within a few months by other acts for dealing with specific emergency problems. New agencies created to deal with emergency problems found need for the type of information that had been diminished or eliminated under the Economy Acts, and either began research themselves to obtain this information or paid the older agencies to do it. In some cases the immediate result was a partial shift of research activities, especially in the social science fields, from the older agencies to the newly created ones. However, as the total amount of research was greatly increased, the losses of the permanent agencies were temporary, for the most part, and were usually replaced by net gains.

Prolongation of Research Projects

The statement is sometimes made that research projects continue long after the needs for the investigations have ceased to exist. Sometimes, however, the continuance of appropriation requests by the agency carrying on a research project does not represent an undue prolongation or repetition of a small piece of work. Rather it represents a shift from one phase of a project to another, in accordance with a well-planned, long-range schedule. A budget officer comments on this problem as follows:

> The question often arises at Budget and Congressional hearings as to whether a research activity is ever concluded and brought to a close. * * * Probably the principal reason for the frequency of the question is the fact that the basis (even a project basis) on which research is presented in the Budget is usually so broad that profitable and quite necessary work may be conducted for a long period under a project even though a continuous shift may be in process from completed phases to new and unanswered problems. It is rather difficult to interpret this point satisfactorily to Budget and Appropriation Committees. The complaint is made constantly that nothing is ever brought to a close. In presenting research items the spending agency is constantly on the defensive on this point. Perhaps there is no adequate solution of the problem, since the use of a project breakdown sufficient to reflect frequent completions of research work would usually be quite impracticable without extensive and detailed cost accounting.

Continuance of a nominally identical project through a series of years is likely to occur whenever the investigation cannot be broken down easily into independent phases. Such instances are difficult for an outsider without technical advice to distinguish from genuine cases of projects that have outlived their period of greatest usefulness. On the other hand, there is an undoubted tendency for appropriations that have once been made to be continued until specifically challenged.

APPENDIX

Notes on Methods Used in Compiling Data on Federal Expenditures for Research

Sources of Information

Published sources of information used in preliminary preparation of data include:

The *Budget of the United States Government, 1939.*

Annual reports of the several Departments and independent establishments for the fiscal year 1937.

Hearings on each of the major appropriation bills for 1939 before the respective subcommittees of the Committee on Appropriations of the House of Representatives.

Budget officers, and in some cases directors of research in the various agencies, were intervewied to obtain information not available in usable form from printed sources. Additional information was sometimes obtained from memoranda received by the Committee on a Survey of Governmental Relations to Re-

search, in response to a request, addressed to agencies carrying on research in the natural sciences, for comments on problems connected with their research work.

If data for an agency were compiled from published or indirect sources, these data were formally transmitted to the head of the agency for confirmation. The amounts in this study given for total research expenditures of each agency are therefore figures that have been confirmed by the agencies themselves, except where otherwise indicated or where an agency has been credited with research paid for, but actually carried on by the one agency which specifically requested that such transferred amounts be not credited to it.

Use of "Obligations" for "Expenditures"

Although the study is labeled *Federal Expenditures for Research* and the word "expenditures" is used in most of the tables as well as in the text, "obligations" were actually used so far as possible. Use of "obligations" aids in classifying "expenditures", since data by separate projects are often available on that basis in the "green sheets" submitted by agency budget officers to the Bureau of the Budget each September 15 and later published in the *Budget of the United States Government.* However, when more feasible, use was made of amounts on other bases—"checks issued", "unrevised cash", "allocations" of administrative funds, or even "appropriations" and (for a few works projects) "authorizations". In most cases, the differences between the amounts reported on the several bases would be smaller than the changes that would result from either an altered definition of "research" or from different methods of applying the necessarily intangible concept of "research" to specific expenditure items.

The use of "obligations" rather than "expenditures" affects somewhat the inclusion of "research" work in those few agencies that have such work transferred to them, or carried on by another agency for them. This study has followed, with one exception, the Government's accounting and budget procedure in the case of such transfers, charging "obligations" to the agency actually performing the technical work, rather than to the agency that eventually pays for the operation and expects to use the results. Since the agency carrying on the work can give a break-down of the costs while the reimbursing agency knows that only certain work including some research is billed to them, this method is more feasible in trying to separate costs of projects. The determining factor for this study, however, was the better information about research projects available on the "obligations" basis.

Definition of "Agency"

For purposes of this study, "agency" was defined to mean either (1) an independent establishment or (2), in the 10 Cabinet Departments, any bureau, office, division, administration, service, college, survey, or other major unit the head of which reports directly to the Secretary, Under Secretary, or Assistant Secretary of the Department without nominal routing through an intermediate bureau chief or other administrative officer.

Accuracy and Consistency

Consistency rather than accuracy is the criterion of excellence in a compilation of expenditures for a function such as research. The definition of "research" used in this report is necessarily arbitrary. Again, the methods of applying the definition to the different types of work encountered must be arbitrarily determined to fit each individual case, especially in such matters as allocating general administrative expenses, travel, printing, etc., between research and nonresearch activities. Hence accuracy, although necessarily implied in any numerical compilation, is without its essential meaning of conformity to an exact standard, and consistency takes its place as a technical criterion. The degree of consistency in the data can be judged, however, only by considering feasible alternatives, and hence is largely a matter of individual judgment.

Data on the basic tables are carried to the nearest thousand dollars, irrespective of size or of the probable degree of care and understanding involved in individual estimates. Most of the material, as received from the agencies was expressed in units of hundreds of dollars or less, although a few estimates were carried only to the nearest ten thousand dollars. Several agencies reporting less than $10,000 for research spent an unusual amount of time trying to get what they considered very accurate figures, in spite of the suggestion that it was not necessary.

The data on emergency obligations for research purposes may be 10 percent or more in error for the fiscal year 1937 and perhaps twice this much for 1938. The probability is, however, that detailed complete compilations of the emergency expenditures would not change the results more than one or two million dollars. The method of estimating the emergency expenditures is explained in a later section of this Appendix.

Omissions

Army and Navy salaries and equipment.—One of the most important omissions, measured by quantity, in data reported is an amount to represent salaries of officers and enlisted personnel from the Army and Navy Departments assigned to research projects, and the cost of the regular Army and Navy equipment and supplies used in making field tests of new devices or ordnance. In each of these two Departments the pay

of officers and men and purchases of regular supplies, materials, etc., are from centralized appropriations, irrespective of the duties or functions of the officers, men, and materials. The Army and Navy budget officers state that no allocation should be attempted of such expenses used for research purposes, since the same number of officers and men and the same amount of supplies and equipment would be maintained irrespective of whether research was carried on or not, and personnel detailed to a research or field-testing job are given such assignments not so much to carry on research as to become acquainted with devices that they may have to use later.

Buildings.—The cost of maintaining Government-owned buildings and the rent of privately owned buildings for governmental use, is an expense borne by the National Park Service for which two consolidated appropriations are received, applicable, respectively, to public buildings and grounds in the District of Columbia and outside the District of Columbia. No attempt has been made in this study to allocate any part of these expenditures to research activities, although some part of the total might legitimately be charged to housing research activities.

Overhead of Bureaus, Departments, and the Government as a Whole

The amount of overhead expenditures of the bureau or office that should be allocated to research was requested for each agency. If no better method of allocation was suggested, a simple division of the cost of administrative and internal-service units was made by using the ratio that research expenditures were to the total budget exclusive of such overhead items. Overhead items, to be included unless otherwise specifically provided for, were general administration, legal counsel, accounting, personnel, chief clerk, printing, transportation, supplies and materials, travel, and clerical help not specifically assigned to the research units. In some cases where a distinct research unit in the organization is supposed to centralize the research work of the organization completely, it was difficult or impossible to obtain a figure representing outside general administrative expenses, especially after printing and travel had been accounted for.

In addition to the overhead of the separate bureaus, some overhead expenses of the departments in which the bureaus were located might have been included. Where research work was carried on within administrative officers' own organizations, these organizations were called an agency and the amount of research was included, with any appropriate intra-agency overhead, as a separate unit in the general data. Otherwise, the general rule was followed that no allocation of overhead expenditures to research would be made from funds expended outside of the agency itself, excepting where definite amounts of a departmental appropriation for printing, travel, etc., were specifically allocated by the department for the work of a constituent bureau. The rule that estimates of general administrative and other overhead expenditures for research should stop at the borders of the agency itself has made some inconsistency in the data for different departments, but on the whole seems more defensible than any other procedure. The effect of the method by departments may be summarized as follows: Amounts for departmental overhead allocable to research were probably included adequately under separately listed administrative units in case of the Departments of State, Treasury, Agriculture, and Labor. Data for overhead allocable to research were omitted (*a*) for the War and Navy Departments for reasons analogous to those stated in the paragraph on Omissions, above; and (*b*) for the Department of Justice where the usual type of investigation for preparation of legal briefs were excluded from research by definition. Any addition of prorated overhead to the small amounts reported for research by the Post Office Department would not increase these amounts appreciably. In the Departments of the Interior and Commerce the general administrative expenses might be estimated on the basis of the research expenditures reported from the constituent bureaus to be in the neighborhood of $100,000 which might be added to the total for research if one wishes to take account of this indirect expense. It is omitted in the tables used in the body of the report because of the rule stated above.

To have a complete allocation of indirect overhead expenditures for research, it might be considered necessary to add to the allocation of such expenses within the bureaus and departments a further amount representing allocated general overhead expenditures of the Government as a whole. For example, expenditures of the Civil Service Commission would be considered an overhead expense for the personnel of the Government, the General Accounting Office an overhead expense for accounting, the finance work of the Treasury Department would be an overhead cost of financing activities, and the Department of Justice would be charged to the cost of dealing with legal difficulties. Even the Congress would be an overhead expense chargeable to legislative consideration and authorization of plans, and the Federal courts would constitute a cost for deciding matters affecting the various functions of the executive agencies. From this point of view, most of the rest of the Government would be an overhead ex-

pense for each of the particular activities carried on within it, which would clearly be an impracticable straining after completeness.

A particular case, however, is involved in such coordinating boards or agencies as the Central Statistical Board and the Federal Board of Surveys and Maps, whose work is practically confined to dealing with research agencies in the Federal Government. From the point of view just stated, it might be contended that all of such an agency's work is research because it is in the nature of an overhead expense for the research work coordinated. This position does not seem as tenable as that expressed in the rule for this study, viz., that allocation of overhead expenditures stops within each bureau or agency, excepting for specific allocations from departments.

Although overhead expenditures have been omitted that might be logically included, it can be said on the other hand that prorating overhead expenditures within a single agency on the basis of the relative expenditures for research and nonresearch activities, overstates the amount of general administrative expense allocable to research that would probably result from a meticulous cost-accounting analysis. Research activities, especially those of the "higher" order involving planning of studies, development of methods, and critical analysis of results, require less general administration, and internal personnel, legal and informational services, etc., than do such activities as regulation, promotion, or other operating functions dealing directly with the public. Hence the results of prorating the unallocable overhead of an agency between research and other activities on the basis of relative expenditures may partly or wholly compensate for any omission of overhead allocable to research from departments or the general governmental organization.

Contingent Expenses, Travel, and Printing

When contingent expenses, travel, and printing are appropriated in lump sums for the department as a whole, the department usually allocates the departmental appropriations to the bureaus according to a schedule that is made public in the budget volume. When the amounts applicable to the research activities of the bureau were not obvious on the basis of published data, the proper amounts were obtained from the budget officer of the bureau concerned. If the appropriations for these expenses were received directly by the bureaus, whether separately or as part of other appropriations, they were accounted for in the same way as in the case of any other direct appropriation to the bureau.

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Libraries

Government libraries and library appropriations have various relationships to their operating agencies. In some cases a library has its own appropriation paragraph; in other cases it is included as part of a single departmental or bureau paragraph; and in still other cases the library receives funds from several different and nominally unrelated appropriations. Since libraries are of interest in this study solely as aids to research, no attempt was made to report library expenditures completely, nor to segregate expenditures for libraries if the library or a proportional part of its disbursements were reported as part of the other research activities of the agency.

In the case of the Library of Congress and a few other libraries, and the analogous case of The National Archives, the amounts reported, representing operating expenditures for activities that may aid research, could not be allocated between the natural sciences and the social sciences, and hence are included in the tables under the caption "Library and other aids to research."

Surveys and Maps

Surveys and maps include not only mapping and surveys leading to mapping but also surveys for inventory purposes. However, cadastral surveying is excluded. Preparation of maps from the maps or data of other agencies has been included whenever reported.

Land and Buildings

The cost of acquisition of land and buildings for research purposes have been excluded from tables showing operating research expenditures after deducting grants and contributions; but such costs have been included along with grants and contributions in tables showing grand total research expenditures of all kinds. The total amount of obligations, however, for land and buildings for research purposes is so small as to be negligible.

Estimates of Emergency Expenditures

Consolidated estimates were compiled for research expenditures from various emergency funds, on the basis of information obtained from the Works Progress Administration, the Office of the Commissioner of Accounts and Deposits of the Treasury Department, and budget officers of several agencies, in addition to the published sources listed in the first section of the Appendix. The more comprehensive data on research expenditures from emergency funds prepared for this study are summarized below. Data for table A were compiled by the Treasury Department and for table B by the Works Progress Administration.

TABLE A.—*Expenditures*[1] *for research and statistical surveys*[2] *from funds allocated under the Emergency Relief Acts of 1935, 1936, and 1937*

[Data compiled by the Office of the Commissioner of Accounts and Deposits, Treasury Department. Figures in thousands of dollars]

Fiscal years:	
1936	23,942
1937	48,233
1938 (to Apr. 30, 1938, only)	23,546
Total	95,721

[1] Basis of checks issued.
[2] Exclusive of "professional and technical projects," "Youth projects," "Miscellaneous women's projects," "Educational projects," "Clerical projects," "Art, literary, and recreational projects," and some miscellaneous and unclassified projects of a similar nature included under the general heading "Educational, professional, and clerical projects."

On the basis of the data to April 30, 1938, in table A, the annual rate of expenditures during the first 10 months of the fiscal year 1938 was about 28.3 million dollars. During the 4 months January to April 1938, inclusive, the average monthly rate was 2.1 million dollars (by subtraction of the amount given in the *Report of the President of the United States to the Congress Showing the Financial Status of Funds Provided in the Emergency Relief Appropriation Acts as of December 31, 1937*, page 169, table VIII B). Hence the amount of research expenditures from Emergency Relief Act funds alone, and exclusive of professional, technical, educational, and other related projects, was 48.2 million dollars for the fiscal year 1937, and will probably be about 28 million dollars for the fiscal year 1938.

TABLE B.—*Expenditures for research and statistics under the Federal Works Program,*[1] *fiscal years 1937 and 1938*

[Data compiled by the Works Progress Administration. Figures in thousands of dollars]

Item	Fiscal year 1937	Fiscal year 1938[2]
Expenditures from funds allocated to the Works Progress Administration—Total	31,700	22,700
(A) Projects sponsored by Federal agencies other than W. P. A.	3,946	2,728
(B) W. P. A. State, local, and national research program	26,954	18,672
(C) W. P. A. research for administration	800	1,300
Expenditures from funds allocated directly to other Federal agencies[3]	8,865	2,093

[1] Covers the Emergency Relief Appropriation Acts of 1935, 1936, and 1937.
[2] Estimated for entire fiscal year on basis of expenditure data for first 10 months.
[3] Does not include expenditures for projects approved under the E. R. A. Act of 1935 or engineering and mapping surveys.

All proposals for projects to be operated under the Works Program, whether sponsored by local, State, or Federal agencies, are subject to technical review by the Works Progress Administration, which also acts in a coordinating capacity to assure that projects approved for operation are suited to the purposes of the Works Program. Table B summarizes recent expenditures for this program.

TABLE C.—*Research obligations*[1] *of Federal agencies from emergency funds for the fiscal years 1937 and 1938*

Compiled from (1) individual appropriation paragraphs in the *Budget of the United States Government, 1939*, (2) direct reports from certain agencies, and (3) detail from the Works Progress Administration corresponding to table B. Figures in millions of dollars]

Types of emergency funds	1937	1938 (estimated)
Total	27.2	11.5
National Industrial Recovery	1.1	0.2
Public Works Administration	0.1	0.3
Federal Emergency Relief Administration[2]	0.2	0
From processing tax proceeds (A. A. A.)	0.3	0.1
Emergency relief allocations through Works Progress Administration[1]	4.7	4.0[3]
Emergency relief allocations *not* through Works Progress Administration	20.8	6.9

[1] Includes some allocations and expenditures.
[2] In process of liquidation.
[3] Sum of amounts reported in table B, lines (A) and (C).

Tables A and B represent expenditures, and table C shows obligations largely. These and other differences are noted in headings, footnotes, and comments with the respective tables.

A summary of these tables may be made in various ways, and somewhat variant results may be obtained. The quickest summary method is to add to the totals of table C, which gives research obligations of Federal agencies from emergency funds, to the expenditures reported in table B for "State, local, and national programs." The results are about 54 million dollars for 1937 and about 30 million dollars for 1938, which are the amounts used in the text of this report. Data from table A, compiled by an entirely independent classification, are confirmatory of the general order of magnitude of these summary results, especially when the exclusions listed in footnote 2 to table A are taken into account.

Incomplete Compilations

The following compilations were not completed for this study, but might be included in any similar survey in the future:

(1) Comparison of research expenditures in the United States and selected foreign countries.

(2) Amounts of research expenditures classified by the general period in which the research function began and by agency or general subject field.

(3) A relatively comprehensive separation of expenditures for research (or for research personnel) into amounts spent at the home office in the District of Columbia and amounts spent in the field, by agency or by general subject field.

(4) Comparison of professional and scientific staffs of agencies with amounts of research undertaken, by agency.

(5) Extension to 1938 of the price index of Federal expenditures from 1915 to 1926, compiled for the annual report of the Secretary of the Treasury for 1926; and use of the index in correcting historical data on research expenditures for price changes.

(6) Research expenditures from emergency funds, by agency. (Data by Federal agencies on allocations of W. P. A. funds were received too late for use in this study.)

Summary of Previous Estimates of Federal Expenditures for Research

a. Authors and References

(1) Rosa, Edward B. Expenditures and Revenues of the Federal Government, in *Annals of the American Academy of Political and Social Science*, May 1921, pp. 26–33, 34, 37, 57–58, 75, and *passim*.

(2) White, Charles P. Trend in Federal Expenditures, in *Annals of the American Academy of Political and Social Science*, May 1924, pp. 3n, 4.

(3) Science Service (Marjorie Van de Water and Watson Davis) in *Science News Letter*, vol. XXV, No. 667, January 20, 1934, p. 35.

(4) U. S. Bureau of the Budget. Science and Research, General, *Budget of the United States Government;* 1926, facing p. A57; 1927, p. A54; 1928, p. A71; 1929, p. A80; 1930, p. A85; 1931, p. A99; 1932, p. A130; 1933, p. A162; 1934, p. A176; 1935, p. A87.

(5) Ward, Ralph B. *Expenditures and budgeted estimates, 1930, 1933, and 1935, for the support of the work of scientific bureaus and independent offices of the United States Government* (mimeographed, 69 pp.).

b. Data by Years

TABLE D.—*Previous estimates of Federal expenditures for research, by scope of definition used*

[In millions of dollars]

Fiscal year	Research	Science and research, general [1]	Research in natural sciences		Research, education, and development	
1902	*McGee* [2] [8] 11.3					
1910					*Rosa* [9] 25.4	*Bureau of Efficiency—Van de Water* [4] 35.2
1911					27.4	
1912					22.2	
1913					21.6	
1914					22.9	
1915		*Bureau of the Budget* [9] 7.1			30.1	40.8
1916		6.8			27.7	
1917		6.6			28.4	
1918		8.0			34.8	
1919		8.0			37.9	
1920		21.4			57.4	77.8
1921		13.9			*Bureau of Efficiency—White* [9] 53.9	72.8
1922		11.5			72.8	67.5
1923	*Bureau of Efficiency—Van de Water* [4] 51.7	8.9	*Van de Water and Davis* [4] [10] 16.6		[2] 57.7	70.9
1924	55.8	9.3	[10] 17.3		[2] 55.5	75.0
1925	61.6	13.0	[10] 19.0			84.1
1926	60.8	11.7	[10] 18.3			84.1
1927	67.1	12.2	[10] 19.5			91.9
1928	71.9	15.0	[10] 20.6			96.2
1929	75.5	14.9	[10] 26.0			102.4
1930	96.0	23.3	[10] 27.7	*Ward* [9] [3] [7] 88.5		125.5
1931	99.6	25.0	[10] 30.5			135.9

See footnotes at end of table.

TABLE D.—*Previous estimates of Federal expenditures for research, by scope of definition used*—Continued

[In millions of dollars]

Fiscal year	Research	Science and research, general [1]	Research in natural sciences		Research, education, and development	
		Bureau of the Budget	*Van de Water and Davis* [4]	*Ward*	*Van de Water and Davis*	
1932		16.0	[6] 42.4		[6] 135	
1933		13.0		[7] 93.4	[3] [4] 121	
1934		[2] 8.5	[5] [2] 25.1			
1935		[2] 10.7	[2] 28.1	[2] [7] 71.1		
1936			[2] 36.9		[2] [4] 88.7	
1937			[2] 42.2			

NOTE.—Expenditures from emergency funds are excluded. Discrepancies between amounts for the same year estimated by different investigators are due largely to differences in definition.

[1] Exclusive of research listed elsewhere in the Bureau of the Budget's classification of expenditures by functions.
[2] Estimates of expenditures or appropriations for the current or immediately succeeding fiscal year.
[3] Departments of Agriculture, Commerce, Interior, Navy, and Treasury only. Omitted departments and independent offices were stated by Ward to have expended about $7½ million in 1933.
[4] Heretofore unpublished.
[5] After preliminary cuts. (Science Service mimeographed statement of Aug. 18, 1933.) First Budget estimate had been $34.8 million. An additional $4.4 million for scientific research was estimated to be available from emergency funds. (See *Science News Letter*, Jan. 20, 1934, vol. 25, p. 35.)
[6] Congressional Record, June 10, 1933, pp. 5793–5794, quoting from Science Service mimeographed statement of Mar. 13, 1933.
[7] Without subdividing appropriation paragraphs.
[8] For detail, see table E.
[9] For citation to source, see "Authors and references" above.
[10] Does not include small amounts from Navy and State Departments to be consistent with Rosa estimates.

TABLE E.—*Appropriations for scientific bureaus maintained by the Government, for the fiscal year 1902*

[In thousands of dollars]

	Appropriations, 1902 [1]
Total	$11,255
Treasury Department:	
Coast and Geodetic Survey	805
National Bureau of Standards	142
Bureau of Statistics	61
Navy Department:	
Naval Observatory	65
Nautical Almanac	23
Department of the Interior:	
Census Office	3,523
Geological Survey	961
Department of Agriculture:	
Secretary's Office	116
Weather Bureau	1,148
Bureau of Animal Industry	1,154
Bureau of Plant Industry	497
Vegetable Pathology	60
Bureau of Forestry	185
Bureau of Chemistry	36
Division of Soils	109
Biological Survey	33
Division of Entomology	36
Office of Road Inquiries	20
Office of Experiment Stations	789
Irrigation Investigations	50
Division of Statistics	141
Miscellaneous	203
Detached:	
Fish Commission	487
Department of Labor	178
Smithsonian	[2] 433

[1] Exclusive of appropriations for printing and binding.
[2] Including $80,000 for National Zoological Park.

Source: W. J. McGee in *Hearing before the Committee on Interstate and Foreign Commerce of the House of Representatives on (bills) to Establish a Department of Commerce and Labor, Industries, and Manufacture.* March 31, 1902, p. 129.

SECTION 4
LEGISLATIVE PROVISIONS AFFECTING THE RESEARCH ACTIVITIES OF FEDERAL AGENCIES

CONTENTS

SECTION 4. LEGISLATIVE PROVISIONS AFFECTING THE RESEARCH ACTIVITIES OF FEDERAL AGENCIES

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I. INTRODUCTION

The Federal Government makes extensive use of scientific research, both as an instrument of administration and as a means of supplying the public with numerous regulatory and informational services which have become essential functions of the modern state. Laws can be made and applied only in the light of exact knowledge as to needs and conditions, and information must be acquired before it can be disseminated.

National defense, for example, requires constant research to develop new weapons and improved materials of war, and battles may be won in the laboratory before armies take the field. The regulation of interstate and foreign commerce requires information as to commodities bought and sold—their origin, quantity, quality, and destination; and the protection of health demands scientific study and control of the diseases of plants and animals as well as those of human beings. The improvement of agriculture and of various industries such as mining and fisheries, the conservation of natural resources and the management of public lands, the protection of labor from exploitation and of the consumer from fraudulently labeled goods, are among the activities of government which are based upon scientific research.

To meet these research needs of government, a vast scientific establishment has grown up, carrying on its work in a multitude of laboratories at strategic centers throughout the country, in field stations located in every State and Territory, and by means of exploring parties and collaborators in all parts of the world. Some of this research is the work of a single agency, some of it the cooperative product of several agencies; some projects are undertaken directly by Government employees and some under cooperative agreement with State or private institutions; but whatever the method employed, the Federal Government is the sponsor and administrative center of research activities penetrating every branch of science.

The success or failure of this vast scientific enterprise depends first and foremost upon Congress, which may through grants of power, limitations, or financial provisions, make effective research possible or foredoom any research program to failure. For it is Congress that writes the organic acts setting up scientific agencies or imposing research functions, and it is Congress that finances from year to year the agencies and activities so provided.

In the present study no attempt has been made to catalog all of the legislative provisions now in force which influence directly or indirectly the conduct of research by the various scientific and statistical agencies of the Federal Government. Neither the time allowed for preparing this study nor the space available for printing it has permitted so exhaustive a task; and the value of such a catalog would in any case be doubtful. The purpose of the following pages is rather to indicate by illustration and example the more important ways in which legislation may control research. The report is factual rather than critical, and is intended to be indicative rather than comprehensive.

For purposes of discussion, legislative provisions affecting the research activities of Federal agencies have been classified as functional, administrative, and financial. Functional provisions are defined as those bearing upon the content and dissemination of the research itself; administrative provisions are those bearing upon the process or administration of research; and financial provisions are those dealing with the appropriation and expenditure of funds for research.

II. FUNCTIONAL PROVISIONS

The most important provisions of a functional nature which are commonly included in research statutes are (1) those granting authority to conduct research, or defining the field within which such research is to be carried on: (2) those granting access to sources of information not otherwise accessible; and (3) those making stipulations with respect to publication or other disposition of the findings of research. These three types of functional provision are treated in detail in the following pages.

Authority to Conduct Research

The statutory grant of power to any research agency serves to fix the limits within which investigations and

studies may be made, and the wording of the grant is therefore highly important. It may be in general terms, specifying only that the agency is to do whatever research may be necessary to carry out its administrative or regulatory functions; or it may describe in detail the particular fields to be entered or even the particular studies to be made. Grants of power of the latter nature, while seemingly broad, often serve as limitations in that by implication studies other than those named are not to be made. Too narrow grants of power in organic acts may be and often are broadened by amendment or by supplementary grants in appropriation acts, but a broad grant of power may also be rendered ineffective by failure to appropriate money for carrying out the authorized function.

Declaration of Purpose

The grant of power to conduct research may be preceded by a declaration of purpose or statement of policy which serves either as a justification for the subsequently enumerated functions or in lieu of such an enumeration. In the latter case such investigations as may be necessary to carry out the declared policy or purpose may be fairly implied, but a specific statement to that effect is usually included. The National Labor Relations Board, for example, "may, by one or more of its members or by such agents or agencies as it may designate, prosecute any inquiry necessary to its functions in any part of the United States."

The declaration of purpose may be illustrated by reference to the statutes creating various of the executive departments. The "general designs and duties" of the Department of Agriculture are declared to be "to acquire and diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants" (12 Stat. 367). Similarly, "the purpose of the Department of Labor shall be to foster, promote, and develop the welfare of the wage earners of the United States, to improve their working conditions, and to advance their opportunities for profitable employment" (U. S. C. 5:611) and it "shall be the province and duty" of the Department of Commerce "to foster, promote, and develop the foreign and domestic commerce, the mining, manufacturing, shipping, and fishery industries, and the transportation facilities of the United States * * *" (U. S. C. 5:596).

Other agencies with duties less broad than those of the Cabinet Departments may be oriented toward purposes more specifically defined. In this category is the Hydrographic Office, which was established

> * * * for the improvement of the means for navigating safely the vessels of the Navy and of the mercantile marine, by providing, under the authority of the Secretary of the Navy, accurate and cheap nautical charts, sailing directions, navigators, and manuals of instructions for the use of all vessels of the United States, and for the benefit and use of navigators generally (U. S. C. 5:457).

A further example is offered by the Central Statistical Board, whose purpose is "to plan and promote the improvement, development, and coordination of, and the elimination of duplication in, statistical services carried on by or subject to the supervision of the Federal Government, and so far as may be practicable, of other statistical services in the United States" (49 Stat. 498).

The Federal Employment Stabilization Act of 1931 declaring it to be "the policy of Congress to arrange the construction of public works so far as practicable in such manner as will assist in the stabilization of industry and employment through the proper timing of such construction" illustrates a declaration of policy out of which a research program has grown by implication; while the prefatory paragraph of the National Bituminous Coal Act of 1937 exemplifies the deliberate justification of an enactment calling for extensive research. The justification states that:

> Regulation of the sale and distribution in interstate commerce of bituminous coal is imperative for the protection of such commerce; there exist practices and methods of distribution and marketing of such coal that waste the coal resources of the Nation and disorganize, burden, and obstruct interstate commerce in bituminous coal, with the result that regulation of the prices thereof and of unfair methods of competition therein is necessary to promote interstate commerce in bituminous coal and to remove burdens and obstructions therefrom (50 Stat. 72).

Explicit Grant of Power

In a number of instances the statutory authorization to carry on research work is so broadly worded as to give the administering agency a virtual *carte blanche* in a specified field of activity—an authority which is, of course, subject to annual review by the Bureau of the Budget and by Congress, and which is limited by the appropriations made for work in the authorized field. The more important of these broad grants of power will be discussed below.

Public Health Service.—Although it has developed from the much older Marine Hospital Service, the organic act of the present Public Health Service dates only from 1912. The act is not lengthy, but authorizes research in broad and inclusive terms:

> The Public Health Service may study and investigate the diseases of man and conditions influencing the propagation and spread thereof, including sanitation and sewage and the pollution either directly or indirectly of the navigable streams and lakes of the United States * * *.

This grant of power is broad enough to cover virtually any activity in the field of public health, but specific grants of power with respect to particular diseases have from time to time been added as new appropriations have been made. Among these may be noted the authority to "study and investigate the cause, treatment, and prevention of venereal diseases" provided in 1918 (40 Stat. 886), and a grant of power in 1937 to "conduct, assist, and foster researches, investigations, experiments, and studies relating to the cause, prevention, and methods of diagnosis and treatment of cancer * * *" (50 Stat. 148).

Agricultural Research.—The basic act with respect to agricultural research is the statute creating the Department of Agriculture in 1862. This act directs the Commissioner of Agriculture—

> * * * to acquire and preserve in his Department all information concerning agriculture which he can obtain by means of books and correspondence, and by practical and scientific experiments (accurate records of which experiments shall be kept in his office), by the collection of statistics, and by any other appropriate means within his power; to collect seeds and plants; to test, by cultivation, the value of such of them as may require such tests; to propagate such as may be worthy of propagation, and to distribute them among agriculturists (12 Stat. 367).

This general authorization has been extended and amplified by numerous succeeding acts creating new functions and new institutions, or providing additional appropriations for carrying on existing activities.

The first extension came with the creation in 1884 of the Bureau of Animal Industry, the chief of which was directed to—

> * * * investigate and report upon the condition of the domestic animals and live poultry of the United States, their protection and use, and also inquire into and report the causes of contagious, infectious, and communicable diseases among them, and the means for the prevention and cure of the same, and to collect such information on these subjects as shall be valuable to the agricultural and commercial interests of the country * * * (23 Stat. 31).

This was followed in 1887 by the Hatch Act (24 Stat. 440), extending Federal support to the States for agricultural research. The act set up Federally supported State agricultural experiment stations in connection with the land-grant colleges and enumerated in detail the types of research for which the grant of funds might be used. Section 2 declares that—

> * * * it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under the varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test the comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States and Territories.

The Commissioner of Agriculture was required by section 3 of the act to "furnish forms, as far as practicable, for the tabulation of results of investigation or experiment;" and to "indicate from time to time such lines of inquiry as to him shall seem most important, and, in general, to furnish such advice and assistance as will best promote the purpose of this act. * * *"

The Adams Act of 1906 provided an additional allotment of Federal funds for the experiment stations, to be used for "paying the necessary expenses of conducting original researches or experiments bearing directly on the agricultural industry of the United States, having due regard to the varying conditions and needs of the respective States or Territories" (34 Stat. 63). The Purnell Act of 1925, which again increased the experiment station funds, broadened the scope of the authorized research to include "such economic and sociological investigations as have for their purpose the development and improvement of the rural home and rural life * * *" (43 Stat. 970).

The most recent authorization to conduct agricultural research of a broad and general nature is contained in the Bankhead-Jones Act of 1935, which is at once an amendment to the experiment station and land-grant college acts and a new departure in legislative provision for research. Section 1 of the act authorizes and directs the Secretary of Agriculture—

> * * * to conduct research into laws and principles underlying basic problems of agriculture in its broadest aspects; research relating to the improvement of the quality of, and the development of new and improved methods of production of, distribution of, and new and extended uses and markets for, agricultural commodities and byproducts and manufactures thereof; and research relating to the conservation, development, and use of land and water resources for agricultural purposes. Research authorized under this section shall be in addition to research provided for under existing law (but both activities shall be coordinated so far as practicable) and shall be conducted by such agencies of the Department of Agriculture as the Secretary may designate or establish.

Forty percent of the total appropriation is made available for the purposes of section 1, and is designated as the Special Research Fund, no part of which "shall be used for the prosecution of research heretofore instituted or for the prosecution of any new research project except upon approval in writing by the Secretary." One-half of this Special Research Fund

is to be used for the establishment and maintenance of regional research laboratories "in the major agricultural regions" (section 4).

The Secretary is authorized under section 2 to encourage similar fundamental research at the State experiment stations; and section 5 (a) provides that 60 percent of the total appropriation shall be allotted to the States for this purpose. The money is distributed in proportion to rural population rather than in the equal allotments provided by the earlier experiment station acts, and for the first time in this connection it must be matched by the States.

Forest Research Act.—The McSweeney-McNary Act of May 22, 1928 (45 Stat. 699), served to codify the research functions of the Department of Agriculture in the field of forestry and is the basis of the present widely varied research program of the Forest Service. The grant of power is so broad that it amounts to a blanket authorization to conduct any research bearing on the field of forestry which the Secretary of Agriculture may deem desirable. In the language of section 1, the Secretary is authorized to conduct—

> * * * such investigations, experiments, and tests as he may deem necessary under sections 2 to 10, inclusive, in order to determine, demonstrate, and promulgate the best methods of reforestation and of growing, managing, and utilizing timber, forage, and other forest products, of maintaining favorable conditions of waterflow and the prevention of erosion, of protecting timber and other forest growth from fire, insects, disease, or other harmful agencies, of obtaining the fullest and most effective use of forest lands, and to determine and promulgate the economic considerations which should underlie the establishment of sound policies for the management of forest land and the utilization of forest products * * *.

The following section of the act provides for the maintenance of forest experiment stations in specified regions covering the entire United States, and the remaining sections enumerate in minute detail the fields of investigation broadly described in section 1.

Department of Labor.—The Children's Bureau of the Department of Labor is empowered to investigate "all matters pertaining to the welfare of children and child life among all classes of our people" (U. S. C. 42:192); and the Women's Bureau has authority "to investigate and report to the Department of Labor upon all matters pertaining to the welfare of women in industry" (U. S. C. 29:13). The Bureau of Labor Statistics, under the direction of the Secretary of Labor—

> * * * shall collect, collate, and report at least once each year, or oftener if necessary, full and complete statistics of the conditions of labor and the products and distribution of the products of the same, and to this end said Secretary shall have power to employ any * * * of the bureaus provided for his department and to rearrange such statistical work and to distribute or consolidate the same as may be deemed desirable in the public interest * * * (37 Stat. 736).

Bureau of Mines.—The Bureau of Mines grew out of the Geological Survey, and received some of its statutory duties while still a division of the older agency. With respect to research the Bureau has authority, subject to approval of the Secretary of the Interior,

> * * * to conduct inquiries and scientific and technologic investigations concerning mining, and the preparation, treatment, and utilization of mineral substances with a view to improving health conditions, and increasing safety, efficiency, economic development, and conserving resources through the prevention of waste in the mining, quarrying, metallurgical, and other mineral industries; to inquire into the economic conditions affecting these industries; to investigate explosives and peat; and on behalf of the Government to investigate the mineral fuels and unfinished mineral products belonging to, or for use of, the United States * * * (U. S. C. 30:3).

Independent Agencies.—Among independent agencies perhaps the broadest research authority is that conferred upon the National Advisory Committee for Aeronautics, which is empowered "to supervise and direct the scientific study of the problems of flight, with a view to their practical solution, and to determine the problems which should be experimentally attacked, and to discuss their solution and their application to practical questions * * *" (U. S. C. 50:151).

Other broad grants of power to independent agencies are those to the Social Security Board and to the Relief Administrator. The Social Security Board is authorized to study "the most effective methods of providing economic security through social insurance, and * * * matters of administrative policy concerning old-age pensions, unemployment compensation, accident compensation, and related subjects" (49 Stat. 620); and the Relief Administrator, under the Relief Act of 1935, "may conduct any investigation pertinent or material to the furtherance of the purposes of this Act * * * and such further investigations and studies as the President may deem necessary in dealing with problems of unemployment relief" (48 Stat. 55, 56).

Independent Regulatory Commissions.—The independent regulatory commissions, as the generic name implies, have as their primary function regulation rather than research. In every case, however, research was originally or has become an essential activity, and the authority to conduct research has in many cases been included in the organic acts setting up these commissions, or in amendments to them.

In pursuance of its regulatory function the Interstate Commerce Commission is given authority to "inquire into the management of the business of all common carriers" subject to the provisions of the Interstate Commerce Act of 1887 (24 Stat. 379) and its amendments, and is directed to "keep itself informed

as to the manner and method in which the same is conducted. * * *"

The Federal Trade Commission is similarly empowered to

> * * * gather and compile information concerning and to investigate from time to time the organization, business, conduct, practices, and management of any corporation engaged in commerce, excepting banks and common carriers subject to the Act to regulate commerce, and its relation to other corporations and to individuals, associations, and partnerships (38 Stat. 717, 721).

Its activities, however, are not confined to domestic corporations. It is also authorized to "investigate, from time to time, trade conditions in and with foreign countries where associations, combinations, or practices of manufacturers, merchants, or traders, or other conditions, may affect the foreign trade of the United States * * *" (Ibid, 722).

The National Bituminous Coal Commission is authorized to "initiate, promote, and conduct research designed to improve standards and methods used in the mining, preparation, conservation, distribution, and utilization of coal and the discovery of additional uses for coal * * *" (50 Stat. 72).

Authorization to Make Specific Studies

Few indeed are the agencies of government that have not, at one time or another, been directed by Congress to make a particular investigation or special study, and the list includes most of those agencies with broad authority to conduct research in a given field. It is with continuing rather than short time research that we are concerned here, however; and examples of authorizations to investigate specific topics or to conduct research along specifically circumscribed lines are numerous.

In some cases the authorization to conduct research refers only to specifically enumerated studies, or subdivisions of a given field. The Smith-Hughes Act, for example, directs the Vocational Education Board to make studies and investigations "with particular reference to their use in aiding the States in the establishment of vocational schools and classes and in giving instruction in agriculture, trades and industries, commerce and commercial pursuits, and home economics."

> * * * Such studies, investigations, and reports shall include agriculture and agricultural processes and requirements upon agricultural workers; trades, industries, and apprenticeships, trade and industrial requirements upon industrial workers, and classification of industrial processes and pursuits; commerce and commercial pursuits and requirements upon commercial workers; home management, domestic science, and the study of related facts and principles; and problems of administration of vocational schools and courses of study and instruction in vocational subjects (39 Stat. 929).

The Board is also empowered, under the Civilian Vocational Rehabilitation Act of 1920, to make studies and investigations "regarding the vocational rehabilitation of disabled persons and their placements in suitable or gainful occupations * * *" (41 Stat. 735).

Generally speaking, the specific lines of investigation authorized are fairly inclusive of the field in which the agency operates, and are designed to keep research from going off at a tangent. Thus, the United States Tariff Commission is empowered to

> * * * investigate the administration and fiscal and industrial effects of the customs laws of this country now in force or which may be hereafter enacted, the relations between the rates of duty on raw materials and finished or partly finished products, the effects of ad valorem and specific duties and of compound specific and ad valorem duties, all questions relative to the arrangement of schedules and classification of articles in the several schedules of the customs law, and in general, to investigate the operation of customs laws, including their relation to the Federal revenues, their effect upon the industries and labor of the country * * * (39 Stat. 795, 796).

The fields of research open to the Federal Power Commission, the National Bituminous Coal Commission, the United States Maritime Commission, the Federal Communications Commission, and other agencies are similarly specified.

The Bureau of Reclamation, through the Secretary of the Interior, is empowered "to make examinations and surveys for * * * irrigation works for the storage, diversion, and development of waters, including artesian wells * * *" (U. S. C. 43:411); and the Rural Electrification Administrator may make studies and investigations "concerning the condition and progress of the electrification of rural areas in the several States and Territories * * *" (49 Stat. 1363). The Tennessee Valley Authority is authorized to undertake "experiments for the purpose of enabling the Corporation to furnish nitrogen products for military purposes, and nitrogen and other fertilizer products for agricultural purposes in the most economical manner and at the highest standard of efficiency," as well as to make surveys and plans of the Tennessee basin and adjoining territory (48 Stat. 58, 61, 69).

In the social science field, the Federal Housing Administrator is responsible for "such statistical surveys and legal and economic studies as he shall deem useful to guide the development of housing and the creation of a sound mortgage market in the United States * * *" (48 Stat. 1246, 1252); the Comptroller General is to investigate all matters relating to the "receipt, disbursement, and application of public funds" (U. S. C. 31:53); and the Bureau of the Budget, when directed by the President, shall

> * * * make a detailed study of the departments and establishments for the purpose of enabling the President to determine what changes * * * should be made in (1) the existing organization, activities, and methods of business of such departments or establishments, (2) the appropriations therefor, (3)

the assignment of particular activities to particular services, or (4) the regrouping of services * * * (U. S. C. 31:18).

Implied Power to Conduct Research

In a considerable number of Federal agencies research functions have grown up to meet the needs of administration for accurate information on which to base policies, and without any specific statutory provision. Such research activities, however, are logical outgrowths of legally assigned administrative or regulatory duties, and may therefore be said to be based on implied powers to conduct research. Much of the research carried on by the War and Navy Departments is of this kind, as also is that of the Federal Communications Commission, Securities and Exchange Commission, and National Labor Relations Board.

In this day of scientific warfare it is difficult to imagine War and Navy Departments providing for the national defense without engaging in extensive research activities for the improvement of equipment and matériel, but the nature and extent of these activities is determined by administrative needs rather than by statute. It is similarly difficult to conceive of the United States Employment Service increasing the usefulness of public employment offices throughout the country "by developing and prescribing minimum standards of efficiency," or assisting these offices "in meeting problems peculiar to their localities" and "promoting uniformity in their administrative and statistical procedure" (48 Stat. 113, 114) without doing research. The exercise of such implied powers, however, is subject to Congressional approval, in the form of appropriation for any program of research so determined.

Access to Information

Research presupposes the collection and compilation of basic data, and the collection of these data by government, especially in social science fields, may often require a technical invasion of private, corporate, or State rights. To insure access to adequate basic information, therefore, a number of Federal agencies have been given specific power to require reports, documents, and other materials from corporations and other non-governmental organizations. This power is common to all of the independent regulatory commissions, and is shared by a few other agencies with respect to specific types of data.

To avoid unnecessary duplication in the collection of material, a number of agencies also possess the power to require other branches of the Government to supply them with relevant information while the literary and scientific collections of the Government are accessible to qualified investigators and students generally (U. S. C. 20:91).

Data From Private Sources

Perhaps the most complete and explicit authority granted to any agency with respect to securing information, documents, and testimony from private sources is again that given to the Federal Trade Commission. The Commission is empowered:

> To require, by general or special orders, corporations engaged in commerce, excepting banks and common carriers subject to the Act to regulate Commerce, or any class of them, or any of them, respectively, to file with the commission in such form as the commission may prescribe annual or special, or both annual and special, reports or answers in writing to specific questions, furnishing to the commission such information as it may require as to the organization, business, conduct, practices, management, and relation to other corporations, partnerships, and individuals of the respective corporations filing such reports or answers in writing. Such reports and answers shall be made under oath, or otherwise, as the commission may prescribe, and shall be filed with the commission within such reasonable period as the commission may prescribe, unless additional time be granted in any case by the commission (38 Stat. 717, Sec. 6 (b)).

In addition to this authority to require reports and answers to specific questions, section 9 of the act provides:

> That for the purposes of this act the commission, or its duly authorized agent or agents, shall at all reasonable times have access to, for the purpose of examination, and the right to copy any documentary evidence of any corporation being investigated or proceeded against; and the commission shall have power to require by subpoena the attendance and testimony of witnesses and the production of all such documentary evidence relating to any matter under investigation. * * * Such attendance may be required from any place in the United States, at any designated place of hearing. * * * The commission may order testimony to be taken by deposition in any proceeding or investigation pending under this act at any stage of such proceeding or investigation.

The Commission may prosecute inquiries by its members or agents in any part of the United States (sec. 3).

With only the phrasing altered to fit the particular field of activity, similar powers are granted to various other agencies, including all of the independent regulatory commissions. The Interstate Commerce Commission has authority to obtain from all common carriers subject to its jurisdiction "full and complete information necessary to enable the Commission to perform the duties and carry out the objects for which it was created," including power to "require the attendance and testimony of witnesses and the production of all books, papers, tariffs, contracts, agreements, and documents relating to any matter under investigation" (24 Stat. 379, 338); and may require from such carriers annual reports containing such information as it may prescribe (ibid., 386). The Federal Communications Commission has equally complete authority to require detailed information bearing on the field of its operations (48

Stat. 1064); and similar provisions apply to the United States Maritime Commission, the Federal Power Commission, the Securities and Exchange Commission, the National Labor Relations Board, and the National Bituminous Coal Commission.

The Federal Reserve Board is authorized to examine the accounts, books, and affairs generally of Federal Reserve and member banks, and to require "such statements and reports as it may deem necessary" (38 Stat. 251, 261–2); while its Federal Advisory Council has power "to call for information and to make recommendations in regard to discount rates, rediscount business, note issues, reserve conditions in the various districts, the purchase and sale of gold or securities by reserve banks, open-market operations by said banks, and the general affairs of the reserve banking system" (ibid., 263). In another field, the Tariff Commission is given access to and a right to copy "any document, paper, or record, pertinent to the subject matter under investigation, in the possession of any person, firm, copartnership, corporation, or association engaged in the production, importation, or distribution of any article under investigation," as well as power to hold hearings and require production of evidence (39 Stat. 795, 797). The Civil Aeronautics Authority may hold public hearings, administer oaths, require preservation of evidence, and subpoena witnesses, books, or documents.

Most of the agencies dealing with statistical materials have authority to compel private organizations or individuals to supply various specified types of data. Thus the Bureau of Labor Statistics has power to secure from industry statistics of employment, wages, hours, and other labor information (46 Stat. 1019); the Commodity Exchange Administration may require statistics relating to the operation of commodity exchanges (49 Stat. 1491); the Bureau of Agricultural Economics has authority to secure periodically on specified dates information from growers and dealers as to quality and quantity of various crops such as cotton and tobacco; and the Bureau of the Census, the Bureau of Foreign and Domestic Commerce, and the Department of Justice may secure detailed statistical data covering numerous fields.

A similar power with respect to specimens is conferred upon the Commissioner of Fisheries who "may take or cause to be taken at all times, in the waters of the seacoast of the United States, where the tide ebbs and flows, and also in the waters of the lakes, such fish or specimens thereof as may in his judgment, from time to time, be needful or proper for the conduct of his duties, any law, custom, or usage of any State to the contrary notwithstanding" (U. S. C. 16:745).

Data From Federal Agencies

The power to secure information from other agencies of the Government is perhaps most clearly stated in the statute creating the Federal Trade Commission, which provides that—

> the several departments and bureaus of the Government when directed by the President shall furnish the commission, upon its request, all records, papers, and information in their possession relating to any corporation subject to any of the provisions of this act * * *

Other agencies, such as the Tariff Commission and the Federal Power Commission have similar authority; and the Federal Communications Commission may request valuations from the Interstate Commerce Commission.

Officers and employees of the executive departments and establishments are required to furnish the Civil Service Commission with whatever information it may need in carrying out its functions (U. S. C. 5:650); and a similar provision requires that:

> All departments and establishments shall furnish to the Comptroller General such information regarding the powers, duties, activities, organization, financial transactions, and methods of business of their respective offices as he may from time to time require of them; and the Comptroller General * * * shall * * * have access to and the right to examine any books, documents, papers, or records of any such department or establishment (U. S. C. 31:54).

In almost identical language the Bureau of the Budget is empowered to require information from other agencies of the Government.

The Bureau of Labor Statistics may call upon other departments for statistical data; and the Central Statistical Board may require from any Federal agency or from any agency subject to Federal supervision, "information, papers, reports, and original records concerning any existing or proposed statistical work carried on by or subject to the supervision of any such agency." The agencies so called upon, however, are not required to disclose confidential information. In the case of the Securities and Exchange Commission, however, even information withheld from the public because of its confidential nature may be made available on request to the Federal Reserve Board.

The Tennessee Valley Authority has been given access to patents, formulae, and other scientific information in the files of the Patent Office as an aid to carrying out its functions with respect to the production of nitrogen, fertilizers, and hydroelectric power. Unless an infringed patent was originally assigned to an employee of the Federal Government, however, the owner may sue the Corporation for royalties. Relevant information collected by the T. V. A. is available to the Federal Power Commission.

Publication of Findings

The publication of research findings is an essential part of research, but is one of the more neglected items so far as legislation is concerned. In few cases is publication required, the more common statutory phrasing being to the effect that the agency "may publish from time to time" such of its findings as it deems desirable. The use of funds for printing and binding is generally authorized but is usually circumscribed by provision of insufficient funds for the purpose in annual appropriation acts.

Annual reports are generally required but are concerned chiefly with an accounting of finances and administration. For present purposes annual reports may be disregarded. Reports on research findings and publication of statistics will be separately discussed.

Publication of Research Findings

The Hatch Act, which has been either a model or a point of departure for so many succeeding research statutes, is more specific in the matter of publication than later enactments have been. In addition to requiring annual reports covering operations and finances, the act provides that—

> bulletins or reports of progress shall be published at said stations at least once in 3 months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same and as far as the means of the station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster General may from time to time prescribe. (24 Stat. 440.)

Detail such as this, however, is rare in organic acts. The more common forms of providing for publication are simpler and less definite. The Chief of the Children's Bureau, for example, and the Director of the Women's Bureau are to publish the results of studies and investigations by their respective organizations "in such manner and to such extent" as the Secretary of Labor may prescribe (U. S. C. 42:192, 29:13); and the annual allotment of funds to the Public Health Service under the Social Security Act is earmarked for "investigation of disease and problems of sanitation (including the printing and binding of the findings of such investigations)" (49 Stat. 620, 635). Similarly the Bureau of Mines is authorized to publish reports of its research findings from time to time, subject to the direction of the Secretary of the Interior; and a like indefiniteness prevails with respect to results of surveys and studies by the Federal Housing Administration. The United States Housing Authority is authorized simply to "publish and disseminate information pertinent to the various aspects of housing." (50 Stat. 888, 891.)

The independent regulatory commissions, because of the special nature of their investigations and because of the fact that their findings constitute prima facie evidence in courts of law, are under rules with regard to publication which differ somewhat from those governing other agencies. Provisions are similar for all the commissions in this category, however, and may be illustrated by one citation. The Federal Trade Commission is empowered to—

> make public from time to time such portions of the information obtained by it hereunder, except trade secrets and names of customers, as it shall deem expedient in the public interest; and to make annual and special reports to the Congress and to submit therewith recommendations for additional legislation; and to provide for the publication of its reports and decisions in such form and manner as may be best adapted for public information and use. (38 Stat. 717, 721–2.)

The reports of the Interstate Commerce Commission are to contain "such information and data collected by the Commission as may be considered of value in the determination of questions connected with the regulation of commerce * * *" (24 Stat. 379, 387); and those of the Federal Communications Commission, "such information and data * * * as may be considered of value in the determination of questions connected with the regulation of interstate and foreign wire and radio communication and radio transmission of energy * * *" (46 Stat. 1064, 1062).

Publication of Statistics

The element of timeliness is more apt to be recognized in the publication of statistics than it is in the publication of research findings. Thus the Commissioner of Labor Statistics is directed by law to "collect, collate, report, and publish at least once each month full and complete statistics" with respect to employment, including number of persons employed, wages, and hours in designated occupations. The Bureau of the Census is required to publish statistics of cotton production weekly from September 1 to February 1, cottonseed statistics monthly, statistics of manufacturing every second year, and the decennial census of population, as well as various other statistical reports.

The Secretary of Agriculture is required to issue between July 1 and December 1 of each year, five monthly reports of cotton statistics—

> each of which shall state the condition and progress of the crop and the probable number of bales which will be ginned, these reports to be issued simultaneously with the cotton ginning reports of the Bureau of the Census relating to the same dates, the two reports to be issued from the same place at

eleven antemeridian of the eighth day following that to which the respective reports relate * * * (U. S. C. 7: 475).

And a like degree of detail is in effect with respect to the monthly crop reports of the Bureau of Agricultural Economics. The monthly crop report—

* * * shall be printed and distributed on or before the twelfth day of each month, and shall embrace statements of the condition of crops by States, in the United States, with such explanations, comparisons, and information as may be useful for illustrating the above matter, and it shall be submitted to and officially approved by the Secretary of Agriculture before being issued or published. (U. S. C. 7: 411a.)

Detailed tobacco statistics are to be published quarterly by the Department of Agriculture, and various other statistical information having to do with crops is to be published annually.

Annual statistical reports are required also of the Bureau of Foreign and Domestic Commerce, the Bureau of Internal Revenue, and other agencies.

III. ADMINISTRATIVE PROVISIONS

Administrative provisions affecting the research activities of Federal agencies are those dealing with the organization of research and the process of investigation rather than with the nature of the research itself. These are discussed below under two main headings, namely, (1) Research Personnel; and (2) Cooperation with Other Agencies.

Research Personnel

Congress may exert a profound influence on governmental research through restrictions on the use of personnel, and through the latitude allowed in the appointment of professional employees, consultants, and experts.

Qualifications Prescribed

Statutes establishing research agencies often specify in some degree the qualifications of personnel to be employed. The first instances occurred before the establishment of the Civil Service Commission, and since that time qualifications have been defined only with reference to special technicians and to members of boards or commissions whose offices are not under the classified service.

The first prescription of this kind was contained in the act establishing the Bureau of Animal Industry in 1884 (23 Stat. 31), which specified that the Chief of the Bureau was to be a veterinarian. Provision also was made for appointment of two agents, "who shall be practical stockraisers or experienced businessmen familiar with questions pertaining to commercial transactions in livestock * * *." The organic act of the Bureau of Mines similarly specifies that the Director is to be technically trained, and scientific employees of the Geological Survey are to be selected "exclusively for their qualifications as professional experts." (U. S. C. 43:34.) In the same connection the Commissioner of Fisheries is described as "a person of scientific and practical acquaintance with the fish and fisheries * * *." (U. S. C. 16:741.)

The power to prescribe personnel qualifications was invoked in a somewhat different connection in the Smith-Hughes Act of 1917 (39 Stat. 929) setting up the Federal Board for Vocational Education. In addition to the Cabinet members of the Board, the act provides for three citizen members who should represent respectively the interests of manufacturing and commerce, agriculture, and labor. The Tennessee Valley Authority Act provides that "all the members of the Board shall be persons who profess a belief in the feasibility and wisdom of this Act" (48 Stat. 58); and the statute creating the Central Statistical Board specifies that the "chairman and all the members shall be persons technically trained in statistics, economics, or public administration, known in their profession as of high standing and wide experience."

Membership on the various independent regulatory commissions is in each case restricted to persons having no private connection with or pecuniary interest in the industry subject to regulation—a restriction which has tended to become more rigorous as new commissions are created. Thus, no person shall hold office as a member of the United States Maritime Commission "who, within 3 years prior to his appointment, shall have been employed by, or have had any pecuniary interest in, any carrier by water or substantial pecuniary interest in any other person who derives a substantial portion of his revenues from any business associated with ships or shipping * * *" (49 Stat. 1985–6). Such provisions as this, of course, bear only indirectly on research, but it is quite as important for fact-finding to be unbiased as it is for the rule-making power to be exercised without prejudice.

The minimum rank and experience of chiefs of the various scientific bureaus of the War and Navy Departments are usually specified.

Exemptions From Civil Service

The civil service does not always attract the more able men in the higher positions, and the privilege of employing on a temporary or per diem basis the most competent scientist for a given job may mean the difference between success and failure in the undertaking. Statutes providing for research activities, therefore,

often allow exemptions from civil service for certain classes of employees. The wording of the provision varies, as does the extent of the exemption, but the general effect is much the same.

The Bureau of Mines may employ engineers and other experts "in a consulting capacity or in the investigation of special subjects" (37 Stat. 681, 682); and the Secretary of the Interior is authorized "in his judgment and discretion, to employ for consultation purposes on important reclamation work five consulting engineers, geologists, and economists * * *" (U. S. C. 43: 411b). The Federal Reserve Board is authorized to employ without regard to the civil service laws "such attorneys, experts, assistants, clerks, or other employees as may be deemed necessary to conduct the business of the Board," with the proviso that "nothing herein shall prevent the President from placing said employees in the classified service" (38 Stat. 251, 262–3); and the Rural Electrification Administration may "appoint and fix the compensation of attorneys, engineers, and experts" without regard to the civil service laws, to which, however, all other employees are to be subject. (49 Stat. 1363.) For the collection and editing of the official papers relating to the original territories of the United States, the Department of State is authorized to employ on a non-civil-service basis "not to exceed five historical experts, especially informed on the various phases of the territorial history of the United States" (U. S. C. 5: 168a); and all employees of the National Archives "shall be appointed by the Archivist solely with reference to their fitness for their particular duties and without regard to civil service law * * *." The appointment of any employee whose salary is $5,000 or over, however, is subject to confirmation by the Senate. (U. S. C. 10: 232.)

In other cases, the provision is expressed in negative rather than positive terms. All employees of the United States Tariff Commission, for example, are to be appointed in accordance with the civil service laws "with the exception of * * * such special experts as the Commission may, from time to time, find necessary for the conduct of its work" (39 Stat. 795, 796); and a substantially identical paragraph appears in the act creating the Federal Trade Commission. (38 Stat. 717, 718.) The Central Statistical Board may make use of unclassified temporary employees only with the consent of the Civil Service Commission and for not more than 12 months (49 Stat. 498, 499); while "any persons with technical or practical knowledge may be employed and compensated" under the act setting up the Soil Conservation Service, "on a basis to be determined by the Civil Service Commission." (49 Stat. 163.)

Under the act creating the United States Housing Authority (50 Stat. 888), employees of professional grade—that is, those whose compensation is in excess of $1,980 per annum—are not subject to the civil service laws; and appointments to positions paying more than $7,500 yearly are subject to confirmation by the Senate. Appointments outside the civil service by the Federal Power Commission are limited to "a secretary, a general counsel, a chief engineer, a solicitor, and a chief accountant." (46 Stat. 797, 798.) With the Federal Communications Commission this leeway in appointment is extended to include "a secretary, a director for each division, a chief engineer, and not more than three assistants, a general counsel and not more than three assistants, and temporary counsel designated by the Commission for the performance of special services." (48 Stat. 1064, 1067.) The United States Maritime Commission—

> * * * may appoint and prescribe the duties and fix the salaries of a secretary, a general counsel, a clerk to each member of the Commission, and not more than 3 assistants, not more than a total of 12 each of naval architects, special experts, attorneys, and examiners, and not more than 2 inspectors at each shipyard at which vessels are being constructed by it or under its supervision * * * (49 Stat. 1985, 1986.)

Necessary attorneys and experts may also be appointed outside the civil service by the Interstate Commerce Commission and the Securities and Exchange Commission.

Although none of the employees of the Tennessee Valley Authority is under the civil service, the Authority must "provide a system of organization to fix responsibility and promote efficiency." The T. V. A. also possesses the very important power to remove employees "in the discretion of the board." Employees of such other emergency agencies as the Works Progress Administration and the Farm Security Administration are not at the time of writing (July 1938) under the civil service.

While the executive secretary of the National Labor Relations Board and its attorneys, examiners, and regional directors are outside the civil service, they are subject to the Classification Act of 1923, as amended. The Bituminous Coal Act of 1937 provides in the same connection that "no person appointed without regard to the provisions of the civil-service laws shall be related to any member of the Commission by marriage or within the third degree by blood."

Moneys received by the Secretary of Commerce for special statistical studies made at the request of private individuals or nongovernmental agencies "may be used, in the discretion of the Secretary of Commerce, and notwithstanding any other provision of law, for the ordinary expenses incidental to the work and/or to secure in connection therewith the special services of

persons who are neither officers nor employees of the United States." (U. S. C. 5:601c.)

Compensation

The salary scale for positions in the professional and scientific service of the Federal Government bears directly on the quality of personnel attracted to governmental positions. For civil service employees, this salary scale is fixed by the Classification Act of 1923 and its amendents (U. S. C. 5:661–674), and runs from $2,000 to $9,000 annually.

Limitations on salaries paid to employees, however, occur not infrequently in connection with provisions permitting the employment of technicians without regard to the civil service. Thus the experts employed on a consulting basis by the Bureau of Mines may not receive more than $10 a day, while maximum compensation authorized for consulting engineers, geologists, and economists with the Bureau of Reclamation is $50 a day, with the proviso that no such consultant shall receive more than $5,000 during any fiscal year.

Maximum annual salaries are specified for the non-civil-service employees of the Federal Communications Commission. The appointees of the U. S. Maritime Commission who are not subject to civil service may not receive salaries higher than those who are; and no employee of the Tennessee Valley Authority may receive a salary in excess of the $10,000 a year drawn by the members of the board. The Agricultural Adjustment Act provided that no employee should receive more than $10,000, and $8,000 was set as a maximum under the Relief Act of 1935. The Chairman of the Central Statistical Board is provided with a salary of $10,000 a year; and in some instances the salaries of bureau chiefs are also prescribed by statute.

The Vocational Rehabilitation Act of 1920 made a more comprehensive gesture toward establishing a complete salary scale for employees engaged in research and administration under the act, but the section was withdrawn by amendment in 1924.

By way of rewarding meritorious service of scientific personnel beyond the permitted limit for position and grade, both the Secretary of War and the Secretary of the Navy may pay cash awards to civilian employees for "beneficial suggestions." (U. S. C. 50:58; 5:416.)

Training of Scientific Personnel

With respect to securing special training for scientific employees of the Government, only the War Department has broad authority, and even here it does not apply to civilian workers. The Secretary of War is authorized, in his discretion—

> to detail not to exceed 2 percent of the commissioned officers and one-half of 1 percent of the enlisted men of the Regular Army in any fiscal year as students at such technical, professional, and other educational institutions, or as student observers, or investigators at such industrial plants, hospitals, and other places as shall be best suited to enable such officers or enlisted men to acquire a knowledge of or experience in the specialties in which it is deemed necessary that such officers or enlisted men shall perfect themselves * * * (U. S. C. 10:535).

The men so detailed at any one time are to be distributed so far as practicable among the various branches of the service; and their pay, allowances, and tuition are to be paid by the Department. The period of detail for enlisted men may not exceed 50 percent of the enlistment period, and the Secretary of War may fix the period of enlistment for this purpose at 3 years or less. In the case of Air Corps officers, as many as 25 at a time may be detailed to study aeronautical engineering, and books and equipment as well as tuition are to be provided. (U. S. C. 10:298.)

Cooperation With Other Agencies.

Provisions for cooperation with other agencies are frequently made in research statutes. The cooperative arrangement authorized may be a grant-in-aid to States or other non-Federal agencies, or it may require other departments or bureaus of the Federal Government to furnish information or lend personnel when called upon to do so. Where cooperation with non-Federal agencies is desired, some financial inducement is generally deemed essential. Cooperation between agencies of the Federal Government, however, does not necessarily depend upon statutory permission.

General Cooperation

Many research statutes authorize or direct the administering agency to cooperate with other bureaus or departments, or with non-Federal instrumentalities, no particular form of cooperation being specified. Thus the Forest Research Act of 1928 authorizes the Secretary of Agriculture to—

> cooperate with individuals and public and private agencies, organizations, and institutions, and, in connection with the collection, investigation, and tests of foreign woods, he may also cooperate with individuals and public and private agencies, organizations, and institutions in other countries * * *

He is empowered to receive money from cooperators "under such conditions as he may impose." In similar substance the Soil Conservation Service, through the Secretary of Agriculture, is empowered to—

> cooperate or enter into agreements with, or to furnish financial or other aid to, any agency, governmental or otherwise, or any person, subject to such conditions as he may deem necessary, for the purposes of this act * * *

The Civil Aeronautics Authority is authorized to "make recommendations to the Secretary of Agriculture as to necessary meteorological service;" to advise with the Bureau of Standards and other executive agencies "in carrying forward such research and development work as tends to create improved air navigation facilities, aircraft, aircraft power plants, and accessories;" and to exchange with foreign governments information relative to air navigation. (44 Stat. 568.) The Navy Department is similarly authorized to exchange data with foreign almanac offices. (U. S. C. 5:464.) The Navy Department is also empowered to loan certain instruments, when not in use, to the Signal Corps of the Army (U. S. C. 5:417); and the pilot charts of the Hydrographic Office are required to give due credit to the Weather Bureau which is in turn to furnish whatever meteorological information is necessary. (U. S. C. 5:458a.)

The Public Health Service is authorized to cooperate with other Federal agencies, such as the Bureau of Mines and the Department of Agriculture; and the Smith-Hughes Act provides for cooperative studies at the discretion of the Vocational Education Board with the Departments of Agriculture, Commerce, and Labor, and with the Office of Education. Since tariff questions are of vital concern to a number of Federal agencies, the Tariff Commission is directed by its basic law to act in appropriate matters "in conjunction and cooperation with the Treasury Department, the Department of Commerce, the Federal Trade Commission, or any other departments, or independent establishments of the Government * * *" (39 Stat. 795.) The Federal Power Commission is similarly directed to cooperate "with the executive departments and other agencies of State or National Governments" in its investigations. (41 Stat. 1063.) The National Bituminous Coal Commission has authority to "assist educational, governmental, and other research institutions in conducting research in coal * * *" (50 Stat. 72, 74); and under the Farm Tenant Act the Secretary of Agriculture may cooperate with other agencies to develop plans for a program of land conservation and utilization. (50 Stat. 522, 526.)

In a different sphere, the Tennessee Valley Authority is authorized to cooperate with national, State, district, or county experimental stations or demonstration farms in testing fertilizers and fertilizer practices; and may also "arrange with farmers and farm organizations for large-scale practical use of the new forms of fertilizers under conditions permitting an accurate measure of the economic return they produce." In the preparation of surveys and plans for the development of the Tennessee Valley, the cooperation of State and local agencies is to be sought.

The National Labor Relations Board is specifically enjoined from making appointments for statistical work "where such service may be obtained from the Department of Labor;" and the Geological Survey is authorized to enter into cooperative agreements with States and civil divisions in making topographic surveys.

Detail of Personnel

Various research agencies of the Federal Government may detail personnel to other agencies for special work, and certain agencies may request or may accept, if voluntarily offered, the services of employees of other establishments. The Public Health Service, for example, may detail medical officers and other scientific personnel to cooperate with State authorities on request of the latter in making any of the investigations authorized under the Social Security Act. At the same time the facilities of the Service are available to "health officers and scientists engaged in special study" and research fellowships may be granted for this purpose. (U. S. C. 42: 232.)

The Tennessee Valley Authority is empowered by its organic act to—

> request the assistance and advice of any officer, agent, or employee of any executive department or of any independent office of the United States, to enable the Corporation the better to carry out its powers successfully, and as far as practicable shall utilize the services of such officers, agents, and employees * * *

The Federal Housing Administrator is similarly authorized to "accept and utilize such voluntary and uncompensated services, utilize such Federal officers and employees, and, with the consent of the State, such State and local officers and employees * * * as he may find necessary;" and a like provision is found in most of the other legislation setting up emergency agencies, such as the Rural Electrification Administration and the United States Housing Authority.

The independent commissions, like the Federal Trade Commission and the Federal Power Commission, may have detailed to them such employees of other governmental agencies as the President may direct. The organic law of the Federal Trade Commission, for example, provides that "the several departments and bureaus of the Government when directed by the President * * * shall detail from time to time such officials and employees to the commission as he may direct." (38 Stat. 717, 722.)

Grants-in-Aid

More formal cooperative arrangements between Federal agencies and agencies of the States have been

worked out on a grant-in-aid basis. The outstanding example here is the relation between the Department of Agriculture and the State experiment stations, which receive Federal grants under the Hatch Act of 1887, the Adams Act of 1906, the Purnell Act of 1925, and the Bankhead-Jones Act of 1935. The various statutes providing the grant funds specify the purposes for which they are to be used, and the Federal department has a supervisory function in connection with the work so done.

The Social Security Act provides a grant-in-aid fund to be administered by the Public Health Service, and the Office of Education administers grants for vocational education under which research by the recipient may be implied.

Advisory Committees

Scientific agencies, if their work is to be of highest value, must maintain some form of contact not only with other agencies of Government operating in closely related fields, but also with the whole scientific world outside the governmental establishment. A common device for maintaining such contacts is the advisory committee, made up of governmental or nongovernmental representatives, or both, and serving as a general liaison between the given bureau and the scientific field with which it is concerned.

Various committees of this sort have been established through the National Academy of Sciences without direct statutory authority, but a considerable number have been set up by Congressional action. The outstanding examples will be discussed in the following pages.

Naval Observatory.—The Board of Visitors of the Naval Observatory is made up of four astronomers of high professional standing and two eminent citizens of the United States. Members are appointed by the President with Senate confirmation for 3-year terms, staggered so that two retire each year. Members serve without compensation, but receive actual expenses incurred in performance of their duties.

The Board of Visitors shall make an annual visitation to the observatory at a date to be determined by the Secretary of the Navy, and may make such other visitations not exceeding two in number annually by the full board or by a duly appointed committee as may be deemed needful or expedient by a majority of the board. The Board of Visitors shall report to the Secretary of the Navy at least once each year the result of its examinations of the Naval Observatory as respects the condition of buildings, instruments, and apparatus, and the efficiency with which its scientific work is prosecuted, and shall also report as respects the expenditures in the administration of the observatory. The Board of Visitors shall prepare and submit to the Secretary of the Navy regulations prescribing the scope of the astronomical and other researches of the observatory and the duties of its staff with reference thereto. When an appointment or detail is to be made to the office of astronomical director, director of the Nautical Almanac, astronomer, or assistant astronomer, the Board of Visitors may recommend to the Secretary of the Navy a suitable person to fill such office, but such recommendation shall be determined only by a majority vote of the members present at a regularly called meeting of the board held in the city of Washington (U. S. C. 5:465).

Bureau of Standards.—The Visiting Committee of the National Bureau of Standards consists of five men "prominent in the various interests involved, and not in the employ of the Government" appointed for 5-year staggered terms by the Secretary of Commerce. "This committee shall visit the bureau at least once a year, and report to the Secretary of Commerce upon the efficiency of its scientific work and the condition of its equipment." Here again members serve without pay but receive actual expenses (U. S. C. 15: 278).

Bureau of Fisheries.—The membership of the Advisory Committee to the Bureau of Fisheries includes "not to exceed two members from the Atlantic coast, two members from the Pacific coast, and four members from the inland waters, Great Lakes, and Alaskan sections of the United States," who shall likewise serve without other compensation than actual expenses. Members are designated from time to time by the Secretary of Commerce, and are required to be men "prominently identified with the various branches of the fishery industry, qualified in aquatic research, and experienced in fish culture." They are to visit the Bureau on call by the Secretary of Commerce, to whom they are to report on the condition and needs of the service (U. S. C. 16: 749).

National Archives Council.—The National Archives Council is composed of the Secretaries of each of the executive departments or designated alternates, the Chairmen of the Senate and House Committees on the Library, the Librarian of Congress, the Secretary of the Smithsonian Institution, and the Archivist of the United States. The council is responsible for determining what classes of material are to be deposited in the Archives building, and has power to advise the Archivist "in respect to regulations governing the disposition and use of the archives and records transferred to his custody" (U. S. C. 40: 236).

Public Health Service.—The National Advisory Health Council is an advisory board for the National Institute of Health, its purpose being to consult with the Surgeon General of the Public Health Service relative to investigations carried on by the Institute and methods of conducting them, and to advise in health matters generally. Ex-officio members of the council are the director of the National Institute of Health, one representative designated by the Surgeon General of the Army, one by the Surgeon General of the Navy, and one by the Secretary of Agriculture representing

the Bureau of Animal Industry. Five other members "who shall be skilled in laboratory work in its relation to the public health, and not in the regular employment of the Government," are appointed by the Surgeon General of the Public Health Service, with the approval of the Secretary of the Treasury. The civilian members serve 5-year staggered terms, and receive an allowance of $10 a day while in conference, in addition to traveling and hotel expenses. With the approval of the Secretary of the Treasury, the Surgeon General may appoint five additional members representing the public health profession (U. S. C. 42: 21).

A similar group known as the National Advisory Cancer Council has been recently created in connection with the National Cancer Institute. The Surgeon General is ex-officio chairman of the National Advisory Cancer Council, and has authority to appoint, subject to approval of the Secretary of the Treasury, six other members who are to be "selected from leading medical or scientific authorities who are outstanding in the study, diagnosis, or treatment of cancer in the United States." Appointed members serve 3-year overlapping terms, and may not be reappointed until an interval of 12 months has elapsed. In addition to traveling and subsistence expenses, a per diem allowance of $25 while engaged on official business is authorized (U. S. C. 42: 137b). The powers of the National Advisory Cancer Council include review of research projects and of applications for grants-in-aid, and the collection and dissemination of information relative to cancer research in the United States and elsewhere (U. S. C. 42: 137c).

IV. FINANCIAL PROVISIONS

Congress is responsible for financing governmental research as it is for providing funds for all the other activities of government. Financial provisions affecting research activities are of two main types: (1) those laid down in organic acts with respect to the use of whatever funds may be supplied; and (2) those contained in appropriation acts which not only make funds available but also determine in large measure the purposes for which these funds are to be used.

Organic Acts

The organic acts with which this study is concerned are those creating research agencies or establishing new research functions to be performed by existing institutions. From the financial point of view, the purpose served by these acts is that of authorizing the appropriation of funds for carrying into effect the various provisions detailed, and specifying the manner in which these appropriations are to be used.

Provisions Generally Applicable

Aside from the legally established budgetary procedure, various provisions with respect to funds apply generally to all agencies, and bear more or less directly upon the prosecution of research. Most important of these is the mandate that unless otherwise provided by law, "sums appropriated for the various branches of expenditure in the public service shall be applied solely to the objects for which they are respectively made, and for no others" (U. S. C. 31: 628).

In addition to this general provision, the law also requires that fees, dues, or travel to meetings of societies or associations are not to be paid unless specifically appropriated for (U. S. C. 5: 83); and that "no appropriations other than those made specifically and solely for printing and binding shall be used for such purposes in any executive department or other Government establishment in the District of Columbia. * * *" (U. S. C. 31: 588).

Types of Authorization

Authorization to appropriate moneys for carrying out the provisions of organic acts appears in various forms. The act setting up the Federal Housing Administration, for example, authorized the appropriation of a lump sum, out of which were to come expenses of conducting research and publishing and disseminating research findings, as well as all other activities (48 Stat. 1246, 1252). The Social Security Act authorizes an annual appropriation to the Public Health Service "for investigation of disease and problems of sanitation" which includes pay, allowances, and travel of personnel, and printing and binding of research findings (49 Stat. 620, 635); and similar annual appropriations are authorized under the various experiment station acts. The Vocational Rehabilitation Act of 1920 (41 Stat. 735) provided one authorization for administrative expenses and another for research; while the Federal Highway Act provides that not to exceed 2½ percent of highway appropriations may be deducted "for administering the provisions of this chapter and for carrying on necessary highway research and investigational studies independently or in cooperation with the State highway departments and other research agencies, and for publishing the results thereof * * *" (U. S. C. 23: 21).

Some organic acts, like the Federal Highway Act just referred to, the Social Security Act, and the acts

providing Federal aid for the State agricultural experiment stations, authorize the annual appropriation of a specific sum, while others, like the act creating the Rural Electrification Administration (49 Stat. 1363, 1365) merely authorize the appropriation of "such sums as shall be necessary."

Expenditures

Organic acts usually specify the type of expenditure for which the authorized appropriation may be used. The extent to which funds may be used for personal services, buildings, equipment, books, traveling expenses, printing and binding, and other items may have an important bearing on the adequacy and efficiency of a research program. Facilities and equipment are as important for many types of research as are competent technicians, and the right to travel may be vital.

Provisions regarding expenditures are of two general types: (1) an authorization to spend the sums appropriated for certain specified purposes; and (2) a limitation on the expenditure of funds for other enumerated purposes.

Authorized Expenditures.—The wording of expenditure authorizations differs from agency to agency and from year to year. The Hatch Act of 1887, for example, provides that the annual appropriation may be used for "necessary expenses of conducting investigations and experiments and printing and distributing the results," those administering the fund being left to determine what expenditures are necessary.

Equally simple is the language of the Interstate Commerce Act in the same year, which provides that "all of the expenses of the Commission, including all necessary expenses for transportation incurred by the Commissioners, or by their employees under their orders, in making any investigation in any other places than in the city of Washington, shall be allowed and paid * * *;" and similar provisions are in effect with respect to other well established agencies. The Secretary of the Interior "may authorize the purchase of such law books, books of reference, periodicals, engineering and statistical publications as are needed in carrying out the surveys and examinations authorized by the reclamation law" (U. S. C. 43:379); and the purchase of "professional and scientific books and periodicals needed for statistical purposes by the scientific divisions of the United States Geological Survey" is provided in the same manner (U. S. C. 43:36). The Secretary of the Treasury, on recommendation of the Surgeon General of the Public Health Service, is authorized to make "such expenditures (including expenditures for personal services and rent at the seat of government, for books of reference, periodicals, and exhibits, and for printing and binding) as he deems necessary for the proper administration" of the National Institute of Health (U. S. C. 42:23d).

More recently, however, and especially since the establishment of the Office of Comptroller General, Congress has defined "necessary expenditures" in the organic statutes in considerable detail. The Bankhead-Jones Act of 1935, which adds the latest increment to the experiment station funds, provides that the appropriation shall be available also "for the purchase and rental of land and the construction of buildings necessary for conducting research provided in this title, for the equipment and maintenance of such buildings, and for printing and disseminating the results of research"; and the Farm Tenant Act of 1937 authorizes the Secretary of Agriculture to—

> make necessary expenditures for personal services and rent at the seat of government and elsewhere; contract stenographic reporting services; purchase and exchange supplies and equipment, law books, books of reference, directories, periodicals, newspapers, and press clippings; travel and subsistence expenses, including the expense of attendance at meetings and conferences; purchase, operation, and maintenance, at the seat of government and elsewhere, of motor-propelled passenger-carrying and other vehicles; printing and binding; and for such other facilities and services as he may from time to time find necessary for the proper administration of this chapter.

The Secretary may also make contracts for services and purchase of supplies without requesting bids if the total amount involved is less than $300; and he may make payments prior to audit and settlement by the General Accounting Office.

More recent statutes setting up research agencies or outlining research programs are generally similar in their provisions to the act just referred to, subject of course to numerous individual variations. The provision for purchase without bids does not always occur, and the amount may vary from $50 to the $300 noted above. The items enumerated differ with the type of work contemplated, and the phrase "subject to audit under the general law" or its equivalent may be used, but is hardly necessary. The wording of the National Labor Relations Act is to the effect that all expenses, including travel and subsistence, shall be "allowed and paid on the presentation of itemized vouchers" approved by the Board.

Special exceptions in particular cases also may be authorized, such as the permission granted to the Secretary of War and to the Secretary of the Navy to purchase, without bids, either in the United States or elsewhere, "such designs, aircraft, aircraft parts, or aeronautical accessories as may be necessary in his judgment for experimental purposes * * *" (U. S. C. 10:310k).

Limitations on Expenditures.—In organic acts expenditure provisions sometimes include limiting pro-

visos like that attached to the Hatch Act, which provided that not more than one-fifth of the first appropriation might be used "in the erection, enlargement, or repair of a building or buildings" necessary for carrying on the work of the given experiment station; "and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended." The Adams Act of 1906 retained this provision, and in addition required the States to replace lost or diminished funds, and empowered the Secretary of Agriculture to withhold the allotment due to any State for non-compliance with the requirements of the Act. The Purnell Act of 1925 raised the expenditure limitation for buildings to 10 percent.

Another type of limitation is exemplified in the McSweeney-McNary Forest Research Act of 1928 which places a limit of $2,500 on the erection, purchase, or improvement of any building, exclusive of water supply and sanitary systems, which may be required in carrying out the provisions of the act. Another method is to limit the total amount which can be spent for any single purpose, as the Relief Act of 1935 authorized the Administrator to make "such expenditures * * * not to exceed $350,000, as are necessary to carry out the provisions of this act."

Appropriation Acts

The preparation of the budget is an executive function, with estimates for individual projects or divisions prepared by those responsible for them, consolidated at the bureau and departmental levels, reviewed by the Bureau of the Budget, and finally recommended to the Congress by the President. These estimates, as modified in the various steps of the process, are ultimately embodied in the appropriation acts annually passed by Congress. Because it is Congress rather than the executive which is finally responsible, however, the provisions of appropriation acts bearing upon the exercise of research functions are treated in this study as legislative provisions.

It is the annual appropriation acts rather than organic statutes that provide the funds with which governmental research is carried on. Organic acts may authorize long-term appropriations, but only the annual renewal of these by Congress can make them operative, and in many cases the full amount of the authorization is never appropriated. The Forest Research Act of 1928, for example, authorized the expenditure of a million dollars a year for 10 years, but annual appropriations for forest research have fallen well short of this amount. In general the appropriation acts do no more than make funds available for purposes authorized in organic grants of power, but they may also and not infrequently do, authorize new functions or even new agencies; and they may restrict or limit previously defined activities.

Items Included

Appropriation acts vary greatly among themselves, though the appropriation items for the same agency do not change markedly from year to year. Generally, the way in which a given act is written is simply the way in which it has been written in the past, and the explanation of the particular form it takes is largely historical. The divergence in form may be illustrated by examples from the extremes. In the appropriation acts for the fiscal year ending June 30, 1937 the Signal Corps of the Army received a single lump sum for all purposes (49 Stat. 1278, 1290), while the Bureau of Plant Industry received a separate sum for each of 20 or more distinct investigations.

Range of Expenditures.—The items of a research nature for which funds are made available in the annual appropriation acts cover somewhere near the maximum possible range of expenditures. The list includes personal services, stenographic reporting services, rental of quarters, newspapers, periodicals, reference books, law books, special counsel fees, supplies and equipment, improvement and care of grounds, repairs to buildings, traveling expenses, attendance at scientific meetings, printing and binding, vehicles, garage rental, press clippings, foreign postage, and numerous special items of equipment ranging from sponges to X-ray apparatus.

By way of example, a few random items will be taken from the various executive appropriations for the fiscal year ending June 30, 1938. The Navy Department appropriation (50 Stat. 96) provides for "the collection and classification of information"; and expenditures by the Naval Research Laboratory may include the "temporary employment of such scientific and technical civilian assistants as may become necessary." Among the items of expenditure for the Bureau of Engineering are "services, instruments, machines and auxiliaries, apparatus and supplies, and technical books and periodicals necessary to carry on experimental and research work"; and funds are made available to the Bureau of Aeronautics "for continuing experiments and development work on all types of aircraft, including the payment of part-time or intermittent employment in the District of Columbia or elsewhere of such scientists and technicists as may be contracted for by the Secretary of the Navy in his discretion * * *."

Safety research relative to aviation equipment, personnel, and operation methods is one of the items for which the Bureau of Air Commerce appropriation

may be spent (50 Stat. 261, 285); and the same act makes available to the Bureau of Foreign and Domestic Commerce funds "to collect and compile information regarding the disposition and handling of raw materials and manufactures within the United States; and to investigate the conditions of production and marketing of foreign raw materials essential for American industries." The Bureau of the Census may spend not more than $2,500 "for the employment by contract of personal services for the preparation of monographs on census subjects"; the Coast and Geodetic Survey is authorized to employ a physicist "to develop survey methods based on transmission of sound through sea water"; and the original purpose of the Bureau of Fisheries is reaffirmed with an appropriation for "inquiry into the cause of the decrease of food fishes in the waters of the United States."

The Weather Bureau appropriation (50 Stat. 395, 402) is to cover "necessary expenses incident to collecting and disseminating meteorological, climatological, and marine information, and for investigations in meteorology, climatology, seismology, evaporation, and aerology * * *"; while the Rural Electrification Administration receives funds for "expenses of studies, investigations, publications, and reports necessary to carry out the provisions of the Rural Electrification Act of 1936" (50 Stat. 329). The Department of Agriculture appropriation (50 Stat. 395, 431) permits, as have similar acts for the past decade, an interchange of funds between bureaus up to 10 percent of their appropriations, providing that no appropriation shall thus be increased by more than 10 percent and that a statement as to such transfers be included in the next budget.

Limitations.—The most definite limitation to be found in appropriation acts is a limited appropriation. Few provisions can so completely hamstring a research program as provision of inadequate funds, but evidence of inadequate provisions in this regard must be sought in the hearings rather than in the acts themselves. In the Department of Commerce appropriation for 1938 (50 Stat. 288), for example, there is no indication that the $50,000 provided for preliminary work on the 1940 census is so small a fraction of the required sum that the preparatory activities of the Census Bureau will be seriously curtailed. (*See* Problems of the Bureau of the Census in their Relation to Social Science, p. 223, below.)

Another type of restriction on research activities is exemplified by a clause in the Department of Agriculture appropriation for 1938 (50 Stat. 395, 396) which provides that "no part of the funds appropriated by this act shall be used for laboratory investigations to determine the possibly harmful effects on human beings of spray insecticides on fruit and vegetables." The purpose of the latter, however, is merely to avoid duplication, since an item carrying on the investigations referred to is included in the Public Health Service appropriation for the same year.

Other limiting clauses in appropriation acts take the general form of a provision that not more than a specified sum, or a specified percentage of the total appropriation, is to be spent for a given purpose. The items most frequently subject to an expenditure limitation of this type are personal services in the District of Columbia, vehicles, travel, buildings, attendance at meetings, printing and binding, and books and periodicals.

New functions.—Since the passage of the Budget and Accounting Act of 1921, and the subsequent revision of House and Senate rules to provide that the committees on appropriations shall not originate general laws, the inclusion of new functions in appropriation acts has become less common than it was in earlier years. It is by no means unknown, however, though it is not always easy to determine, short of detailed examination of successive acts and hearings, whether appropriation items are for new functions or merely for continuing older activities. Sometimes the phrase "for continuing investigations of * * *" is used, but its absence does not necessarily indicate a new field of effort.

In some cases, too, the appropriation titles remain substantially the same from year to year but are general enough to permit of some variety in the work done under them. The appropriation items for the Geological Survey and for the Bureau of Plant Industry are of this type, and represent scientific divisions of the agency rather than specific research projects.

Actually there is probably less authorization of new activities in appropriation acts than would be desirable, in view of the frequently changing emphasis demanded of a thoroughgoing research program.

Trends in Appropriation Acts

Although appropriation procedure has been much improved under the budget system, the texts of appropriation acts have not shown any particularly significant alteration. Taking the early 1920's as the transition period between the system which was discarded in 1921 and that which has grown up under the Budget and Accounting Act, the most general change is in respect to the item for personnel which is now lumped instead of itemized by salary grades. As a whole the appropriation acts for the 10 years following 1921 show

no less detail than those preceding the change in methodology.

In some few instances, however, the language of the appropriation acts has shown significant alteration in the past 5 years. The Bureau of Standards appropriation, for example, provided in 1908 for personnel, equipment, and maintenance, with no separate items for investigation. By 1918 a dozen research appropriations were itemized in the act, and the number had increased to 25 by 1928. Five years later it was still 25, but the appropriation for the fiscal year ending June 30, 1938, was divided among salaries and expenses, operation and administration, and four general items for research, investigation, and testing. The Geological Survey appropriations, on the other hand, have not changed in form since the 1920's.

If any trend is visible at all, it is in the direction of authorization of research functions in broader and more general terms, but with increasingly detailed statements as to individual items of expenditure under the broad authorization.

SECTION 5
THE LEGISLATIVE BRANCH AND RESEARCH

CONTENTS

SECTION 5. THE LEGISLATIVE BRANCH AND RESEARCH

By William F. Willoughby

INTRODUCTION

In the study that follows the attempt has been made to do four things: To survey the extent to which American legislative bodies have engaged in research, using that term to cover the assembling and rendering available of data as well as the examination of data with a view to determining causes, tendencies, results of action, etc.; to list the more important documents in which the results of such research have been given publicity; to describe the character of agencies set up, or made use of, by the legislatures in carrying on their research work; and to offer certain recommendations in respect to how existing methods of organization and methods for prosecuting research by these bodies may, with advantage, be modified.

It is, it is believed, amply shown that our legislative bodies have important responsibilities with respect to research other than that of creating and supporting administrative services having research as one of or their major function, and that they have, in fact, done much in this field. It is hoped, moreover, that the analysis here presented by this work, and the suggestions made for modifications in organization and method, will lead to a better appreciation of what has been and is being done by American legislatures in facilitating, and engaging in, direct research work and to the taking of the steps that will lead to this work being prosecuted under more favorable conditions.

I. CONSTITUTIONAL DOCUMENTS

The Federal Constitution, the constitutions of the several constituent States, the organic acts providing governmental systems for the dependencies and the records of the conventions that have been from time to time convened for their formulation or revision constitute the most important body of source material regarding the American political system and its development that can be provided the student. Upon the legislative branch rests the responsibility of seeing that these documents and records are properly prepared and rendered available. This responsibility is one that in general has been satisfactorily met by the Federal Congress and the State legislatures.

Constitutions

Both the Federal Congress and the State legislatures make provision for the publication of the constitution in a way that makes it a matter of comparative ease for the student to secure access to it. The Federal Constitution may be secured in pamphlet form from the United States Superintendent of Documents for the price of 5 cents and is reproduced in such compilations as the United States Code and the Senate and House Manuals. The constitutions of the States may, in like manner, usually though not invariably, be secured in pamphlet form and are reproduced in the State codes or compiled statutes and in the State manuals, which latter compilations usually reproduce the Federal Constitution as well.

The student of history or of the development of our political system frequently desires to know, not only existing constitutional provisions, but those which existed in the past and have been subsequently modified by the process of revision and amendment. To meet this need, Congress, by act of June 30, 1906, directed that a compilation be made of all State charters and constitutions from the beginning of their political systems to date. This work was entrusted to Francis Newton Thorpe and resulted in the publication, in 1909, as a House document, in seven volumes, of the work the full title of which is: *The Federal and State Constitutions, Colonial Charters and Other Organic Laws of the States, Territories, and Colonies Now or Heretofore Forming the United States of America*, compiled and edited under the act of Congress of June 30, 1906, by Francis Newton Thorpe. (H. Doc. 357, 57th Cong., 2d sess., 1909.) The first volume of this work contains an elaborate and valuable bibliography of the authorities used by the compiler in the preparation of his work.

Two other documents prepared and published under Congressional auspices having for their purpose to furnish similar information are: *The Federal and State Constitutions, Colonial Charters and Other Organic Laws of the United States*, compiled by Ben Perley Poore (G. P. O. 1877) and *Organic Acts for the Territories of the United States With Notes Thereon, Compiled from the Statutes at Large. Also Appendices*

Comprising Other Matters Relating to the Government of the Territories. (S. Doc. 148, 56th Congress, 1st sess., 1900.)

Constitutions Annotated

Due to the fact that the provisions of the Federal and State constitutions are necessarily set forth in relatively general terms, their scope, precise meaning, and applicability to particular conditions under our jurisprudential system come before the courts for more definite determination. It results, therefore, that a full knowledge of constitutional provisions can only be had by an examination of the constitutional documents themselves, supplemented by an examination of the cases where the provisions of these documents have been passed upon by the courts, and particularly by the Supreme Court of the United States, and the courts of last resort of the States. In recognition of this fact, Congress and most of the State legislatures have caused to be prepared and published what are known as "Constitutions Annotated," that is, copies of the constitutions with notes giving references to all, or the more important, cases where the meaning, force, or applicability of their several provisions has received judicial determination and the dates when each was first inserted in the constitution or subsequently modified by the means of constitutional amendment or revision.

The Federal compilation of this character, as prepared in accordance with the direction of Congress, was issued in 1924 and bears the title: *The Constitution of the United States as Amended to December 11, 1924: Annotated: With Citations to Cases of the Supreme Court Construing its Several Provisions, Collated Under Each Provision.* (Compiled by George Gordon Payne under the direction of the chairmen of the House Committee on Rules and the Senate Committee on the Judiciary.) (S. Doc. 154, 68th Cong., 1st sess. 1924.)[1]

As regards the States, the copies of the constitutions appearing in the State codes or compiled statutes are, in many cases, carefully annotated.

Proceedings of Constitutional Conventions

Next in importance to the constitutions themselves as source documents are the published proceedings and records of the various conventions that have been held for the adoption and revision of these constitutions. Their value derives, not only from the fact that they furnish the historical record of the more important steps in the evolution of our political system, but in the discussions that they contain of the merits and demerits of existing constitutional provisions and of proposals for their modification or supplementing by new provisions. They thus furnish an unequaled record of political thought at different periods of our history.

There has been but one Federal Constitutional Convention—that which sat in 1787 and framed the existing Constitution. This Convention sat in secret session, though it was known that certain members, notably James Madison, took rather complete personal notes regarding the proceedings and that other documents, in the form of drafts, proposals, letters, etc., were in existence that would throw light upon such proceedings. In 1818, Congress, by joint resolution, removed the injunction of secrecy upon the Convention proceedings and directed the publication of its papers. This was done in 1819 under the title *Journal, Acts and Proceedings of the Convention. . . .Which Formed the Constitution of the United States*, 1819.

Later Congress assisted in the publication of the debates in the several State conventions on the adoption of the Constitution and certain other documents bearing upon the work of the convention by the purchase of copies to be supplied to members of Congress and for other official use. This work, which was done by Jonathan Elliot, appeared in four volumes, in 1836, under the title: *The Debates in the Several State Conventions on the Adoption of the Federal Constitution as Recommended by the General Convention at Philadelphia in 1787.* A second, enlarged, edition of this work was published in 1859 which included a fifth volume, giving Madison's Debates. Still later, in 1927, Congress caused to be published as a public document the work *Documents Illustrative of the Formation of the Union of the American States, Selected, Arranged and Indexed by Charles C. Tansill, prepared under the General Supervision of H. H. B. Meyer, Director Legislative Reference Service, Library of Congress*, 1927 (H. Doc. 398, 69th Cong., 1st sess., 1927).[2]

As an aid in tracing the movement for the modification of the Constitution by specific amendments, Congress directed the publication of a compilation made by M. A. Musmano, entitled: *Proposed Amendments to the Constitution: Monograph on Resolutions Introduced in Congress Proposing Amendments to the Constitution of the United States* (H. Doc. 551, 70th Cong., 2d sess., 1929).

[1] Announcement has been made that a new edition of this work, bringing the annotations to date, is in course of preparation and will shortly appear.

[2] The most complete compilation of documents regarding the framing of the Constitution and the ratification by the States is the series of volumes issued by the Bureau of Rolls and Library of the State Department entitled *Documentary History of the Constitution*, 1894–1905. Other important works are: *Debates in the Federal Convention of 1787*, edited by Gaillard Hunt and James Brown Scott, Carnegie Endowment for International Peace, 1920; *The Records of the Federal Convention of 1787*, 3 volumes, 1911, vol. 4, 1937; and *The Framing of the Constitution of the United States*, 1930, both by Max Farrand.

In the States, numerous conventions have been held for the purpose of adopting and revising their constitutions. In all cases the State legislatures have made provision for the publication of at least the journals of these conventions and, in the case of the more recent conventions, other records, such as reports of committees, debates, etc.[3]

Reports of Constitutional Commissions

An important development of recent years has been the policy followed by not a few of the State legislatures of providing for the establishment of commissions having for their function the consideration of the advisability of amending or revising the constitution or suggesting the changes believed to be advisable; or the assembling in advance of the convening of a projected constitutional convention of the basic data needed by such a body in considering the proposals for changes likely to come before it. The appointment of these commissions is usually provided for in legislative acts. In some cases, however, the Governor, acting under his general powers, has brought such commissions into existence. The extent to which commissions of the first class have been employed is indicated by the following list of their reports:[4]

California: Report of the California Constitutional Commission, 1931.

Massachusetts: Report of the Special Commission Established to Investigate the Advisability of Amending the Constitution of the Commonwealth, 1936.

New York: Amendments Proposed to the Constitution of New York * * * by the Constitutional Commission, 1872–73. Journal and Documents of the Constitutional Commission, 1890.

North Carolina: Report of the Commission on Constitutional Amendments, 1913.

North Carolina: Report of the North Carolina Constitutional Commission, 1932.

Pennsylvania: Report of the Commission on Constitutional Amendment and Revision, 1920.

Rhode Island: Report of Commissioners to Revise the Constitution, 1898.

Vermont: Report of Commission on Constitutional Amendment, 1920.

Vermont: Report of Commission on Proposals for Constitutional Amendment, 1931.

Virginia: Report of Commission to Suggest Amendments to the Constitution, 1927.

Washington: Report of Advisory Constitutional Revision Commission, 1935.

West Virginia: Report by Constitutional Commission, 1930.

Compilations of Data for Use of Constitutional Conventions

The States that have made provision for the compilation of data for the use of constitutional conventions are Michigan, New York, Massachusetts, Illinois, and Pennsylvania. In some cases this provision has taken the form of the creation of a special commission to perform this service; in others, that of delegating this work to the legislative reference bureau; and, in the case of the New York Constitutional Convention of 1915, of having documents compiled under various auspices. The material assembled and published in this way has not only been of great assistance to the members of the constitutional conventions, but has furnished to students of American Government a body of exceedingly valuable data. The importance of this material warrants our reproduction of the titles of the several compilations issued in detail.

Michigan: Constitutional Convention of 1907:

Bulletins compiled by the Michigan State Library Legislative Reference Department, for the Committee on Printing of the Constitutional Commission of 1907:

1. Amendment and revision: Provisions of the various State constitutions relative to constitutional changes compared with those of Michigan.
2. Boundaries: Seat of government and departments: Constitutional provisions of other States relating thereto compared with those of Michigan.
3. Bribery and corruption: Constitutional provisions of the several States relating thereto.
4. Education and public schools: Constitutional provisions of other States compared with the constitution of Michigan.
5. Elections: Constitutional provisions of the several States relating thereto.
6. Eminent domain: Constitutional provisions of the several States as to the taking of private property for public use.
7. Executive department: Constitutional provisions of the several States compared with those of Michigan.
8. Exemptions: Article XVI, Michigan constitution compared with like provisions in other State constitutions.
9. Finance and taxation: Constitutional provisions relative thereto compared with the provisions of Article XIV, Michigan constitution.
10. Impeachment and removal from office: Constitutional provisions of the several States compared with the Michigan provisions.
11. Judicial department: Constitutional provisions of other States relative thereto compared with those of Michigan.
12. Legislative department: Constitutional provisions relative thereto compared with the provisions of Article IX, Michigan constitution.
13. Miscellaneous provisions and addenda: Contained in the several State constitutions compared with those in the Michigan constitution.

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[3] For a list of the constitutional conventions held by the States and their published records see:

(1) Augustus Hunt Shearer, *A list of Official Publications of American State Constitutional Conventions, 1776–1916.* Newberry Library, Bulletin No. 1, 1917.

(2) Charles F. Babbitt, *Handlist of Legislative Sessions and Session Laws, Statutory Revisions, Compilations, Codes and Constitutional Conventions of the United States and Its Possessions and of the Several States to May 1912.* Massachusetts State Library, 1912.

(3) *Official Publications Relating to American State Constitutional Conventions.* H. W. Wilson Co., 1936 (processed).

Information regarding official publications of conventions held subsequent to the appearance of these volumes may be had from the *Monthly Check List of State Publications,* issued by the Library of Congress.

[4] It is possible that there have been a few constitutional commissions other than those here listed.

14. Liquor traffic: State constitutional provisions for its regulation or supervision.

15. Labor interests: Constitutional provisions of the several States relative thereto.

16. Military affairs: Constitutional provisions relating thereto compared with Michigan's constitution.

17. Municipal corporations: Constitutional provisions of the several States relating to counties, townships, cities, and villages.

18. Preambles and bills of rights: Formal preambles and those sections of the several bills of rights which have no corresponding provisions in the Michigan constitution.

19. Private corporations: Provisions of the Michigan constitution compared with those of other States.

20. Public lands and forest protection: Constitutional provisions of the several States relative thereto.

21. Rights of women: As defined in the several State constitutions.

22. State officers: Salaries; State boards and institutions; constitutional provisions of the several States relating thereto compared with those of Michigan.

New York: Constitutional Convention, 1915:

1. Index-digest of State constitution: Prepared for the New York Constitutional Convention of 1915 by the Legislative Drafting Research Fund of Columbia University.

2. The New York State Constitution Annotated: Prepared under the direction of the New York State Library.

3. The revision of the State constitution: A collection of papers, addresses, and discussions presented at the annual meeting of the Academy of Political and Social Sciences in the city of New York, November 19–20, 1914.

4. Study of county government within the City of New York and a plan for its reorganization: Prepared for the Constitutional Convention of 1915 by the commissioner of accounts and the city chamberlain, New York City.

5. Government of the State of New York: A description of its organization and functions: Prepared for the Constitutional Convention of 1915 by the New York State Department of Efficiency and Economy and the New York Bureau of Municipal Research.

6. City and county government: Special reports.

7. Government of the city of New York: Addresses and special papers.

8. An appraisal of the New York State Constitution and Government.

9. City and county government: The relation of the State to the city school systems.

10. Government of the city of Rochester.

11. Government of Monroe County.

12. Government of Nassau County: Prepared by the New York Bureau of Municipal Research.

13. The Constitution and Government of the State of New York: An appraisal by the New York State Constitutional Convention Commission.

14. County Government: Part I. Papers on Special Topics; Part II. Organization of Westchester County; Part III. System of education; Part IV. County finances.

15. Government of the City of New York.

Massachusetts: Constitutional Convention 1917–1918:

Commission to compile information and data for the use of the constitutional convention: Bulletins:

1. The procedure of constitutional conventions.

2. State budget systems in the United States.

3. The abolition of the Governor's cabinet, Supplement, Statutory powers and duties of the Governor and Council.

4. The pardoning power.

5. A summary of existing laws on old age pension systems.

6. The initiative and referendum.

7. The public opinion law of Massachusetts.

8. County government in Massachusetts.

9. Biennial elections and legislative sessions.

10. The short ballot.

11. Municipal home rule.

12. Commission government in American cities.

13. The city manager plan of municipal government.

14. Constitutional restrictions on municipal indebtedness.

15. Constitutional restrictions on State debts.

16. The selection and retirement of judges.

17. Appropriations for sectarian and private purposes.

18. The constitutionality of social welfare legislation.

19. Excess condemnation.

20. Classification of property for purposes of taxation.

21. Methods of borrowing: Sinking fund vs. serial bonds.

22. Municipal ownership in the United States.

23. Absent voting.

24. Compulsory voting.

25. The abolition of capital punishment.

26. The recall of officers.

27. Preferential voting.

28. Proportional representation.

29. The basis of the apportionment of representation in the several States.

30. The English system of provisional orders.

31. The regulation of billboards.

32. The regulation of the liquor traffic.

33. Woman suffrage in the United States.

34. Special legislation.

35. The amendment and revision of State constitutions.

36. The removal of judges in Massachusetts.

37. Report of the commission to compile information and data for the use of the constitutional convention.

38. A manual for the Constitutional Convention of 1917, 2d edition.

Illinois: Constitutional Convention 1918–1919:

1. The procedure and problems of the constitutional convention.

2. The initiative, referendum, and recall

3. The amending article of the constitution.

4. State and local finance: Taxation, appropriation, and budget methods, State and municipal debts.

5. The short ballot.

6. Municipal home rule.

7. Eminent domain and excess condemnation.

8. The legislative department.

9. The executive department.

10. The judicial department; jury, grand jury, and claims against the State.

11. Local government in Chicago and Cook County.

12. County and local government in Illinois.

13. Farm tenancy and rural credits.

14. Social and economic problems.

15. Bill of rights, education, militia, suffrage and elections, preamble, boundary, distribution and powers, schedule.

Pennsylvania: Commission on Constitutional Amendment and Revision, 1919–1920: Memoranda and Briefs:

1. State budget system: preliminary memorandum.

2. Taxation: Graduated income tax, article 9, section 1.

3. County officers: Compensation.

4. Taxation: Separation of land and buildings: Article 9, section 1.

5. Legislation: Charitable appropriations.
6. Municipal bond issues: Recommendations, department of internal affairs, bureau of municipalities.
7. State budget system: Constitutional provisions in Massachusetts.
8. State budget system: Recommendations of New York State Reconstruction Commission.
9. Courts: Reorganization recommended by American Judiciary Society.
10. Budget system: Recommendations of New York 1915 convention.
11. Courts: Organization of the intermediary appellate courts of New York State.
12. Courts: Organization and operation of court of common pleas of Allegheny County.
13. Charitable institutions: Appropriations to.
14. Courts: Regulation of procedure.
15. Suffrage: Restrictions as to newly naturalized persons.
16. Charitable appropriations: Amount of, to, and services rendered by, institutions not controlled by State.
17. State duties imposed on local executive officers.
18. Local government: Constitutional restrictions.
19. Charitable appropriations: Rates and amounts of 1919 appropriations.
20. Local government: Constitutional home rule provisions of other States.
21. Local government: Discussions of constitutional provisions affecting municipalities' "Home Rule."
22. Executive: Present organization and changes in the interest of efficiency.
23. Municipalities: Contracts with public utilities; police power of state.
24. Local government: Borrowing powers of coextensive municipalities.
25. County officers' compensation for collecting State taxes.
26. Courts: Protection of legal rights of poor.
27. Municipalities: Improvement; excess condemnation; assessment of benefits.
28. Proportional representation.
29. Constitution: Method of changing.
30. Mandamus evil in Philadelphia.
31. Civil service reform.
32. Schools: Support of.
33. Initiative and referendum.
34. Education, higher: Provision for in State.
35. Education: State's ability to greatly increase appropriations.
36. Brief of Kenneth L. M. Pray, secretary of Public Charities Association of Pennsylvania: on State aid to private social agencies.
37. Education: Distribution of State appropriations.
38. Housing problem: Constitutional changes necessary to solve.
39. Courts: Justice of the peace: Arguments of R. H. Smith and J. C. Jones at public hearings.
40. Local and special legislation.
41. Reasons in support submitted by proponents: Amendments on calendar of May 11, 1920: Articles 1, 2, 3 and 4.
42. Judges: Appointing vs. election system.
43. Amendments of preliminary draft: Suggestions by Law Association of Philadelphia.
44. Amendments on calendar of May 11, 1920. Article 5. Reasons in support submitted by proponents.
45. Amendments on calendar of May 11, 1920, articles 6, 8, 9, 10, 16, 17, 18, 18-a: Reasons in support submitted by proponents.
46. Education: Sufficiency of facilities provided in this State: Enforcement of compulsory education laws.
47. Initiative and referendum: Types of constitutional provisions.
48. Eminent domain: Provision for compensation under fourteenth amendment of the Federal Constitution and article 1, section 10 of the Constitution of Pennsylvania.
49. Charitable appropriation: Letter of Hon. William Flinn.
50. Resolution *in re* appointment of committee on style.

New York: State Constitutional Convention Committee, 1938:

1. New York State Constitution annotated.
2. Amendments proposed to New York Constitution, 1895–1937.
3. Constitutions of the States and United States.
4. State and local government in New York.
5. New York City government: Functions and problems.
6. Problems relating to bill of rights and general welfare.
7. Problems relating to legislative organization and powers.
8. Problems relating to executive administration and powers.
9. Problems relating to judicial administration and organization.
10. Problems relating to taxation and finance.
11. Problems relating to home rule and local government.
12. General index.

II. LEGISLATIVE RECORDS

The records of legislative action constitute source material for the student of history, politics, and economics second only in importance to that recording the proceedings and action by constitutional conventions. Our legislative bodies are thus under an especial obligation to research students of taking that action that will ensure that an accurate record of their proceedings is kept and that such records will be given due publication. These records embrace not only a mere statement of action taken but all documents made use of by the legislators in the performance of their duties. As regards the national government, there is probably no other government in the world that has done as much in the way of giving publicity to its proceedings and publishing the material prepared in connection with the performance of its duties. The work of the State legislatures in this way has been, and is, on a much less extensive scale, the deterring element here being primarily the cost involved.

Journals

The Federal Constitution (art. I, sec. 5) provides that "each House shall keep a journal of its proceedings and from time to time publish the same, excepting such parts as may, in their judgment, require secrecy." In compliance with this provision, both Houses have kept and published a journal of their proceedings since the beginning of the Government. Due

to the scarcity and difficulty of securing copies of the early journals, the Senate, in 1820, ordered a reprint of its journals for the first 13 Congresses, 1789–1815, in 5 volumes, and, in 1826, the House did the same for its journal in 9 volumes.

From the start, the Senate has kept a special journal of its proceedings while sitting in executive session, that is, for the consideration of treaties with foreign powers and nominations to office submitted by the President. While sitting in this capacity, it was the invariable practice, down to 1919 when the Versailles Treaty following the World War was submitted to it by the President, for the Senate to hold such sessions in secret, the public being excluded and the members and officers of the Senate being under the obligation not to reveal anything taking place in them. While a journal was kept of these proceedings, publicity to it was not at the time given. From time to time, however, the Senate has removed the injunction of secrecy as regards executive proceedings in the past and directed the publication of the journals of such proceedings. The last of such orders was that of February 28, 1931, which resulted in the bringing of the printed series of Senate Executive Journals down to and including the Seventy-first Congress, though the injunction of secrecy was not removed for the journals beyond the Fifty-sixth Congress, 1899–1901, with the result that the printed journals for the subsequent Congresses have not been released for distribution.

The journals of the Continental Congress were published contemporaneously but, due to the scarcity of certain of the volumes, Congress, in 1800 and again in 1823, ordered a reprint of them. In 1815 it also caused to be published, in four volumes, the secret journals of the Continental Congress.[5] Congress has also provided for the publication as a Senate document of the "Journals of the Congress of the Confederate States of America, 1861–1865" in seven volumes.

As in the case of the National Government, the State constitutions in all cases provide that each of their legislative houses shall keep a journal of its proceedings which, among other things, shall give specified information regarding roll calls. These journals vary greatly in character, not only as between different States, but as between the two houses of the same State and as between different sessions of the same house. The Kentucky Journals are the only ones that reproduce bills in full. Committee reports are printed in full in the Senate Journals of Arizona, California, Minnesota, New York, North Dakota, and Texas, and in the House Journals of Arizona, California, New Hampshire, New York, Oklahoma, Texas, West Virginia, and Wyoming. All the journals, it is believed, give in full the annual and veto messages of the Governors and are thus the best sources of information for such communications.

For the foregoing information the author is indebted largely to an article appearing in a recent number of the American Political Science Review by Phillips Bradley. It is of interest to reproduce here this writer's general comments regarding the nature and value of these documents. He writes:[6]

> The investigator of the content of proposed legislation is therefore at a great disadvantage so far as most of the existing legislative journals are concerned. He will obtain a direct knowledge of only a small proportion of the bills and resolutions introduced and must have available the printed or mimeographed slip laws to get any adequate impression of the trend of legislation in any State. Since off-prints of bills in passage are not included, no permanent record of the evolution of bills enacted into law is available. The minutes reported in most legislative journals are uninformative. The record of legislation introduced and carried from stage to stage contains little more than the number and brief title of the bill. In some journals will be found detailed committee reports which include the actual wording of bills recommended for passage; but practice with respect to committee reports is not uniform even within the same legislative house and session. Moreover, a large proportion of the bills relate to existing statutes which are cited by chapter or section leaving the reader in ignorance as to their purpose. The history of bills tends to be more effectively recorded though the journals vary in this respect as much as in any other.

In view of the fact, as is subsequently pointed out, that, with but one exception, the States make no provision for the reporting stenographically of debates and other proceedings on the floor and their subsequent publication, such as is done by the National Government, it is especially important that the journals of the State legislative chambers should give as full a record as possible of proceedings. Furthermore, it is desirable that the State legislatures, working through some such organization as the American Legislators' Association, should agree upon a more uniform system of legislative journals.

Bills

The bills and resolutions introduced in legislative bodies are not only an important part of the latter's record but, in many cases, have value in that they represent the final product of detailed studies of economic, legal, and social conditions and the means recommended for ameliorating them. It is important, therefore, that our legislative bodies shall make careful pro-

[5] In 1937 the Library of Congress brought to completion the republication of these journals in a complete and carefully edited edition. This work, which was begun in 1904, embraces 34 large folio volumes.

[6] Phillips Bradley, "State legislative journals and manuals," *American Political Science Review*, February 1935.

vision for the preservation of all such proposals, their systematic classification, listing, and filing in such a manner that they may be readily available to the legislator desiring to frame action along the same or similar lines, to the private interests that may be affected by such proposed action, and to the student of public affairs. If this record is to be complete it should embrace copies of the bills and resolutions as introduced, as amended by committees and as finally passed, where favorable action upon them is had.

The proper depository, in the first instance, of such records is the offices of the clerks of the two chambers. Later, the records of the earlier sessions may be transferred to the Department of Archives where provision is made for such an office and special provision is made for the physical safeguarding of the public archives. It is furthermore desirable that duplicate copies of all bills and resolutions be currently supplied to those libraries of general importance that express a desire to receive them and can give assurances that they will be properly preserved and made available to interested persons.

Information is not available regarding the extent to which these considerations are appreciated and met by the several State legislatures, but it is highly probable that, in the majority of cases, conditions in this respect are not fully satisfactory. In the case of the National Government, the only provision of law regarding the preservation of copies of bills and resolutions is section 80 of the General Printing Act of January 12, 1895 (now section 190, title 44 of the United States Code) which provides that "the Public Printer shall bind four sets of Senate and House of Representatives bills, joint and concurrent resolutions of each Congress, two for the Senate and two for the House, to be furnished him from the files of the Senate and House Document Rooms, the volumes when bound to be kept there for reference." The Library of Congress has, however, for many years maintained a collection of these proposals, including their various printings during their progress in the two Houses. A few other central libraries have made arrangements for the receipt of Congressional bills and resolutions for current reference and probably for permanent preservation.

A consideration of importance in respect to legislative proposals is the provision of means through which the legislative history of such proposals may be readily traced. In the case of Congress, such means exist in the journals, the indexes to the daily and final editions of the Congressional Record, and the daily calendars that are supplied to the Members and other interested parties. To supplement these aids, Congress, by a provision contained in the Legislative Appropriation Act of 1936, provided for the preparation and periodical publication by the Legislative Reference Service of the Library of Congress of a *Digest of Public General Bills*. This publication gives not only a digest of the important provisions of all public bills of a general character but the action that has been had upon them and their existing status. Regarding this publication the Librarian of Congress, in his annual report for 1936, says:

> While the preparation of digests is the primary object of the section (e. g., the division set up in the Legislative Reference Service for the preparation of the digest) its facilities and personnel were available, and have proved peculiarly valuable, in the handling of all inquiries relating to bills generally. The number of such inquiries is constantly increasing, requests for legislative histories of bills, especially, being very frequent. Such requests are now allocated properly to the Bill Digest Section, and receive, instead of the more or less inexpert treatment heretofore accorded them, a prompt examination and careful treatment by persons constantly engaged in such work and with considerable facilities at their command. The section maintains an index and history of bills running back to the Sixty-seventh Congress, and is thus enabled to trace bills or particular subjects with considerable expedition. The digests, themselves, will, it is believed, in course of time afford Members a valuable aid in this respect by making readily available in printed form a concise historical index and statement of the status of bills of earlier Congresses.

Petitions and Memorials

Another class of legislative documents of interest as throwing light upon the reaction of the public towards legislative action is the numerous petitions and memorials addressed to our legislative bodies. The manner in which these documents are handled and preserved by the State legislatures is not known; probably practice varies widely in the several States. In the case of Congress, the rules of the Senate provide that the titles of all petitions and memorials presented shall be entered in the Journal and a brief statement of their contents accompany a similar listing in the Congressional Record. The House rules provide for a mere listing of the titles in the Journal and the Congressional Record. The petitions and memorials themselves are referred to appropriate committees for their consideration. Not infrequently, unanimous consent is granted for the reproduction in full in the Congressional Record of a memorial or petition. The original documents themselves remain in the files of the several committees except as they may be from time to time transferred to the document rooms or the National Archives.

Hearings

Probably the most important, certainly the most distinctive, feature of the system of procedure of American legislative bodies is the requirement that

all legislative proposals shall be referred to committees for examination, recommendation, and report before coming before the chambers themselves for action. This feature, which finds no counterpart, so far as the writer is aware, in any other country of first rank, is made all the more important by the practice generally adopted by the committees of holding what are known as public hearings upon all measures in respect to which there is any evidence of a desire on the part of any interested party to be heard in support of, or opposition to, the proposal. This system, in addition to its significance as a means of permitting popular participation in the reaching of legislative determinations, has the important interest, from the standpoint of the present study, that it affords an exceedingly effective means of research into the problems presented by legislative proposals, and of securing the essential data upon which to base intelligent action. In the case of Congress, these hearings are almost invariably reported stenographically and printed for the use of committee members and others. These printed hearings often embrace, not only the oral testimony of witnesses, but carefully compiled data presented by the witnesses in support of their evidence.

It results from the foregoing that this system of public hearings presents an exceptionally effective means of research into legislative problems; and the printed hearings constitute research documents of exceptional value. This is especially true of the hearings held by certain of the more important committees—the hearings on the annual appropriation bills by the committees on appropriations which represent an annual searching inquiry into the manner in which previous appropriations have been expended by administrative agencies and the validity of demands for the future as set forth in the budget submitted by the President; the hearings by the House Committee on Ways and Means and the Senate Committee on Finance on tariff, taxation, and other financial proposals; the hearings on proposals for amending the constitution and judicial reforms by the Committees on the judiciary of the two Houses; the hearings by the Senate Committee on Foreign Relations and the House Committee on Foreign Affairs on matters relating to treaties and other aspects of foreign relations, etc.

In view of the importance of these documents it is to be regretted that they are not printed in larger editions and greater opportunity is not afforded to the public to obtain them. In theory, they are printed for the information alone of the committee, and, thus, are not deemed to be "public documents" which, under the general law governing the distribution of public documents, are distributed to "depository public libraries." It is even difficult for the student to get information regarding their existence and, unless he makes immediate application for a copy to the committee holding the hearing, he may find great difficulty in securing a copy or of getting access to it in his local library.[7] Much the best source of obtaining knowledge of hearings that have been reported and printed is the volume published by the Senate Library entitled: *Index of Congressional Committee Hearings* (not confidential in character) *Prior to January 3, 1935, in the United States Senate Library.* G. P. O. 1935 and Supplement covering the period January 3, 1935 to January 5, 1937.

Although the system of public hearings obtains in the States, and is especially well developed in the New England States, it is exceptional when the hearings are reported stenographically and reproduced in typewriting or printing. Though their results are thus not available to the future student they none the less serve a valuable purpose in facilitating legislation.

Committee Reports

Another important feature of the American committee system, at least insofar as the National Government is concerned, is the requirement of the rules that "all bills, petitions, memorials, or resolutions reported from a committee shall be accompanied by reports in writing which shall be printed." These reports, in the case of minor bills or ones of a noncontentious nature, are often of a perfunctory character, consisting of little more than a statement that the bill has had consideration and that favorable action upon it is recommended. When, however, the bill is one of importance, or gives grounds for serious differences of opinion, the report is frequently of considerable length and sets forth in detail the arguments in favor of the action recommended; in particular does it seek to explain all amendments recommended to be made in the bill. As bills are rarely reported by committees except when favorable action is recommended, the reports prepared represent for the most part but the voice of the majority. The rules, however, recognize the right of the minority to explain their views in dissenting reports. In general, these minority reports, as they are called, are made at the same time and in conjunction with the majority reports. Occasionally, however, they are later submitted by unanimous consent in which case they appear as separate documents.

It is hardly necessary to say that these committee reports often constitute exceedingly valuable documents, representing, as they frequently do, the results of careful research and examination of data. In them are to be found not only the arguments in favor of and against the action recommended but often refer-

[7] The Superintendent of Documents, Government Printing Office, seeks to carry surplus stock of Hearings which may usually be secured from him, at a moderate cost.

ences to prior or existing legislation, citations of judicial decisions, when the constitutional right to act is in queston, and analyses of the testimony of witnesses at the public hearings. Especially valuable are the reports of the Senate and House Committees on the Judiciary on matters involving constitutional limitations and the organization and procedure of the judicial branch, and the Senate Committee on Foreign Relations on matters pertaining to foreign affairs. In 1901, the latter committee caused to be reprinted in 8 volumes a compilation of its reports made during the period 1789–1901.

The printed committee reports are published as a separate series of congressional documents under the titles *Senate Reports* and *House Reports*. Only the reports of conference committees are printed in full in the *Congressional Record*. In the earlier Congresses, committee reports were not segregated and printed as a separate series and it was consequently not always an easy matter to locate a desired report. To remedy this, Congress, by Joint Resolution of July 29, 1886, directed the assembling of all committee reports for the period 1815 to 1887, or the Fourteenth Congress to the Forty-ninth Congress. This work was performed by T. H. McKee, Clerk of the Senate Document Room, under the general direction of the Joint Committee on Printing. It consisted, not in the reprinting of these reports, but merely their reassembling and binding up according to the committees responsible for them. The result was a collection of 515 volumes, some including several parts, the volume for each committee being separately indexed. This compilation, known as *McKee's Compilation of Reports*, was intended for the use of the several standing committees of the two Houses and is not available outside of Washington.[8] For the period covering the first 13 Congresses recourse can be had to *American State Papers*.

In one respect this system of reports would seem to be open to criticism. In some cases, the reports reproduce the bills to which they relate and indicate the specific changes recommended to be made in them. This, however, is by no means the invariable rule. This failure to reproduce the bill, either as introduced and referred to the committee, or as recommended by the committee for favorable action, may not be a serious disadvantage to the Members of Congress who are supplied with copies of all bills introduced and as reported with amendments by the committees. It does, however, constitute a serious handicap to the outside student who is placed under the necessity of securing a copy of the bill, something he cannot always do if he is making his study some time after the event. It would seem to be a reasonable requirement of the rules that all reports should set forth in full the bills reported upon with changes recommended by the committee indicated.

A further requirement that at least merits consideration is that, when public hearings have been held, the printed report of such hearings be attached to the committee report as an appendix. Were these two requirements met, the Member of Congress and the student would have in one volume, the bill as introduced, the hearings upon such bill, the bill as amended by the committee and the committee report in which the action recommended is supported or opposed. As it is, this information must be sought in a number of separate documents which cannot always be easily assembled.

In the State legislatures, no such well developed system of printed committee reports obtains. The requirement that reports be in writing, in cases, either does not exist, or is not rigidly adhered to. When written, they too often are of a more or less perfunctory character. Few, if any, State legislatures make provision for a separate series of committee reports. A general practice is for the committee reports to be set forth in full in the journal. It would appear that room exists for the material improvement of the whole system of committee reports of the State legislatures.

Record of Debates

For a record of proceedings on the floor of the two Houses of Congress, and especially the debates on proposed action, there is available the four series:

Annals of Congress, 1789–1824.
Register of Debates, 1824–1837.
Congressional Globe, 1833–1873.
Congressional Record, 1873 to date.

For the period covered by the first of these series these is no contemporary record of debates. Subsequently the firm of Gales & Seaton compiled a record of Congressional action during these years which was published in 42 volumes, Congress subsidizing the work by providing for the purchase of 2,000 sets. These *Annals of Congress*, as they were entitled, do not contain a full report of proceedings but only abstracts of the more important debates prepared by the compilers from contemporaneous sources.

Beginning with 1824, the firm of Gales & Seaton undertook the contemporaneous reporting of Congressional proceedings under the title of *Register of Debates*, which was continued until 1837. This series is not a complete report of proceedings: Debates are not in all cases reported verbatim; and no part of the

[8] A complete set of this compilation is not to be found even in Washington.

proceedings not involving debates, or some incident of a novel or important character, is given.

In 1833 was begun the publication of another record of Congressional proceedings known as the *Congressional Globe* which continued to be published by various publishing houses until 1873. It will be noted that this series overlaps the *Register of Debates* during its early years. As first issued, this publication bore the heading "Sketches of Debates and Proceedings." Later, the words "Sketches of" were omitted, implying a fuller report of debates.

The publication of the *Congressional Record* was begun in 1873 and has been continued to date. It constitutes the first record of congressional proceedings to be officially reported, printed, and published by the Government. It gives a complete report of proceedings of all kinds in the two Houses, except those of the Senate while sitting in secret executive session, taken from stenographic reports by the official reporters of the two houses. It appears in two editions: (1) a daily issue in pamphlet form giving a report of the proceedings of the previous day; and (2) a final definitive edition in bound volumes. The daily edition enables the Members and others to secure currently detailed information regarding congressional proceedings. It is of a preliminary character since, under the rules, Members are given a period of days in which to correct, and within reasonable limits, to revise and extend their remarks for the definitive edition. The latter thus contains a certain amount of matter that does not represent words actually spoken on the floor, and it may omit matters actually spoken but subsequently, by action of the chambers, stricken from the record. Both the daily and definitive edition also contain a large amount of matter representing speeches of Members and others made outside the chambers, periodical articles, editorials, and the like which have been presented for incorporation in the Record by Members under the rule regarding "leave to print" which may be secured by unanimous consent.

The bound volumes of the Record for each session are accompanied by a detailed index to which is appended the legislative history of each bill and resolution.

With the single exception of Pennsylvania, no State legislature attempts a verbatim report of its proceedings. That State has for a long period of time published a *Legislative Journal*, giving proceedings of its legislative chambers, including debates, comparable in comprehensiveness to the Federal *Congressional Record*.

Laws

The final product of legislative activity is the body of enactments known as acts, statutes, or laws. In the case of the National Government, acts of Congress, as soon as passed, are separately printed in pamphlet form and issued as "slip laws." In this form individual laws may usually be secured from the Senate and House document rooms. For $1, a subscription for all the laws of a session in this form may be entered with the Superintendent of Documents of the Government Printing Office. At the end of each session the enactments of the session were formerly published in a single unbound volume known as "session laws." [9] At the end of each Congress, the laws enacted during it are published in definite bound form known as "statutes at large." This designation derives from the fact that the laws of a session were technically known as "statutes."

The set of statutes at large, running from the beginning of the Government, gives the historical record of the legislative action of Congress; and to them reference must be made in tracing the history of legislation by Congress upon a particular subject. The fact that the laws appearing in these volumes are arranged chronologically, and not classified topically by subject matter, and embrace many acts that no longer have any legal significance, such as the annual appropriation acts of the past, the acts providing for the erection of particular public buildings, etc., or which have been subsequently amended or repealed, makes it difficult for the legislator, the courts, and the student to determine from them the law actually in force at the time regarding a particular matter. Congress, accordingly, has, from time to time, given attention to the preparation of compilations or codes in which the attempt is made to eliminate all obsolete laws or parts of laws, to effect the changes in original enactments called for by subsequent amendatory acts, and to present the laws still in force classified according to subject matters. The first general compilation of this character listed the laws in force on December 1, 1873 and was known as the *Revised Statutes of the United States.* A second edition of this compilation, with slight corrections, was issued in 1878; and two *Supplements of the Revised Statutes* bringing the compilation to a later date were issued: Vol. I, 1874–1891 and Vol. II, 1892–1901. In 1925, the Committee on the Revision of the Laws of the House of Representatives, acting under authority granted by Congress, contracted with the two law-book publishing houses, Edward Thompson Co. and the West Publishing Co., to prepare a new compilation of the Federal laws of a general and permanent character then in force. This compilation was approved by Congress, though the laws contained in it were not reenacted as was done in the case of the Revised Statutes of 1873 and 1878. Congress directed that the compilation should be known as the *United*

[9] Beginning with the 7th Cong., 1st sess., the publication of these session laws was discontinued.

States Code and might be cited in subsequent legislative or court proceedings. This 1925 edition has been followed by a number of supplements having for their purpose to bring the compilation more nearly to date. In 1935 a new edition of the Code was prepared by incorporating in the first edition the material contained in the supplements; and this, in turn, has been followed by supplements.[10]

In the Code, the laws are classified according to a scheme having for its purpose to bring together all laws relating to the same subject matter, a purpose that is not, however, always achieved. The Code is annotated in the sense that appended to each section are citations of the original and amendatory acts and the sections of the Revised Statutes constituting the authority for its inclusion. Obsolete and repealed statutes are eliminated, though such statutes were not expressly repealed until a later date. The most important of these general repeal acts was that of 1933 (47 Stat. 1428), which repealed 1005 sections, said to be the most comprehensive repeal act ever enacted. In appendixes to the Code are given parallel tables showing where Revised Statutes sections and Statutes at Large sections may be found in the Code. Finally the Code is provided with an exhaustive index.[11]

From time to time, under the authorization of Congress, or at the instance of the several administrative services, special pamphlet compilations of the laws relating to particular services or particular subjects are printed and published. Much the most important of these special compilations are those issued by the Superintendent of the House Document Room.[12]

As a further means of facilitating the securing of information regarding Federal legislation, Congress has, from time to time, directed the preparation of consolidated indexes to the statutes. The first of these was the compilation: *Consolidated Index to the Statutes at-Large of the United States of America from March 4, 1789 to March 3, 1903*, 4 volumes, G. P. O. 1903. In this work no attempt was made to prepare a new analytical index to the legislation of the period covered: All that was done was to consolidate the indexes to the several volumes of the Statutes at Large of the period. Strangely enough, only 25 copies of this work were printed. The volume, therefore, is to be found in but few libraries and is practically unobtainable. Though superseded by subsequently prepared indexes, this work, nevertheless, is still of value as an aid in securing information regarding the enactment of private laws since the indexes later prepared cover only general laws.

Of much greater importance was the index prepared under the direction of the Library of Congress by George Winfield Scott and Middleton G. Beaman and published in 1908. The title of this work is: *Index Analysis of the Federal Statutes Together with a Table of Repeals and Amendments: Vol. I, General and Permanent Laws in the Revised Statutes of 1873 and the Statutes at Large 1873–1907* (*Vol. 18–34*) G. P. O. 1908. This was followed in 1911 by a volume, prepared by Middleton G. Beaman and A. K. McNamara, the title of which is: *Index Analysis of the Federal Statutes* (*General and Permanent Laws*) *1789–1873, Together with a Table of Repeals and Amendments*, G. P. O. 1911. In 1927 Congress, by Act of March 3, 1927, as amended by Act of June 14, 1930, directed the preparation, under the direction of the Library of Congress, of a revision of the first of these two works in order to bring it to a later date. This revision was prepared by Walter H. McClenon and Wilfred C. Gilbert and appeared under the title of: *Index to the Federal Statutes, 1874–1931: General and Permanent Law Contained in the Revised Statutes of 1874 and the Volumes 18–46 of the Statutes at Large: Revision of the Scott and Beaman Index Analysis of the Federal Statutes*, G. P. O. 1933. The two works together thus cover the period from the beginning of the government, 1789, to 1931.

It will be noted that these indexes relate to the original Statutes at Large and the Revised Statutes of 1873 while the index to the United States Code relates only to that document which gives the laws then in force. The two sets of indexes can be used in conjunction since one may contain a reference omitted in the other. Mention also should be made that there is now being maintained at the Library of Congress a card index to the Federal Statutes that embraces reference to private and temporary acts as well as general and permanent laws, that covers the entire period since 1789 and is kept constantly to date.

All that has been written regarding the necessity and usefulness of compiled statutes and indexes applies, of course, with equal force to the State laws. At the close of each session of a State legislature, the laws

[10] The 1935 edition is known as the 1934 edition, 1934 being the last completed year covered.

[11] The value of this Code has been greatly increased by the preparation by the joint editorial staffs of the two law book publishing houses that prepared the Code for the House Committee on the Revision of the Laws of the comprehensive annotated edition of the Code, which they have published under the title: *The Code of Laws of the United States in Force December 7, 1925, as Enacted by Congress June 25 and Approved June 30, 1926, Annotated from all the Cases Construing the Laws*, 52 volumes, 1927–1928. Annual cumulative supplements are issued in pamphlet form, each of the 52 volumes being provided with a pocket in which to insert the pamphlet containing the new legislation covered by the volume. The publication of this compilation is a purely private enterprise on a commercial basis.

[12] For a list of the more important of these compilations available for purchase, see: *Price List 10: Laws, Federal and State, Opinions of Attorney General, Decisions of Courts*, issued by the Superintendent of Documents, Government Printing Office, a copy of which may be obtained upon application.

enacted by it are assembled and published in a volume bearing some such general title as "Acts of the Legislature," "Session Laws," etc. In all, or practically all, cases the legislatures of the several States have, from time to time, directed the preparation by special codifying commissions of compilations of the laws in force analogous to the United States Code. In many cases these codes have been annotated by including notes giving references to the legislative history of the several sections and to decisions of the courts where these sections have been construed.[13] Each volume of the State session laws and the codes is, of course, indexed. It is possible that certain of the States have prepared consolidated indexes to their statutes analogous to that prepared for the Federal statutes.

In the case of the States the special condition exists that students often desire references, not only to the laws of a particular State regarding the subjects in which they are interested, but to the laws of all of the States. The first effort to meet this need was made by the New York State Library which, in 1901, began the publication of a biennial *Review of Legislation*. Successive volumes covered the period 1901 to 1908. A fire in the State Library at Albany, in 1911, destroyed the manuscript for the years 1909–1910, and the issue of the *Review* was discontinued. In 1927, Congress by act approved February 10 of that year, directed the Library of Congress to undertake what, in effect, was a renewal of this enterprise on an expanded scale. In pursuance of this direction, the Legislative Reference Service of the Library of Congress now issues biennially a volume entitled: *State Law Index: An Index and Digest to the Legislation of the States of the United States Enacted during the Biennium*. To date, five volumes, covering the bienniums 1925–26, 1927–28, 1929–30, 1931–32, and 1933–34, have appeared. These volumes embrace two parts: The first gives an index to the general permanent laws enacted by the States during the biennium; the second embraces two sections, the first giving a "digest of important statutory changes" during the period and the second a "digest of important changes in State laws relating to administrative organization and personnel." It is hardly necessary to say that these volumes are of great value to the student of comparative legislation and public affairs.

Legislative Manuals

A final obligation resting upon legislative bodies, from the standpoint of facilitating research in the political field, is that of making known the character of organization and the rules of procedure adopted by them for the performance of their functions. The freedom that is left to our legislative bodies in determining these things constitutes an outstanding feature of the American political system. Not only may each succeeding legislature elected by the people, with few limitations, take such action in respect to its organization and procedural practice as it sees fit, but each branch of the legislature may act independently of the other. The manner in which our legislative chambers, and particularly those of Congress, have exercised this freedom, not only furnishes one of the most interesting chapters in the development of our political system, but has determined in no small degree the character of that system from the standpoint of its practical workings. The documents setting forth these provisions are thus of basic importance embracing as they do a part of the public law second in importance only to the Federal and state constitutions themselves.

In the case of the National Government, Congress has taken, and annually takes, exceptional pains to provide full information regarding this matter. The current rules of organization and procedure of the House of Representatives are to be found in the *House Manual and Digest*, prepared and published for each Congress. This compilation, in addition to giving the rules of organization and procedure proper, reproduces important documents such as the Declaration of Independence, the Constitution of the United States, the Ordinance for the Government of the Northwest Territory, and Jefferson's Manual of Parliamentary Procedure. The last named is a document of great historical interest. It was prepared by Thomas Jefferson for his own guidance as President of the Senate in the years of his vice-presidency, 1797–1801. In its preparation he relied largely upon the procedure and practices of the British House of Commons, and the compilation, according to English parliamentarians, represents the best statement available of the law of the British parliament as it existed at the time of its preparation. It is reproduced in the House Manual since one of the House rules provides that its provisions shall "govern the House in all cases to which they are applicable and in which they are not in conflict with the standing rules and orders of the House."

[13] For a list of these codes down to 1912, see: *Handbook of Legislative Sessions and Session Laws; Statutory Revisions, Compilations, Codes, etc., and Constitutional Conventions of the United States and Its Possessions and of the Several States to May, 1912.* Massachusetts State Library, 1912.

Grace E. Macdonald, *Check-List of Statutes of States of the United States of America: Including Revisions, Compilations, Digests, Codes, and Indexes.* Prepared for the Public Document Clearing House Committee of the National Association of State Libraries. Providence: Oxford Press, 1937.

Grace E. Macdonald, *Check-List of Session Laws.* Prepared for the Public Document Clearing House Committee of the National Association of State Libraries. H. W. Wilson Co., 1936.

The rules proper are annotated by reference to rulings of the Chair and the House in applying them.

The rules of organization and procedure as set forth in this manual are comparatively brief. Just as the full purport of the provisions of our Constitution can only be understood in the light of the decisions of the courts construing them, so the force and effect of the rules of the House can only be understood as construed by the Chair in applying them. Following the doctrine of *stare decisis* in the courts, the decisions of the Chair in respect to the rules are deemed to constitute precedent and to have controlling or at least high persuasive force in controlling future interpretations and applications. In order that reference may be readily had to these rulings, the House directed that a compilation of them be made. The result is the monumental work known as *Hinds Precedents*, the full title of which is *Hinds Precedents of the House of Representatives of the United States: Including References to Provisions of the Constitution, the Laws and Decisions of the United States Senate.* The author of this work, Asher C. Hinds, was for years clerk at the Speaker's Table, and, as such, the technical aid to the Speaker in the discharge of his duty of construing and applying the rules. The work itself was published in 8 large quarto volumes in 1907. It is impossible to speak too highly of the character and importance of this work. It was compiled with meticulous care, with great discrimination, and without discernible bias and constitutes literally a mine of information regarding, not only the parliamentary system of the House, but also many other features of our constitutional system. The fact that almost every feature handled is considered from the historical standpoint showing its origin and development, as well as its existing status, adds greatly to its value.

A second edition of this work, prepared by Clarence Cannon, who succeeded Mr. Hinds as parliamentarian of the House, was published in 1935. This edition, known as *Cannon's Precedents*, is, in reality, a supplement to *Hinds Precedents*, since the latter was left undisturbed and was reprinted in unabridged form in the second edition, new volumes being added to cover the development of the parliamentary law of the House since the appearance of the first edition, and a new index being prepared to cover the combined works. In his preface to the second edition, Mr. Cannon takes occasion to comment upon the significance and excellence of Mr. Hinds' work.

"It is difficult," he wrote, "to appreciate too highly the benefits accruing to the House from the codification of its procedure by Mr. Hinds. The daily citation of the precedents on the floor and the adherence to fundamental principles of procedure which they have enjoined have affected, not only the technical routine of the House, but also, in a larger way, the ideals of democracy in legislation, its conception of parliamentary equity and, indirectly, its prestige as a branch of the Government. * * * Through the recognition of established parliamentary principles which it enjoined to Speakers and Chairmen; through the stable and orderly processes which it constituted in the practice of the House, men came to look upon parliamentary probity as a matter of inherent right rather than a contingent privilege subject to political exigencies; to regard it as a science rather than an improvisation to be varied at the caprice of the Chair or the behests of partisan interests. In this respect it contributed inevitably to momentous readjustments in the law of the House."

Developments in the interpretation and application of the rules subsequent to *Cannon's Precedents* can be followed in the *House Manuals* and the *House Journals* which reproduce important rulings of the Chair.

Another official publication regarding the House organization and procedure is the small volume *Procedure in the House of Representatives* by Clarence Cannon, the parliamentarian of the House, the second edition of which appeared in 1928, which has for its purpose to present an analytical statement of the manner of proceeding under the rules.

The Senate has caused to be prepared no work dealing with its organization and procedure that is comparable to *Hinds Precedents*. Nor does its *Rules and Manual, United States Senate*, which is issued for each Congress, embrace annotations to its rules as an aid to their interpretation. It has, however, caused to be prepared and published as public documents the following compilations dealing with specific features of the Senate's activities: *Precedents, Discussions on Points of Order, with Phraseology, in the United States Senate from the First Congress to the End of the Sixty-second Congress, 1789–1913*, by Henry H. Gilfrey, Chief Clerk of the United States Senate (Sen. Doc. 1123, 62nd Cong., 3d sess., 1914; *Digest of Decisions and Precedents of the Senate and House of Representatives*, by Henry H. Smith (Sen. Misc. Doc. 278, 53d Cong., 2d sess., 1894); *Procedure in the Senate of the United States*, by Charles G. Bennett, 1913; *Precedents Relating to the Privileges of the Senate*, by George P. Furber (Sen. Misc. Doc. 68, 52d Cong., 2d sess., 1893); *Statement of the Rules and Practices of the Senate of the United States in the Appointment of Committees from March 4, 1789, to March 4, 1863*, by M. Anthony (Sen. Doc. 1122, 62d Cong., 3d sess., 1913); *Conferences and Conference Reports* (Sen. Doc. 1545, 57th Cong., 1st sess., 1902); *President of the Senate, Pro Tempore: Proceedings in the United States Senate from April 6, 1789 to December 5, 1911, Relating to the Election, Powers, Duties, and Tenure in Office of the President of the Senate, Pro Tempore, Including the Report of the Committee on Privileges and Elections, January 6, 1876*, by Henry H. Gilfrey, Chief Clerk of the United States Senate (Sen. Doc. 104, 62d Cong., 1st sess., 1911); and *Extracts from the*

Journals of the United States Senate in All Cases of Impeachment, 1789–1904 (Sen. Doc. 876, 62d Cong., 2d sess., 1912).[14]

Information regarding the business operations of the two Houses may be found in the *Annual Reports of the Secretary of the Senate and Clerk of the House.*

No State legislature, so far as the writer can learn, has caused to be prepared compilations giving the historical development and interpretation of its organization and procedural practices analogous to those issued by the National Congress to which reference has just been made. All, or practically all, however, issue yearly, or biennially, volumes variously styled *State Manuals, Official Registers, Blue Books*, or the like, which give the rules of procedure of the two Houses, together with other data regarding the Government. These books partake partially of the character of the Federal Senate and House Manuals and partially of that of the *Congressional Directory.*[15]

Only in a few cases have the State legislatures undertaken special surveys of their procedural systems with a view to their improvement. Investigation reveals only the following of comparatively recent date:

Nebraska: Report of Joint Committee on Reform of Legislative Procedure and Budget, 1914.

Massachusetts: Report of Special Joint Committee on Legislative Procedure, 1915.

Vermont: Report of Joint Committee on Revision of the Rules of the Manual of Parliamentary Procedure, 1916.

California: Report of Interim Committee on Legislative Procedure and Reduction of Legislative Expense, 1932.

In a few cases, the Legislative Reference Bureaus of the States have issued pamphlets having for their purpose to describe or suggest improvements in the legislative procedures of their States.[16]

III. SPECIAL INVESTIGATIONS

In the part immediately preceding, the importance of legislative records as source material for research students and the obligation under which legislative bodies rest to preserve and render them available have been pointed out. From action in this way, which may be termed a research obligation incidental to the performance of their primary function, we now turn to a consideration of the extent to which these bodies, availing themselves of their general powers, have sought to go beyond this and prosecute special inquiries into matters in which they may be interested or regarding which, in their opinion, it is desirable to have information which has not been made available, or which cannot equally well be made available, by agencies of the other two branches of Government or private efforts.

It is hardly necessary to say that this power of making special investigations is one that has been largely availed of by our legislative bodies in the past, and every indication points to its continued use on an extensive scale. Nor can there be any question that, though this power may be at times used for purely partisan or frivolous ends, it is one that should be used as the most effective means of providing the legislatures with the information needed by them in the performance of their duties. As Prof. Joseph P. Chamberlain, one of our leading authorities on the legislative branch, has pointed out:[17]

> The great majority of questions which come before the legislatures are non-partisan and in no way affect the political questions in respect of which the members of the legislature, or the leaders of the political parties, are particularly competent, but rather involve complicated technical problems, such as questions of the law of decedents' estates, or modification of the corporate law, or real property law, or involve important projects of social reform in respect of which it is important for the body which must make a decision to know both the facts and public opinion. * * *
>
> With the complexity of business and the great number of bills presented at each session, it is becoming increasingly important that the legislatures devise ways and means of putting their members into a position to judge intelligently and fairly the proposals which come before them. * * * With so short a time at its disposal and so great a crowd of requests for legislation, and with the increasing complexity of the problems involved, it is not surprising that the legislatures are showing an increasing tendency to appoint commissions to study important questions.

Investigating Agency

Granting that it is desirable that legislative bodies shall make investigations of this character, the ques-

[14] Valuable as these documents regarding the organization and procedure of the two Houses of Congress are, it is important that the student should appreciate that they give only a partial picture of the conditions actually governing the organization and procedure of these two bodies. This arises from the fact that there have developed, outside of the formal rules, conventions that are of the utmost importance as they affect the actual operation of the rules and the manner in which the two Houses conduct their business. For information regarding these political practices, the student must turn to privately published works having for their purpose to subject the organization, procedure, and work of our legislative bodies to interpretative, critical, and constructive examination.

[15] For a list of these manuals see Jerome K. Wilcox (compiler): *Bibliography of Official Rosters, State Manuals, Yearbooks, etc., Currently Issued*, John Crerar Library, 1930; and the periodical *State Government* for more recent data regarding such publications.

[16] In considering the rules of procedure of the State legislatures it is important to bear in mind that the constitutions of the several states very generally contain provisions regarding the organization and procedure of the legislative chambers to a far greater extent than in the case of the Federal Constitution. These documents therefore must be consulted by the student desiring to make a study of State legislative organization and procedure.

[17] *The Legislator*, March 1929. *The Legislator* was published for a short time by the American Legislators' Association as its organ, and has been supplanted by *The State.*

tion is presented of the character of the agency to which this work shall be entrusted. Examination shows that the choice lies between the following agencies, all of which, in point of fact, have been made use of by American legislatures:

1. Standing committees.
2. Standing joint committees.
3. Special and select committees.
4. Special and select joint committees.
5. Administrative services.
6. Commissions.

Standing Committees

All of the hearings of standing committees partake of the nature of special investigations. These, however, for the most part, have in view only the eliciting of data and opinions bearing upon the merits of a particular measure. Cases, however, frequently present themselves where a standing committee desires to secure information upon the subject matter of a whole series of bills or upon which it may itself desire to frame legislative proposals. In these cases it is a matter of common practice for the committees to appoint subcommittees with directions to make the investigations desired. When the matter is one of general importance, and particularly when considerable expense is involved in making the inquiry and it is apprehended that use will have to be made of the powers of Congress to compel the giving of testimony and the production of papers, the committee, through the formulation of a resolution, seeks the authorization of the chamber to proceed with the inquiry, the grant to it of funds with which to meet expenses, and the authority to compel the appearance of witnesses, the giving of testimony and the production of papers. An example of where this procedure has been followed is the investigation of the conduct of important industrial establishments in respect to the practice of espionage over labor now being conducted by a subcommittee of the Senate Committee on Education and Labor under the chairmanship of Senator La Follette, an investigation that may easily lead to legislation and certainly has had an important influence upon public opinion and probably upon the future attitude of industry towards labor.[18]

Standing Joint Committees

The term "standing committee," when used without qualification, is generally understood to mean the permanent committees created by the two Houses, acting independently of each other, for the conduct of their business. The rules of the two Houses of Congress provide, however, for three standing joint committees: The Joint Committee on Printing, the Joint Committee on the Library, and the Joint Committee on Internal Revenue Taxation. These three committees have been given a permanent status because upon them have been conferred duties of an administrative character or, at least, of an administrative control character. The Joint Committee on Printing is an integral part of the machinery for the conduct of the Government Printing Office and the printing and distribution of Government publications. The joint committee on the Library acts in a somewhat similar capacity in respect to the operation of the Library of Congress. And the joint committee on internal revenue taxation, among its other functions, has the duty of examining all claims for the refund of income taxes in excess of $75,000, before payment of them can be made by the Treasury Department, and of reporting the results of its examinations to Congress, with the result that it, in this respect, exercises a controlling authority over the operation of the Bureau of Internal Revenue.

Special mention is made of these standing joint committees, since at least two of them have had conferred upon them the prosecution of research work of an important character. The Joint Committee on Printing thus had charge of the preparation, in 1887, of *McKee's Compilation of Reports* mentioned in our account of reports of Congressional Committees. Under its direction and supervision was prepared the *Biographical Directory of the American Congress, 1774–1927; The Continental Congress, September 5, 1774, to October 21, 1788, and the Congress of the United States from the First to the Sixty-ninth Congress, March 4, 1789, to March 3, 1927* (H. Doc. 783, 69th Cong., 2d sess., 1928). This large quarto volume, embodying 1,740 pages, in addition to giving brief biographies of all members of the two bodies mentioned, lists, with dates, all Presidents, Vice Presidents, and members of the Cabinet; the number of Representatives of each State under each apportionment; and the officers and members by States of each Congress.[19] Under its direction was also prepared and published the well-known Richardson's Messages and Papers

[18] To date this subcommittee has issued one report: S. Rep. 46, 75th Cong., 2d sess., 1937.

[19] A prefatory note of this volume states that:

"This volume, compiled by Ansol Wold, Clerk of the Committee, is a revision of the Directory of the United States Congress and the General Government, published in 1859, and again revised in 1869 by Charles Samman: The Biographical Annals of the Civil Government of the United States, in 1876, by Charles Samman and James Angling; and the Samman edition of 1876 as corrected by Joseph Morrison in 1887; the Political Register and Congressional Directory of 1878, by Ben Perley Poore; the Biographical Congressional Directory of 1903, by O. M. Enyart; and the Biographical Congressional Directory of 1911. * * *

"With the aid of a trained corps of investigators, the journals and records of debates have been searched, biographical publications consulted, and special appeals made to Government depositories, public libraries, historical associations, postmasters, State, county, and municipal officers, as well as private individuals for specific and general information."

of the Presidents, the full title of which is *J. W. Richardson: A Compilation of the Messages and Papers of the Presidents, 1789–1897*, 10 volumes, G. P. O., 1896–1899.[20]

Finally, it is this committee which compiles and issues the *Congressional Directory*, the publication of which was first authorized in 1865, the first issue being for the second session of the Fortieth Congress, 1867. This volume is issued annually, and at times more frequently, for the purpose of giving information regarding, not only Congress, but the Government generally. It is an exceedingly useful document. Among the data given by it are: Biographies[21] of all Members of Congress; maps of the States showing their division into congressional or electoral districts; the votes cast at recent elections for each Senator and Representative; the date of beginning and ending and duration in days of each session of Congress since the beginning of the Government: the number of Representatives for each State under each apportionment; the dates of all special sessions of the Senate; the cases where the Senate has sat as a court of impeachment; the names of the governors of all the States, their terms of service and salaries; the names of all committees, standing, joint, and special; a directory of all important officers in the executive and judicial branches of the Government; a statement of the functions and duties of all administrative agencies, boards and commissions; and miscellaneous data regarding foreign representatives in the United States and diplomatic representatives of the United States in foreign countries.[22]

Special and Select Committees

The employment of standing committees for the purpose of making investigations, other than those directly relating to a legislative proposal under consideration by those bodies, is the exception rather than the rule. The more usual practice is for the chambers to create *ad hoc* committees, technically known as special or select committees, for this purpose. The research work done by Congress through instrumentalities of this character is on an extensive scale. The January 1937 edition of the Congressional Directory thus enumerates the following special and select committees as then in existence:

Senate:

1. Special committee to investigate air and ocean mail contracts.
2. Special committee on conservation of wildlife resources.
3. Special committee to investigate labor conditions on the Mississippi flood-control project.
4. Special committee to investigate receivership and bankruptcy proceedings and the administration of justice in the United States.
5. Special committee on investigation of the munitions industry.
6. Special committee to investigate production, transportation, and marketing of wool.
7. Special silver committee.
8. Special committee to investigate executive agencies of the Government.
9. Special committee to investigate campaign expenditures.
10. Select committee on Government organization.

House:

1. Select committee on conservation of wildlife resources.
2. Special committee to investigate old-age pension plans.
3. Select committee to investigate real estate bondholders' reorganizations.
4. Special investigating committee on cross-licensing and pooling of patents.
5. Special committee to investigate campaign expenditures.
6. Special committee to investigate retail federations and trade practices of big scale wholesale and retail buying and selling organizations and their associations.
7. Select committee to investigate executive agencies of the Government.[23]

The foregoing is fairly representative of the magnitude and scope of the investigatory work of the two Houses of Congress that is constantly under way through the instrumentality of special or select committees. These committees vary in size and the general rule is that their members are appointed by the presiding officer of the chamber setting them up.

Special and Select Joint Committees

Where the matter is one of very general importance in which both Houses are interested, action frequently takes the form of the two Houses acting together to create a joint committee for the prosecution of the inquiry. Examples where this practice has been followed are: The Joint Committee to investigate the Department of the Interior and the Bureau of Forestry, created by Joint Resolution of January 19, 1910; the Joint Committee to investigate Federal aid in road construction, created by act of August 24, 1912; the Joint Committee on general parcel post, created by act of August 24, 1912; the Joint Committee on the reorganization of the administrative branch of the Government, created by joint resolution of December 29, 1920; the Joint Committee on fiscal relations with the District of Columbia, created by Act of June 29, 1922; the Joint

[20] Subsequent editions of this work, bringing the compilation to a later date, were published by a private company (New York Bureau of National Literature, Inc.), the latest, in 20 volumes, being in 1917. This edition is entitled: *Messages and Papers of the Presidents: A compilation of the Messages and Papers of the Presidents Prepared under the Direction of the Joint Committee on Printing of the House and Senate Pursuant to an Act of the Fifty-second Congress of the United States (With Additions and Encyclopedic Index by Private Enterprises)*.

[21] These biographies are prepared by the members themselves and vary widely in respect to amount and character of the personal data given.

[22] Copies of this publication can be secured from the Superintendent of Documents, at the price of $1.00.

[23] For a list of the interim committees, joint committees, and commissions created by the State legislatures for a single biennium, 1931–1932, see *State Government*, February 1932, pp. 14–18.

Committee to determine what employment may be furnished Federal prisoners, created by House Concurrent Resolution of March 2, 1923, and many others that might be mentioned.

In setting up these joint committees, it is not an unusual practice for the act or resolution creating them to provide that their members shall be selected from the corresponding standing committee of the two chambers. Thus it was provided that the Joint Committee on the Federal Reserve System, created by Act of March 4, 1923, should be composed of three members of the Banking and Currency Committee of the Senate, to be appointed by the presiding officer of the Senate and five members of the Banking and Currency Committee of the House to be appointed by the Speaker of the House. Occasionally, as in the case of the Joint Subcommittee on Interstate and Foreign Commerce, created by Joint Resolution of July 20, 1916, the provision was made that the members should be selected by the chairmen, respectively, of the Senate and House Committees on Interstate and Foreign Commerce.

It would appear that there are many cases where the preferable mode of procedure would be to create a joint committee instead of one or more special committees by a chamber acting independently. A reading of the list of special and select committees in existence in 1937 given above shows that both Houses had at that time special committees for the investigation of wildlife resources and the reorganization of the administrative branch of the Government. Some of the reasons why preference is so often given to the creation of separate special and select committees are: The general desire of the two chambers to act independently in the framing of legislation to be considered by them; the greater ease with which action by a single House can be secured; and the desire of the member initiating the proposal for the starting of the investigation that he shall be made chairman of the committee and secure the publicity and prestige resulting from the work.[24]

Administrative Agencies

When the nature of the inquiry is such that information does not have to be elicited by the exercise of the inquisitional powers of Congress in the way of the cross-examination of witnesses and the compelling of the production of records and papers, it not infrequently happens that the best method of procedure is for Congress to direct the securing of the data by some one of the administrative agencies. An important example of where this procedure has been followed by Congress was the direction given, by the act of January 29, 1907, to the Secretary of Commerce and Labor to make a comprehensive investigation of the conditions of labor of women and children, a direction which led to the preparation of a report by the Bureau of Labor, in 19 volumes, covering every phase of the subject (S. Doc. 645, 61st Cong., 2d sess., 1910).

With the establishment of the Federal Trade Commission as a dependency of Congress rather than as part of the administrative establishment proper and the endowing of it with broad investigatory powers, Congress has shown a tendency to make use of it, rather than its own standing or special committees, for the prosecution of certain inquiries. A notable instance of where it has acted in this way was the direction given to this body by Senate Resolution 83, 1928, supplemented by Joint Resolution 115, approved June 26, 1934, to make a detailed study of certain features of public utility corporation practices. In pursuance of these directions, the Federal Trade Commission made the most exhaustive investigation of public utility corporations ever attempted in this country. Its report to Congress embraced 84 reports exclusive of 7 volumes of exhibits, appendices and index.[25] While the present study was being made the question whether the proposed investigation of the Tennessee Valley Authority should be made by the Federal Trade Commission, a special committee of the Senate, or a special joint committee of the two Houses was being debated.

It is hardly necessary to say that the two Houses of Congress, by resolution, and their committees and committee chairmen, in a more informal manner, are constantly calling upon the President and administrative officers for information desired by them. In some cases, response to their calls involves the making of special investigations by the officers called upon. Whether or not the President, in given cases, is under the constitutional obligation to supply the information called for has, on various occasions, been a matter of controversy. The clause of the Constitution bearing on this matter reads "[The President] shall, from time to time, give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall deem necessary and

[24] An interesting example of this matter of which House should provide the chairman of a joint committee being at issue is provided by the Joint Committee on the Reorganization of the Administrative Branch of the Government listed above. Senator Smoot headed the Senate delegation on the Joint Committee and desired to be designated as chairman. The House, unwilling to do this, secured the passage of an amending resolution providing for the designation by the President of a representative to act with the committee. The President designated Walter F. Brown, afterwards Postmaster General, as his representative, and the committee then proceeded to select Mr. Brown as its chairman, thus furnishing probably the only example where a person who was not a member of either House of Congress served as the chairman of a Congressional committee.

[25] Though transmitted at different dates, the final report being transmitted in 1936, all the volumes bear the document number S. Doc. 92, 70th Cong., 1st sess., 1928.

expedient." The discretionary right of the President to refuse information to Congress has been claimed by the Presidents and exercised by them from the earliest times. More than this, they have, at times, directed the heads of departments not to furnish information in response to requests by Congress made upon them. Refusal to meet the legitimate demand of Congress for information is however, rarely, if ever, made, though occasionally, the reply is sent that the securing of the data desired would involve so great an expense or so disrupt the regular work of the service, that the latter does not feel that it should comply with the request unless insisted upon.

Commissions

A common characteristic of standing, joint, and special committees is that they are composed wholly of members of the two Houses. At times, where the subject of the inquiry is a very general, or a technical, one, and where the cooperation of outside aid is believed to be of value. Congress adopts the policy of entrusting the conduct of the investigation to a body composed wholly, or partially, of persons not members of either House. A body so constituted is usually known as a Commission, in contradistinction to the term committee, and it is in that sense that the term is here employed.[26] Important examples of where this type of investigatory body has been set up are: The Industrial Commission created by Act of June 18, 1898; the Joint Commission on Immigration, created by Act of February 20, 1903; and the Employers' Liability and Workmen's Compensation Commission, created by Joint Resolution of June 25, 1910.

At times, action by Congress takes the form of requesting and empowering the President to appoint a commission to make a desired investigation, none of whose members may be members of Congress. This was done in the case of the Waterways Commission, created by act of August 8, 1917, and the United States Coal Commission, created by act of September 22, 1922. At other times, the act or resolution creating the commission provides that the commission, in addition to embracing members of Congress, shall include certain designated officials. Thus, the Public Buildings Commission, created by act of July 1, 1916, to investigate what public buildings were needed in the District of Columbia to furnish accommodations for the Government services in Government-owned buildings, was made to consist of the chairmen of the Senate and House Committees on Appropriations, and on Public Buildings and Grounds, two of the members of each of said committees to be selected by the chairmen of said committees, the Superintendent of Capitol Building and Grounds, the officer in charge of public buildings, and the Supervising, or Acting Supervising, Architect of the Treasury Department; and the Commission for the Purchase of Diplomatic and Consular Premises, created by act of March 2, 1921, was made to consist of the Chairmen and ranking minority members of the Senate Committee on Foreign Relations and the House Committee on Foreign Affairs, the Secretary of State and the Secretary of the Treasury. The most striking instance of this practice being followed, however, is afforded by the National Economic Committee created at the close of the last session of Congress to make a comprehensive investigation of the more fundamental features of our existing economic system. This Committee, which is really a commission, consists of three Senators, three Representatives, and six high-ranking executive officials to be designated by the President. The importance of this commission is partially indicated by the fact that $500,000 was appropriated to meet its expenses, of which sum $400,000 was to be allotted by the President.

When the commission is composed of representatives of the two Houses and a designated number of civilians, the provision is usually made that the civilian members shall be selected by the President of the United States, and a fixed compensation for such members is usually provided.

The President, as is well known, has, in recent years, created numerous commissions for the study of matters of public and governmental interest. These investigations, important as many of them are, fall outside of the scope of the present study and are consequently not here considered.

Subject Matter of Investigations

The character of the special investigations undertaken by legislative bodies is probably of greater interest and importance than the particular nature of the agency employed in making the inquiry. An examination of the work of Congress in this way reveals that the great majority of the special investigations directed to be made by Congress fall within certain fairly well-defined fields. In the pages that immediately follow, the attempt is made to list and describe the more important of these inquiries that have been made in recent years in each of these fields. When the results of the investigations have been published in a series of reports or volumes it has been thought desir-

[26] Unfortunately, Congress itself does not consistently follow this terminological distinction. In many cases what is really nothing more than a joint committee is officially designated a commission. For example, the National Monetary Commission, created in 1908, which made one of the most extensive investigations ever undertaken by Congress, and the National Waterways Commission of 1909, which made a general study of water transportation and the improvement of waterways, were composed wholly of members of Congress, and were thus in fact, but joint committees.

able to list the titles of the several studies that are included.

Economic and Social Conditions and Problems

Undoubtedly the most important investigations made by Congress are those where a standing committee has been empowered, or a special joint committee or commission has been set up, to make a comprehensive investigation and report on some broad aspect or problem of the economic or social life of the people. The outstanding instances where researches of this character have been made are those made by the Industrial Commission of 1898; the Immigration Commission of 1907; the National Monetary Commission of 1908; the Industrial Relations Commission of 1917; and the Joint Commission on Agricultural Inquiry of 1921. To this category also belongs the National Economic Committee to which allusion has been made above.

The Industrial Commission was created by Act of June 18, 1898, which provided that it should consist of 20 members: 4 Senators appointed by the presiding officer of the Senate, 5 Representatives appointed by the Speaker of the House, and 11 other persons to be appointed by the President of the United States by and with the advice and consent of the Senate, the 11 civilian members to receive each a compensation of $3,600 per annum. Power was given to the Commission to hold hearings, to administer oaths, and to compel the giving of testimony and the production of papers; and it was authorized to employ a technical staff of research workers and other assistants. The Commission was directed "to investigate questions pertaining to immigration, to labor, to agriculture, to manufacturing, and to business and to report to Congress and to suggest such legislation as it may deem best upon these subjects." It was further directed to "suggest such laws as may be made a basis for uniform legislation by the various States of the Union in order to harmonize conflicting interests and to be equitable to the laborer, the employer, the producer, and the consumer."

The commission proceeded by holding hearings and by employing a large staff of experts to analyze the hearings and to prepare reports upon special topics. These reports were transmitted to Congress during the years 1900–1902 in 19 volumes (H. Doc. 476, 56th Cong., 1st sess.; H. Docs. 494 and 495, 56th Cong., 2d sess.; H. Docs. 177–187 and 380, 57th Cong., 1st sess.). Together they represent one of the most exhaustive and painstaking investigations of labor and industrial conditions and problems ever undertaken by any government. The comprehensive scope of this enquiry may be seen from the list of the abbreviated titles of its reports that follows:

Industrial Commission: Reports:

1 Trusts and Industrial Combinations, 1900.
2. Trust and Corporation Laws, 1900.
3. Prison Labor, 1900.
4. Transportation, 1900.
5. Labor Legislation, 1900.
6. Distribution of Farm Products, 1900.
7. Capital and Labor Employed in Manufactures and General Business, 1901.
8. Chicago Labor Dispute, 1901.
9. Transportation (second volume), 1901.
10. Agriculture and Agricultural Labor, 1901.
11. Agriculture and Taxation, 1901.
12. Capital and Labor in Mining Industry, 1901.
13. Trusts and Industrial Combinations (second volume), 1901.
14. Capital and Labor Employed in Manufactures and General Business (second volume), 1901.
15. Immigration and Education, 1901.
16. Foreign Labor, 1901.
17. Labor Organizations, Labor Disputes and Arbitration, Railway Labor, 1901.
18. Industrial Combinations in Europe, 1902.
19. Final Report, 1902.

The Immigration Commission was created by act of February 20, 1907, which provided that it should be composed of three Senators, appointed by the President of the Senate, three Representatives, appointed by the Speaker of the House, and three other persons, appointed by the President of the United States. To this Commission was entrusted the work of making an investigation into every phase of the immigration problem. The comprehensiveness with which it fulfilled its mission may be seen from the fact that its reports embraced 42 volumes, which appeared during the years 1910 and 1911. Together they furnish an unequalled body of data regarding almost every aspect of the immigration problem as it confronted the United States at that time. The abbreviated titles of these reports are as follows:

Immigration Commission: Reports:

1–2. Abstracts of Reports of Commission.
3. Statistical Review of Immigration, 1820–1910, by Frederick C. Croxton.
4. Emigration Conditions in Europe.
5. Dictionary of Races or Peoples (with bibliography), by Daniel Folkmar, assisted by Elnora C. Folkmar.
6–7. Immigrants in Industries: Bituminous Coal Mining, by W. Jett Lauck.
8–9. Immigrants in Industries: Iron and Steel Manufacturing, by W. Jett Lauck.
10. Immigrants in Industries: Cotton Goods Manufacturing in North Atlantic States; Woolen and Worsted Goods Manufacturing, by W. Jett Lauck.
11. Immigrants in Industries: Silk Goods Manufacturing and Dyeing; Clothing Manufacturing; Collar, Cuff, and Shirt Manufacturing, by W. Jett Lauck.
12. Immigrants in Industries: Leather Manufacturing; Boot and Shoe Manufacturing; Glove Manufacturing, by W. Jett Lauck.

13. Immigrants in Industries: Slaughtering and Meat Packing, by W. Jett Lauck.

14. Immigrants in Industries: Glass Manufacturing; Agricultural Implements and Vehicle Manufacturing, by W. Jett Lauck.

15. Immigrants in Industries: Cigar and Tobacco Manufacturing; Furniture Manufacturing; Sugar Refining, by W. Jett Lauck.

16. Immigrants in Industries: Copper Mining and Smelting; Iron Ore Mining; Anthracite Coal Mining; Oil Refining, by W. Jett Lauck.

17. Immigrants in Industries: Diversified Industries, by W. Jett Lauck.

18. Immigrants in Industries: Diversified Industries; General Tables; Floating Immigrant Labor Supply, by W. Jett Lauck.

19–20. Immigrants in Industries: Summary Report on Immigrants in Manufacturing and Mining, by W. Jett Lauck.

21–22. Immigrants in Industries: Recent Immigrants in Agriculture, by Alexander E. Cance.

23–25. Immigrants in Industries: Japanese and Other Immigrant Races in Pacific Coast and Rocky Mountain States, by H. A. Millis.

26–27. Immigrants in Cities: Study of Population of Selected Districts in New York, Chicago, Philadelphia, Boston, Cleveland, Buffalo, and Milwaukee, by E. A. Goldenweiser and Mary L. Marks, annotated by Nellie F. Sheets.

28. Occupations of 1st and 2d Generations of Immigrants in United States, by Joseph H. Hill; Fecundity of Immigrant Women, by Joseph H. Hill, assisted by Julius H. Parmelee.

29–33. Children of Immigrants in School, by Frederick C. Croxton, Mary W. Simonds, Roland P. Falkner.

34–35. Immigrants as Charity Seekers, by Jesse C. Lloyd, Leslie Hayford.

36. Immigration and Crime, by Leslie Hayford.

37. Steerage Conditions, by Anna Herbner; Importation and Harboring of Women for Immoral Purposes; Immigrant Homes and Aid Societies, by Martha E. Dodson; Immigrant Banks, by W. K. Ramsey.

38. Changes in Bodily Forms of Descendents of Immigrants, by Franz Boas.

39. Immigration Legislation: Federal Immigration Legislation, by Frank L. Shaw; Digest of Immigration Decisions, by John W. Clifton; Steerage Legislation, 1819–1908, by Glen Edwards; State Immigration and Alien Laws, compiled by John W. Clifton.

40. Immigration Restrictions in Other Countries: Canada, Australia, New Zealand, Argentina, Brazil.

41. Statements and Recommendations Submitted by Societies and Organizations Interested in Immigration.

42. Index of Reports of Commission.

The National Monetary Commission was created by act of May 30, 1908, to inquire into and report to Congress the changes deemed necessary or desirable in the monetary system of the United States or in the laws relating to banking and currency. The Commission was composed of nine Senators appointed by the Presiding Officer of the Senate and nine Representatives appointed by the Speaker of the House. Under the chairmanship of Nelson W. Aldrich of Rhode Island, this Commission, in order to provide a basis for its recommendations and for the subsequent consideration of the reforms of the American banking system, caused to be prepared by the leading students of finance what amounted to a comprehensive library of volumes covering almost every phase of banking throughout the world. A list of these volumes, 23 in number, but each, in many cases, embracing a number of separate studies, follows:

National Monetary Commission, 1908: Publications:

1. Report of National Monetary Commission; Interviews on Banking in Europe.

2. Financial Laws of the United States, 1778–1909.

3. Digest of State Banking Laws.

4. Banking in the United States before Civil War, Including First and Second Banks of United States, by J. T. Holdsworth and Davis R. Dewey; State Banking Before Civil War, by Davis R. Dewey and Robert E. Chaddock.

5. National Banking System, Including Origin of National Banking System by Andrew MacFarland Davis; History of National Bank Currency, by A. D. Noyes; History of Crises Under National Banking System, by O. M. W. Sprague.

6. Clearing Houses and Credit Instruments, Including Clearing House Methods and Practices, by J. G. Cannon; Use of Credit Instruments in Payments in United States, by David Kinley.

7. State Banks, Trust Companies and Independent Treasury Systems, Including State Banks and Trust Companies since Passage of National Bank Act, by George E. Barnett; and Independent Treasury System of United States and Its Relations to Banks of Country, by David Kinley.

8. English Banking System, including English Banking System by Hartley Withers, Sir R. H. Inglis Palgrave, and others; History of Bank of England, by Eugene Philippovich and H. S. Foxwell.

9. Banking in Canada, Including History of Banking in Canada, by R. M. Breckenridge; Canadian Banking System, by Joseph French Johnson; Interviews on Banking and Currency Systems of Canada.

10. Reichsbank and Renewal of Its Charter, Including Reichsbank 1876–1900; Renewal of Reichsbank Charter.

11. Articles on German Banking and German Banking Laws, Including Miscellaneous Articles on German Banking; German Imperial Banking Laws, edited by R. Koch.

12. German Bank Inquiry of 1908, Part I.

13. German Bank Inquiry of 1908, Part II.

14. The Great German Banks, by F. Reisser.

15. Banking in France and French Bourse, Including Evolution of Credit and Banks in France, by Andre Liesse; Bank of France in Its Relation to National and International Credit, by Maurice Patron; History and Methods of Paris Bourse, by E. Vidal.

16. Banking in Belgium and Mexico, Including National Bank of Belgium, by Charles A. Conant; Banking System of Mexico, by Charles A. Conant.

17. Banking in Sweden and Switzerland, Including Swedish Banking System, by A. W. Flux; Swiss Banking Law, by Julius Sandmann.

18. Banking in Italy, Russia, Austria-Hungary and Japan, Including Italian Banks of Issue, by Tito Canovai and Carlo F. Ferrarns; Banking in Russia, Austria-Hungary, Holland and Japan, by various writers.

19. Administrative Features of National Banking Laws and European Fiscal and Postal Savings Systems, Including Suggested Changes in Administrative Features of National Banking Laws; Fiscal Systems of England, France, Germany, and

United States, by J. O. Manson; Notes on Postal Savings Bank Systems of Leading Countries.

20. Miscellaneous Articles, Including Address by Senator Aldrich on Work of National Monetary Commission; Discount Systems in Europe, by Paul M. Warburg; Bank Acceptances, by Lawrence Merton Jacobs; Credit of Nations, by Francis W. Hurst; Trade Bureaus of the United States, by George Paish; Bank Loans and Stock Exchange Speculation, by Jacob H. Hollander.

21. Statistics from United States, Great Britain, Germany, and France, Including Statistics for the United States, compiled by A. Piatt Andrew; Special Report from Banks of United States, 1909; Statistics for Great Britain, Germany, and France, 1867–1908, by Sir R. H. Inglis Palgrave, F. W. Hurst, B. Breslauer, Robert Franz, Albert Aupetit and M. Lefevre.

22. Seasonal Variations in Demands for Currency and Capital, by Edward W. Kemmerer.

23. Financial Diagrams and European Bank Summaries, prepared by A. Piatt Andrew.

The great value of these studies was at once recognized. That they influenced Congressional action in the establishment of the Federal Reserve System that followed and prepared public opinion to accept the radical departure from past practice that this system represented, cannot be questioned.

The Industrial Relations Commission was created by act of August 23, 1912, which provided that it should be composed of nine persons to be appointed by the President of the United States by and with the advice and consent of the Senate, not less than three of whom should be employers of labor and not less than three representatives of organized labor. The Act gave detailed instructions to the Commission to inquire into the general conditions of labor in the principal industries of the United States, including agriculture; the relations between employers and employees and other collateral matters, and to seek to discover the underlying causes of dissatisfaction in the industrial situation and to report its conclusions thereon. The Commission employed a staff of investigators, headed by Basil M. Manly, held extensive hearings and reported its findings in 11 volumes as follows (S. Doc. 415, 64th Cong., 1st sess., 1916):

Industrial Relations Commission: Reports:

Vol. 1. Final report of the Commission: Suggestions of expert witnesses regarding investigations; Trade agreements in collective bargaining; Efficiency systems and labor.

Vol. 2. Cloak, suit, and waist industry: Employment offices and unemployment; American Federation of Labor, Socialist Party, and Industrial Workers of the World; Building trades of New York City; Industrial education, apprenticeship, and administration of child labor laws; State mediation and arbitration of industrial disputes; Men's garment trades of New York City.

Vol. 3. Dock workers of New York City; Department stores of New York City; Industrial conditions and relations in Paterson, New Jersey; General industrial relations and conditions in Philadelphia; Cooperative plan of Philadelphia Rapid Transit Company; Metal trades of Philadelphia; Industrial education, apprenticeship, and administration of child labor laws; Glass and pottery industries.

Vol. 4. Textile industry in Philadelphia; Women's garment industries of Philadelphia; Industrial conditions and relations in Chicago; Life and labor conditions of Chicago stockyard employees; Conditions of employment of waiters and cooks; Industrial conditions and relations in gold mining operations at Lead and Black Hills, S. Dak.; Mining conditions and industrial relations at Butte, Mont.

Vol. 5. Industrial relations and remedies, Seattle, Wash.; General industrial conditions and relations in Portland, Oreg.; Open and closed shop controversy in Stockton, Calif.; Seasonal labor problems in agriculture; Unemployment in California.

Vol. 6. Labor conditions in construction camps; Collective bargaining in San Francisco; Industrial accident compensation; General industrial relations and conditions in San Francisco; Open and closed shop controversy in Los Angeles.

Vol. 7. Smuggling of Asiatics; Colorado coal miners' strike.

Vol. 8. Colorado coal miners' strike (continued); Centralization of industrial control and operations of philanthropic foundations; Further proceedings relating to Colorado strike, large foundations, and industrial control.

Vol. 9. Further proceedings relating to Colorado strike, large foundations, and industrial control (continued); Rockefeller interests in Colorado; Land question in the Southwest.

Vol. 10. Land question in the Southwest (continued); Commercial telegraph companies; Pullman employees, Harriman railroad system strike.

Vol. 11. Conditions of labor on Pennsylvania Railroad; Labor and the law; Pennsylvania State police; Labor conditions in Puerto Rico; Index.

The Joint Commission on Agricultural Inquiry was created by concurrent resolution of June 7, 1921, and was composed of five Senators, three selected from the majority and two from the minority party, appointed by the President of the Senate and five Representatives, three selected from the majority and two from the minority party, appointed by the Speaker of the House. This Commission was instructed to investigate and report on the causes of the then existing depression in agriculture; the causes of the difference between the prices of agricultural products paid to producers and their ultimate cost to the consumer; the comparative condition of industries other than agriculture; the relation of prices of commodities, other than agricultural products, to such products; the banking and financial resources and credit of the country, especially as affecting agricultural credits; and the marketing and transportation facilities of the country. The results of the Commission's investigations were reported to Congress in 3 volumes of hearings and 4 volumes of reports (H. Rept. 408, 67th Cong., 1st sess., 1921) the general titles of which were:

1. Agricultural crises.
2. Credit.
3. Transportation.
4. Marketing and Distribution.

In addition to these very comprehensive investigations, Congress is constantly directing its standing

committees, or creating special or select committees and, occasionally commissions, technically speaking, to inquire into more special matters in which it is interested and in respect to which the enactment of legislation is deemed probably desirable. It is impracticable to give any detailed presentation of the organization and reports of these inquiries such as has been attempted in respect of economic and social inquiries of a more general character. All that is possible to do here is to present a roughly classified list of some of the more important of these investigations in recent years.[27]

Banking:

1. Joint Committee on the Federal Reserve System, created by act of March 4, 1923, composed of three members of the Senate Committee on Banking and Currency, appointed by the President of the Senate, and five members of the House Committee on Banking and Currency, appointed by the Speaker of the House, with instructions to inquire into the effect of the existing limited membership of State banks and trust companies in the Federal Reserve System upon financial conditions in the agricultural sections of the United States; the reasons which actuated eligible State banks and trust companies in failing to become members of the Federal Reserve System; what administrative measures had been, and were being, taken to increase such membership; and whether or not any change should be made in existing laws, or in the rules and regulations of the Federal Reserve Board, or in methods of administration to bring about in the agricultural districts a larger membership of such banks and trust companies in the Federal Reserve System.

Merchant Marine:

1. Merchant Marine Commission, created by act of April 28, 1904, composed of five Senators and five Representatives appointed by the presiding officers of the two Houses, with instructions to investigate what legislation, if any, was desirable for the development of the American merchant marine; and what changes, if any, should be made to the existing laws relating to the treatment, comfort, and safety of seamen in order to make the seagoing calling more attractive to American citizens.

Rural Credit:

1. Commission to Investigate Rural Credits in Europe, created by act of March 4, 1912, composed of not more than seven persons, to be appointed by the President of the United States, with instructions to study, in European countries, cooperative land mortgage banks, cooperative rural credit unions and similar organizations, and to cooperate with the American Commission assembled under the auspices of the Southern Commercial Congress.

2. Joint Committee on Short Term Rural Credits, created by act of May 31, 1920, composed of the chairmen of the Senate and House Committees on Agriculture and Forestry and on Banking and Currency and seven other members from each of these committees appointed by the chairmen respectively of these committees, with instructions to formulate a system of short term rural credits in the United States.

Gold and Silver:

1. Gold and Silver Inquiry Commission, created by Senate resolution of March 3, 1923, composed of five Senators appointed by the President of the Senate, three of whom should be of the majority and two of the minority party, with instructions to investigate the cause of the continued decrease in the production of gold and silver; the causes of the depressed condition of the gold and silver industry in the United States; the production, reduction, refining, transportation, marketing, sale, and use of gold and silver in the United States and elsewhere; the effect of the decreased production of gold and silver upon commerce, industry, exchange, and prices; to confer with citizens, associations, and corporations of foreign countries with a view to the stabilization of wider use of silver in exchange and to prepare plans for negotiation with foreign governments to that end.

Waterways:

1. National Waterways Commission, created by act of March 3, 1907, composed of five Senators appointed by the President of the Senate and seven Representatives appointed by the Speaker of the House, with instructions to investigate questions pertaining to water transportation and improvement of waterways. Its report (S. Doc. 469, 62d Cong., 2d sess., 1912) embraced a large number of monographs by various authors dealing with waterways in different countries in Europe, particular waterways, or other topics.

2. Waterways Commission, created by act of August 8, 1917, composed of seven persons appointed by the President of the United States, one of whom should be chosen from the active or retired list of the Engineer Corps of the Army, one, at least, should be an expert hydraulic engineer from civil life, and the remaining five of whom should be chosen from either private life or the public service.

Highway Construction:

1. Joint Committee to Investigate Federal Aid in Road Construction, created by act of August 24, 1912, composed of five Senators, appointed by the chairman of the Senate Committee on Post Offices and Post Roads, and five Representatives, appointed by the chairman of the House Committee on the Post Office and Post Roads with instructions to inquire into the matter of the grant of aid to the states for the construction of public roads.

Employers' Liability and Workmen's Compensation:

1. Commission to investigate Employers' Liability and Workmen's Compensation, created by joint resolution of June 25, 1910, composed of two Senators appointed by the President of the Senate, two Representatives, appointed by the Speaker of the House, and two other persons, appointed by the President of the United States, with instructions to make a thorough investigation of the whole matter of employers' liability for accidents to labor and workmen's compensation.

Wages and Prices:

By Senate resolution of March 3, 1891, the Senate Committee on Finance was directed to make an investigation of wages and prices over a period of years. In pursuance of this direction, this committee, under the direction of Senator Aldrich of Rhode Island, caused to be made by a staff recruited by it for the purpose and with the aid of the old Department of Labor (now the Bureau of Labor Statistics of the Department of Labor) one of the most extensive compilations of wages

[27] This list is by no means exhaustive. Its purpose is little more than to give an indication of the research work of Congress carried on in this way. For a more comprehensive list see: *Federal Commissions, Committees, and Boards:* List of Federal commissions and boards and similar bodies created during the period September 14, 1901, to March 4, 1929 (S. Doc. 174, 71st Cong., 2d sess., 1930) and the Document Catalogues and Congressional Directories for the years since 1929.

and prices statistics ever attempted. Its report appeared in two series, the one of four volumes dealing with wholesale prices, wages, and transportation (S. Rep. 1394, 52d Cong., 2d sess., 1893) and the other with retail prices and wages in three volumes (S. Rep. 986, 52d Congress, 1st sess., 1892).

Education:

1. Commission on National Aid for Vocational Education, created by joint resolution of January 20, 1914, composed of seven members, appointed by the President of the United States, with instructions to consider and report upon the subject of the grant by the National Government of aid to the States for vocational education.

Organization and Operations of the Administrative Branch

The present writer has had occasion to point out, and to emphasize in a way that other writers have not done, the fact that the legislative branch, under our system of separation of powers, is the source of all administrative authority and, as a necessary consequence, has a very special responsibility in respect to the manner in which the administrative services are organized and conduct their operations.[28] The American legislature is the body that, subject to constitutional limitations, determines what activities shall be engaged in by the Government; how the administrative services shall be organized for the performance of these activities; what sums of money shall be applied to such purposes; how this money shall be raised and disbursed; and the rules of procedure that shall be followed in performing the work to be done. In the exercise of this authority, the legislature acts in the capacity of a board of directors and performs a function that can be clearly distinguished from that of legislation, strictly speaking, from the jurisprudential standpoint.

Having this responsibility, it is essential that the legislature shall take the steps that will ensure to it the knowledge of administrative conditions and needs upon which alone intelligent action by it can be had. Much of this knowledge can be secured from the annual administrative and financial reports which the administrative services are required to make and through the hearings upon the annual appropriation bills when these services are called upon to justify the demands for the grant of funds that have been made on their behalf in the Budget. Many occasions arise, however, where the information thus obtained is inadequate. Especially is this so where the legislature is not satisfied with the fundamental aspects of administrative conditions and has in contemplation the introduction of changes of a basic character. On such occasions, the legislature finds that by far the most effective means open to it is that of causing to be made a detailed study of the matters in which it is interested, a study that will not only reveal existing conditions, but result in concrete recommendations for action having for their purpose the correction of evils that may be found to exist.

Inquiries of this character, as regards their reports, fall into a number of categories: (1) Those of a general nature; that is, relating to the administrative establishment as a whole with a view to improving administrative conditions generally; (2) those relating to a particular phase or aspect of public administration, such as organization, accounting, the recruitment and handling of personnel, etc.; and (3) those having for their purpose to examine the conduct of affairs by particular services.

From almost the beginning of the Government, inquiries of this character have been made by Congress. It is, manifestly, impracticable even to list, much less to describe in any detail all these investigations. It would seem desirable, however, to give a brief account of some of the more general ones as throwing light upon the character and importance of the research work of Congress in this field.[29]

Investigations of a general character.—Of investigations falling within the first category that has been mentioned, that is, those pertaining to administrative conditions generally, much the most important are those that were presented, on behalf of Congress, by:

1. The Joint Commission on Executive Departments, Organization, etc. (Dockery-Cockrill Commission) 1893–1895.
2. The President's Commission on Economy and Efficiency, 1910–1912.
3. The Joint Committee on Reorganization of the Administrative Branch of the Government, 1920.
4. The Senate Select Committee to Investigate Executive Agencies of the Government and the House Special Committee to Investigate Executive Agencies of the Government, 1937–1938.

The Joint Commission on Executive Departments, Organization, etc., known as the Dockery-Cockrill Commission, was created by a clause inserted in the Legislative, Executive, and Judicial Appropriation Act for 1894, approved March 3, 1893, which provided for the creation of a joint commission, composed of three Senators, appointed by the President of the Senate, and three Representatives, appointed by the Speaker of the House, with instructions to inquire into: the status of the laws organizing the executive departments, bureaus, and other administrative establishments; the rules, regulations, and methods for the conduct of business in such services; the time and attention devoted to the public

[28] *Principles of Public Administration* and *Principles of Legislative Organization and Administration*, The Brookings Institution, 1927 and 1934.

[29] The report of the President's Commission on Economy and Efficiency, *The Need for a National Budget* (H. Doc. 851, 62d Cong., 2d sess., 1912) gives an exceptionally detailed list of such inquiries during the period 1789–1911, which list is reproduced in Gustavus A. Weber, *Organized Efforts for the Improvement of Methods of Administration in the United States*, the Brookings Institution, 1919.

business by the officers and employees of these services and the degree of efficiency of such personnel; whether any modification in the laws governing the services were desirable in the interest of securing greater economy and efficiency in the dispatch of the public business; and whether a reduction in the number or compensation of the personnel manning these services at Washington could be made without doing injury to the public services.

This joint committee (though termed a commission) assisted by a corps of experts employed from private life, made an exceptionally thorough investigation into the organization and business methods of the administrative services and submitted a large number of reports which were published as congressional documents. More important still, the recommendations contained in these reports led to the passage of a large number of acts introducing important improvements in administrative organization and methods.[30]

The President's Commission on Economy and Efficiency, though set up by the President and conducted under his direction, is here mentioned and described since its creation was due to special action by Congress and its findings reported to it. A clause inserted in the Sundry Civil Appropriation Act for 1911, approved June 25, 1910, provided for an appropriation [31] "to enable the President, by the employment of accountants and experts from official and private life, to more effectually inquire into the methods of transacting the public business of the Government in the several executive departments and the Government establishments, with the view of inaugurating new or changing old methods of transacting such public business, so as to attain greater efficiency and economy therein, and to ascertain and recommend to Congress what changes in law may be necessary to carry into effect such results of his inquiry as cannot be carried into effect by executive action alone."

In pursuance of this authorization, the President set up a commission to which was given the name President's Commission on Economy and Efficiency, composed of five members. This Commission functioned until June 30, 1913, when it went out of existence due to the failure of Congress to continue appropriations for its support. It organized a staff of experts and clerical assistants, and subjected the Government to what is undoubtedly the most thorough survey that has ever been made of its organization, procedure, and administrative problems. Its findings were embodied in a large number of reports which were submitted to Congress and published as public documents. Among these, the two most important were those dealing with the problem of improving the system then in force for determining and making provision for the financial needs of the Government through the establishment of a scientific budget system. The titles of these reports are:

1. *The need for a national budget:* Message from the President of the United States transmitting a report of the Commission on Economy and Efficiency on the subject of the need for a national budget (H. Doc. 854, 62d Cong., 2d sess., 1912).
2. Message of the President of the United States transmitting for the consideration of the Congress a budget with supporting memoranda and reports (S. Doc. 1113, 62d Cong., 3d sess., 1913).

Other reports dealt with such matters as: methods of appointment; the system of accounting and reporting; the organization of the administrative branch, with recommendations for the consolidation of certain services; the centralization of the distribution of public documents; the establishment of a retirement system for civil employees; the creation of a bureau of central administrative control, etc.[32]

Although these reports, largely for reasons later pointed out [33] resulted in no immediate important legislative action, they had a large educational influence upon both Congress and the general public and ultimately led to the putting into effect of many of their most fundamental recommendations. There can thus be no question but that the two reports dealing with the desirability of the establishment of a budget system that have been mentioned had an important influence in promoting this reform which was finally accomplished through the passage of the Budget and Accounting Act, 1921, and the revision of the rules of the two Houses of Congress regarding the handling of appropriation bills, in the same year.

Second in importance among the recommendations of the President's Commission on Economy and Efficiency to that urging the adoption of a budget system, was the recommendation that the administrative branch as a whole be subjected to a thorough reorganization with a view to the elimination of duplication of functions and the bringing together under a common direction of services operating in the same general field and which should have close working relations with each other. Impressed with the necessity for action in this way, Congress, by joint resolution of December 29, 1920, created a Joint Committee on the Reorganization of the Administrative Branch of the Government, composed of three Senators, appointed by the Presi-

[30] For a list of these reports and an enumeration of the laws providing for putting their recommendations into effect, see G. A. Weber, *Op. cit.*, pp. 71–73.

[31] $100,000, subsequently supplemented by further grants aggregating $160,000.

[32] For a complete list of the reports of the commission, including printed circulars and other documents that were not transmitted to Congress and were thus not printed as Congressional documents, see Gustavus A. Weber, *Op. cit.*, pp. 99–103.

[33] See p. 149, below.

dent of the Senate and three Representatives, appointed by the Speaker of the House,[34] which was directed to make a survey of the administrative services of the government for the purpose of securing all pertinent facts concerning their powers and duties, their distribution among the several executive departments and their overlapping and duplication of authority; also to determine what redistribution of activities could be made among the several services with a view to the proper correlation of the same and what departmental regrouping of services should be made to the end that there shall be achieved the greatest possible measure of efficiency and economy in the conduct of the Government business.

The work of this committee resulted in the preparation of an extensive report setting forth the existing organization of the administrative branch with a scheme for its complete reorganization, the holding of extensive hearings, the published report of which constitutes a valuable contribution to the subject, and a report by the committee giving its consideration of the problem and its recommendations for action. The report on the existing organization, with suggestions for changes, though taking the form of a letter from the President to the chairman of the committee, was, in fact, prepared by the latter, Mr. Walter F. Brown, who was the President's representative on the committee, and submitted by him to the President for submission to the members of the Cabinet. Due to this procedure the document has the value of representing the opinion of the President in respect to the reorganization that ought to be effected. Following are the titles of these three documents:

1. *Reorganization of the Executive Departments.*—Letter from the President of the United States to Walter F. Brown, chairman of the Joint Committee on the Reorganization of Government Departments, transmitting a chart exhibiting in detail the present organization of the Government departments and the changes suggested by the President to the Cabinet (S. Doc. 302, 67th Cong., 4th sess., 1923).
2. Hearings: Reorganization of Executive Departments, 68th Cong., 1st sess., 1924.
3. Report of Joint Committee (H. Doc. 356, 68th Cong., 1st sess., 1924).

Although it proved impossible to get through Congress any general reorganization bill, certain specific changes in line with the recommendations of the President and the committee were subsequently effected by law.

The subject of the reorganization of the administrative branch of the Government continued to be recognized as one of major importance by both Congress and the Executive. In 1937 both branches of Congress inaugurated efforts with a view to action. The Senate created a Select Committee on Investigation of Executive Agencies of the Government; the House a Select Committee on Government Organization and the two Houses, acting jointly, a Joint Committee on Government Organization, while the President, acting under his general powers, created a Committee on Administrative Management.

The work of this latter commission, though not an example of research on the part of Congress, is of importance from the standpoint of the present study since the recommendations contained in it were made the basis of the more important bills for the reorganization of the administrative system that have actually received the attention of Congress. The committee was composed of Louis Brownlow, chairman, Charles E. Merriam, and Luther Gulick. Its report, entitled: *President's Committee on Administrative Management: Report of the Committee with Studies of Administrative Management in the Federal Government* (G. P. O. 1937), was transmitted to Congress by the President with a message urging action upon its recommendations. In addition to the report proper were included a number of special studies, the contents of the report thus being as set forth below:

Letter of the President.
Part I. Report of the President's Committee.
Part II. Studies of Administrative Management in the Federal Government.
1. Personnel Administration in the Federal Service, by Floyd W. Reeves and Paul T. David.
2. Financial Control and Accountability, by A. E. Buck.
3. The General Accounting Office, by Harvey C. Mansfield.
4. The Problem of the Independent Regulatory Commissions, by Robert E. Cushman.
5. Departmental Management, by Arthur W. Macmahon.
6. Executive Management and the Federal Field Services, by James W. Fesler.
7. Government Corporations and Independent Supervisory Agencies, by Herbert Emmerick.
8. The exercise of Rule-making Powers, by James Hart.
9. The Preparation of Proposed Legislative Measures by Administrative Departments, by Edwin E. Witte.

The congressional committees enumerated are in existence and still functioning as this report is being written. They have held hearings and made reports on various bills having for their purpose to put into effect the recommendations contained in the report of the President's Committee on Administrative Management. The Senate Select Committee has also published a report reproducing the reports made to it by the Brookings Institution which was employed by the committee to act as its technical aid in the making of searches into the organizational problems of the ad-

[34] As has been pointed out in our consideration of the different types of agencies created by Congress for the performance of research work, this Commission had afterward added to it a representative of the President, who became its chairman.

ministrative branch and the formulation of recommendations for change. A list of these reports follows:

Reports of the Brookings Institution to the Senate Select Committee to Investigate the Executive Agencies of the Government (S. Rpt. 1275, 75th Cong., 1st sess. 1937):

1. Government Financial Agencies.
2. Expansion in Governmental Activity: Introduction to report.
3. Government Activities in the Field of Public Supply and Property.
4. Government Activities in the Field of Mineral Resources and Power.
5. Financial Administration of the Federal Government.
6. The Organization of Federal Law Enforcement Activities.
7. Government Activities in the Field of Public Personnel.
8. Government Activities in the Field of Public Welfare.
9. Government Activities in the Promotion of Commerce and Industry.
10. Government Activities in the Regulation of Private Business Enterprises.
11. Government Activities in the Fields of the Public Domain, Agriculture and Wildlife and Aquatic Resources.
12. Government Activities in the Field of Transportation.
13. Government Activities in the Field of Library, Information and Statistical Services.
14. Government Activities in the field of Public Works and Water Resources.

Investigations of special aspects.—General investigations of the administrative branch have concerned themselves primarily with the matter of organization from the standpoint of the allocation of activities among the several services and the grouping of these services departmentally for the exercise of central administrative direction and control. These general inquiries have been supplemented by others having for their purpose the examination of particular aspects or branches of administration. Among the most important congressional investigations of this character in recent years are those made by:

1. The Senate Select Committee on Methods of Business in the Executive Departments, 1887–1889.
2. Joint Commission on Reclassification of Salaries, 1919–1920.
3. House and Senate Special Committees on the Budget, 1919.
4. Joint Commission on Printing and Binding, 1905.
5. Joint Committee to Determine what Employment may be Furnished Federal Prisoners, 1923.
6. Joint Committee on Fiscal Relations with the District of Columbia, 1922.
7. Public Buildings Commission, 1916.
8. Foreign Service Buildings Commission, 1926.

The Senate Select Committee on Methods of Business in the Executive Departments, popularly known as the Cockrill Committee from the name of its chairman, was created by Senate resolution of March 3, 1887, at a time when complaint was general that many of the administrative services were far behind in the performance of their current duties, that much useless paper work was performed, and that the methods employed by the administrative services generally, were archaic in the extreme. The committee was appointed to inquire into these complaints and, where found to be justified, to recommend measures for their removal. In point of fact, the committee found that these complaints were more than justified. It thus, for example, found:

> That 39 employees, with salaries ranging from $720 to $1,600 per annum, were engaged more or less in copying with pen and ink the letter press copies of letters into record books. Cases of employees furnishing proxies or substitutes to perform their work at their salaries or at reduced compensation were found in three of the executive departments. On August 20, 1887, there were in the General Land Office a total of 276,670 individual cases pending and undisposed of, and 14,000 unanswered letters. There were 47,000 claims of soldiers, their widows and orphans, pending for adjustment before the Second Auditor. An engineer officer's request for approval of the employment of two pilots, one for $25 and the other for $150, in its course from the officer through the War Department, its return to that officer and its return again by him to the War Department was handled by officers and clerks 76 times, and, including messenger service 94 times.

The findings of the committee were transmitted to Congress in two reports, embracing several volumes (S. Rept. 507, 50th Cong., 1st sess., 1888; and S. Rept. 3, 51st Cong., 2d sess., 1889). The result of these reports and action taken directly with administrative officers was the effecting of exceedingly important reforms in the conduct of the Government's business by the administrative departments and services.

The Joint Committee on Reclassification of Salaries was created by act of March 1, 1919, to correct another outstanding defect in the administrative system. At the time of its appointment, nothing approaching consistancy and equity existed in the administrative service with respect to the compensation attached to different positions. Employees doing precisely the same work in the same and in different divisions and departments were paid widely divergent rates of compensation and the practice of paying higher wages for work of an inferior character than was paid for the performance of duties involving much greater experience, skill, and knowledge, was widespread. To correct this condition of affairs, the Joint Committee was entrusted with the duty of making a survey of the situation and of working out a scheme of classification of positions and rates of compensation for the civil service at Washington. Its report (H. Doc. 686, 66th Cong. 2d sess., 1920) is an exceedingly able document. In addition to its general consideration of the problem of personnel classification, it sets forth in detail a complete scheme of classification of positions in the civil service at Washington, with job specifications and compensation schedules for all positions shown. This report led to the passing of the Classification Act of

1923 which, for the first time, put the personnel system of the Government at Washington upon a scientific basis.

The House and Senate Special Committees on the Budget were set up in 1919 for the purpose of formulating means by which the existing system for determining and making provision for the financial needs of the Government, which was generally held to be unsatisfactory in the extreme, might be supplanted by one resting upon a budgetary basis. These committees held hearings at which experts on the subject were called upon to describe the budgetary systems of other countries and the character of the provision that should be made for a budgetary system for the National Government. The published reports of these hearings and the reports of the committees furnished the basis for the drafting of the bill, which became the Budget and Accounting Act of 1921, and the radical revision of the rules of the two Houses of Congress governing the preparation and handling of appropriation bills.[35]

The nature of the investigations made by the other committees and commissions is sufficiently indicated by their titles. They are, as has been stated, merely indicative of character of researches constantly being made by special and joint committees into administrative problems.

Investigations of Special Services.—In contradistinction to the investigation of specific problems of administration, Congress is constantly making researches into the organization and operations of particular services. These inquiries are conducted partly by standing committees and partly by special or joint committees or commissions specially created for the purpose. They have in view, either the securing of information upon which to base constructive legislation or the determination of the facts in regard to alleged improper conduct on the part of those in charge of the conduct of the affairs of the services inquired into. Notable examples of an inquiry of the latter character are those made by the Joint Committee to investigate the Department of the Interior and the Bureau of Forestry, created by Joint Resolution of January 19, 1910, to investigate the issues involved in the famous Ballinger-Pinchot controversy when allegation of serious misconduct of affairs of the Department of the Interior had been made, and the investigation of the oil leases which led to the prosecution of Albert Fall, Secretary of the Interior, and the resignation of the Secretary of the Navy, Denby. Such an investigation is now pending of the conduct of the affairs of the Tennessee Valley Authority.

Of inquiries having for their purpose merely to aid Congress in making provision for the conduct of the affairs of a particular service, those regarding the Post Office Department and Postal Service have been much the most numerous. A listing of some of these special inquiries regarding that service shows the extent to which Congress finds it desirable to make researches in the administrative field.

1. Joint Commission to Investigate the Postal Service, created by act of June 13, 1898.
2. Joint Commission on Second Class Mail Matter, created by act of June 26, 1906.
3. Joint Commission on Business Methods of the Post Office Department and Postal Service, created by act of March 2, 1907.
4. Commission on Second Class Mail Matter, created by joint resolution and act of March 4, 1911.
5. Joint Committee to Investigate Second Class Mail Matter, created by act of August 24, 1912.
6. Joint Committee on General Parcel Post, created by act of August 24, 1912.
7. Joint Committee to Investigate Purchase of Pneumatic Tube Service, created by act of August 24, 1912.
8. Joint Committee to Investigate Pneumatic Tube Service, created by Act of March 3, 1917.
9. Joint Commission on Postal Employees' Compensation, created by act of February 28, 1919.
10. Joint Postal Commission, created by act of April 24, 1920.

Political Conditions and Problems

In the political field Congress has made important investigations into such matters as proposals for the amendment of the Federal Constitution, the conduct of Federal elections, lobbying, and propaganda.

In 1893 the House created its Standing Committee on Election of President, Vice President, and Representatives in Congress, supplanting select committees which had been created from time to time prior to that date. The hearings and reports of this committee on proposals eventuating in the adoption of the Seventeenth and Twentieth Amendments to the Constitution, providing, respectively, for the election of Senators by direct vote of the people and the elimination of the so-called "Lame-Duck" Congress, by fixing new dates for the beginning and ending of the term of office of the President, Vice President, Senators and Representatives and, incidentally, providing for certain contingencies in respect to the succession to the office of President, embrace careful consideration of all the factors involved in these proposals and the character of affirmative action to be taken. This committee has also held hearings and submitted reports upon such proposals for constitutional amendment as those providing for changing the terms of Representatives from 2 to 4 years, fixing the terms of the President and Vice President at 6 years, and that the President and

[35] Of the two committees, the House Committee made much the most thorough inquiry and its hearings and reports are of the greater value. They are:
(1) National Budget System: Hearings, 66th Cong., 1st sess., 1919.
(2) H. Rpt. 362, 66th Cong., 1st sess., 1919.
(3) H. Rpt. 373, 66th Cong., 1st sess., 1919.

Vice President shall not be eligible for reelection. In the Senate, proposals for constitutional change have been considered and reported upon by the Senate Standing Committee on Privileges and Elections; and, in both Houses, consideration to proposals for constitutional change have been given by the Committee on Judiciary.

From the date of the adoption of the Federal Corrupt Practices Act, 1925, both Houses of Congress have concerned themselves with the manner in which the provisions of this act have been complied with by candidates for the office of President, Vice President, and membership in the two chambers. To this end, they have repeatedly appointed special committees to investigate the raising of funds by candidates and their expenditure for election purposes. These committees have, in all cases, held extensive hearings and have submitted reports giving their findings. These hearings and reports constitute the most detailed and valuable material upon the raising and expenditure of campaign funds that is in existence. A chronological list of these committees and their publications follows:

1. Senate Special Committee on Campaign Expenditures in Presidential Elections.
   1. Hearings.
   2. Report (S. Rpt. 1160, 68th Cong., 2d sess., 1925).
2. Senate Special Committee on Senatorial Campaign Expenditures.
   1. Hearings.
   2. Report (S. Rpt. 1197, 69th Cong., 2d sess., 1927).
3. Senate Special Committee on Senatorial Campaign Expenditures.
   1. Hearings.
   2. Report (S. Rpt. 603, 70th Cong., 1st sess., 1928).
4. Senate Special Committee on Campaign Expenditures of Presidential Candidates.
   1. Hearings.
   2. Report (S. Rpts. 1480, 2024, 70th Cong., 2d sess., 1929).
5. House Select Committee on Campaign Expenditures of Various Presidential and other Candidates.
   1. Hearings.
   2. Report (H. Rpt. 2821, 70th Cong., 2d sess., 1929).
6. House Select Committee on Campaign Expenditures of Candidates for the House of Representatives.
   1. Hearings.
   2. Report (H. Rpt. 2140, 71st Cong. 3d sess., 1931).
7. Senate Special Committee on Senatorial Campaign Expenditures: Primaries, Conventions, Contest, and Campaign, Terminating in General Election of November 1930: Including Investigation of Complaint of Alleged Violation of Federal Corrupt Practices Act Relating to Campaign Expenditures.
   1. Hearings.
   2. Reports (S. Rpts. 1824, 1870, 71st Cong., 2d sess., 1931; 20, 24, 72d Cong., 1st sess., 1932).
8. House Select Committee on Campaign Expenditures of Candidates for President, Vice-President, and House of Representatives.
   1. Hearings.
   2. Reports.
9. Senate Special Committee on Campaign Expenditures of Presidential, Vice Presidential and Senatorial Candidates in 1932.
   1. Hearings.
   2. Report (S. Rpt. 191, 73d Cong., 2d sess., 1934).
10. Senate Special Committee on Campaign Contributions and Expenditures in 1934: Senatorial Contests.
   1. Hearings.
   2. Report (S. Rpt. 11, 74th Cong., 1st sess., 1935).

Additional material regarding electoral practices is also to be found in the hearings and reports of the House Committee on Elections on electoral contests, such contests usually being made on the ground of fraud or improper practice in respect to the raising and expenditure of campaign funds.

The existence of a lobby at Washington, the methods employed by it to influence legislation, and the desirability of submitting it to regulation has led Congress, on various occasions, to subject these matters to investigation. In 1913, the House created a Select Committee on the Lobby which held extensive hearings and submitted a report (H. Rpt. 113, 63d Cong., 2d sess., 1913). In the same year the subject was likewise investigated and reported upon by the Senate and House Judiciary Committees, the hearings before the Senate Committee embracing 4 volumes. In pursuance of Senate Resolution of December 8, 1921, the Senate Judiciary Committee made another investigation of expenditures for propaganda and lobbying in Washington. Again, the same committee, in 1929, acting in pursuance of a Senate Resolution, made an especially exhaustive investigation of the lobby at Washington, the printed hearings embracing 5 volumes, and 10 separate reports being submitted (S. Rpt. 43, 71st Cong., 3d sess., 1931).

In 1930–31, an investigation of Communist propaganda activities was made by a select committee of the House, created by House Resolution 180 of April 17, 1930. The report of the committee (H. Rpt. 2290, 71st Cong., 3d sess., 1931) and the printed hearings, in 5 volumes, contain a mass of data on the Communist movement in the United States.

Special Investigations by State Legislatures

In general, the work of State legislatures in the way of making special investigations of economic social, governmental, and political questions parallels that of Congress, with the important differences that the reports submitted by standing and special committees are, as a rule, much less exhaustive and carefully compiled than those by similar bodies in Congress; and it is exceptional when elaborate hearings are held, and, if held, the results given to the public in printed form. When one turns, however, to the use of the

commission, that is, a body specially created for the making of an inquiry, composed in whole or in part of persons selected from private life, and with powers to employ a staff of experts to aid it in its work, the record of the State legislatures is in advance of that of Congress. In certain fields, such as those of reorganization of the administrative branch of the State government, judicial administration, finance, taxation, accounting and reporting, municipal and local government, the reports of these bodies constitute by far the most valuable source material regarding the subjects treated that is in existence.

An idea of the importance of the research work done by State legislatures in this way may be obtained from the following classified list of commissions set up to make investigations of a general character, and their reports, during recent years. This list, it is believed, is a substantially complete enumeration for the period considered.[36]

Electoral Branch:

1. Connecticut:
   1. Commission on Corrupt Practices and Elections. Report, 1927.
2. Illinois:
   1. Commission on Revision of the Electoral Laws. Report, 1931.
3. Massachusetts:
   1. Joint Special Committee on the Administration and Operation of the Election Laws. Report, 1928.
4. New York:
   1. Joint Committee to Investigate Primary and Election Laws in This and Other States. Report, 1910.
   2. Joint Committee on Reclassification and Revision of the Election Laws. Report, 1922.
   3. Joint Legislative Committee on Revision of the Constitution and Election Laws. Report, 1933.
5. Pennsylvania:
   1. Commission to Revise and Codify the Election Law. Reports, 1911–13.
6. Virginia:
   1. Commission to Revise the Election Laws. Report, 1932.

Legislative Branch:

1. California:
   1. Interim Committee on Legislative Procedure and Reduction of Legislative Expense. Report, 1932.
2. Massachusetts:
   1. Special Joint Committee on Legislative Procedure. Report, 1915.

Legislative Branch—Continued.

3. Vermont:
   1. Committee to Revise the Rules of the Senate, Rules of the House of Representatives, and the Manual of Legislative Procedure. Report, 1916.

Judicial Branch:

1. Alabama:
   1. Law Reform Commission. Report, 1915.
2. Arkansas:
   1. Commission for the Reform of Criminal Procedure. Report, 1927.
3. California:
   1. Commission for the Reform of Criminal Procedure. Report, 1927.
   2. Crime Commission. Reports, 1927–31.
4. Louisiana:
   1. Criminal Code Commission. Report, 1928.
5. Massachusetts:
   1. Special Committee on the Expediency of Revising the Judicial System. Report, 1877.
   2. Joint Legislative Committee on the Judicial System. Report, 1887.
   3. Special Committee on the Expediency of Revising the Judicial System. Report, 1893.
   4. Commission on Simplification of Criminal Pleadings. Report, 1899.
   5. Commission on Causes of Delay in the Administration of Justice. Report, 1910.
   6. Special Commission to Consider Abolishing the Trial Justice System. Report, 1917.
   7. Commission to Investigate the Judicature of the Commonwealth. Reports, 1920–21.
   8. Special Commission to Investigate the Criminal Laws. Report, 1924.
   9. Special Crime Commission. Report, 1934.
   10. Special Commission on Investigation of the Judicial System. Report, 1936.
6. Michigan:
   1. Commission of Inquiry into Criminal procedure. Reports, 1927–29.
   2. Crime Commission. Reports, 1930–37.
7. Montana:
   1. Crime Commission. Report, 1930.
8. New Hampshire:
   1. Crime Commission. Report, 1929.
9. New Jersey:
   1. State Commission to Investigate the Jury System. Report, 1913.

[36] In addition to these investigations of a general character, the State legislatures made numerous investigations of other matters of which the more important are those concerning local government and taxation.

Judicial Branch—Continued.

9. New Jersey—Continued.
   2. Commission to Investigate the Subject of Crime in New Jersey.
      Report, 1927.
   3. Commission for Law Reform.
      Report, 1927.
10. New York:
   1. Commission on Laws Delay.
      Report, 1904.
   2. Commission to Inquire into Courts of Inferior Criminal Jurisdiction in Cities of the First Class.
      Reports, 1909–10.
   3. Commission to Revise the Practice and Procedure in Surrogate Courts.
      Report, 1914.
   4. Joint Legislative Committee on the Simplification of Civil Practice.
      Reports, 1917–21.
   5. Commission to Consider and Adopt Rules of Civil Practice.
      Report, 1921.
   6. Commission to Investigate Defects in the Law and Its administration.
      Reports, 1924–25.
   7. Joint Legislative Committee on the Coordination of Civil and Criminal Practice Acts.
      Report, 1926.
   8. Crime Commission.
      Reports, 1927–30.
   9. Joint Legislative Committee to Examine the Consolidated Civil Practices Act.
      Report, 1932.
   10. Commission on the Administration of Justice.
      Reports, 1932–37.
   11. Special Committee on the Revision of the Code of Criminal Procedure.
      Reports, 1935–37.
11. North Carolina:
   1. Commission on Law Reform and Procedure.
      Report, 1916.
12. Ohio:
   1. Committee to Investigate the Judicial System of Ohio.
      Report, 1915.
13. Oregon:
   1. Commission on Revision of the Judicial System.
      Report, 1913.
   2. Commission on Revision and Improvement of the Judicial Administration.
      Report, 1919.
   3. Crime Commission.
      Report, 1933.
14. Pennsylvania:
   1. Commission to Revise the Criminal Code.
      Reports, 1924–25.
   2. Commission to Study the Law, Procedure, etc. Relating to Crime and Criminals.
      Reports, 1929–30.
15. Rhode Island:
   1. Special Committee on the Revision of the Criminal Law.
      Report, 1913.

Judicial Branch—Continued.

16. Vermont:
   1. Special Commission to Study the Judicial System.
      Report, 1937.
17. Virginia:
   1. Commission on Crime and Prisons.
      Report, 1930.
   2. Commission to Consider the Question of Criminal Costs in Virginia.
      Report, 1932.
18. Wisconsin:
   1. Joint Committee on Investigation of the Organization and System of Courts in Wisconsin.
      Report, 1915.

Administrative Branch:

1. Alabama:
   1. Institute for Government Research; Brookings Institution.
      Report on a survey of the organization and administration of State and county government in Alabama, 1932.
2. Arizona:
   1. New York Bureau of Municipal Research.
      Report on reorganization plan for the state, 1921.
   2. Special Legislative Committee to Investigate Costs of Government and to make Recommendations.
      Report, 1933.
3. Arkansas:
   1. National Institute of Public Administration. Findings and recommendations on a survey of the administrative structure of the State government of Arkansas, 1930.
4. California:
   1. Committee on Efficiency and Economy.
      Report, 1919.
5. Colorado:
   1. Survey Committee of State Affairs.
      Report, 1916.
6. Connecticut:
   1. Commission to Investigate the Advisability of Consolidating State Boards and Commissions and to investigate Public Health Laws.
      Report, 1915.
   2. Special State Commission to Investigate and Report on a Civil Administration Code.
      Report, 1921.
   3. Commission Concerning the Reorganization of the State Departments.
      Report, 1937.
7. Delaware:
   1. State Survey Commission.
      Report and Recommendations, 1920.
8. Georgia:
   1. Budget and Investigating Commission.
      Reports, 1919–23.
   2. Commission to Simplify and Coordinate the Operations of the Government Departments.
      Plan of simplification and coordination of the departments, boards, commissions, and institutions of the state government of Georgia, 1929.
   3. Searle, Milter & Co. Report on a survey relating to the proposed administrative reorganization of State government of Georgia, 1930.

Administrative Branch—Continued.

8. Georgia—Continued.
   4. Special Investigating Committee on State Reorganization.
      Report, 1931.
9. Illinois:
   1. Efficiency and Economy Committee.
      Reports, 1914.
10. Iowa:
   1. Institute for Government Research; Brookings Institution.
      Report on a survey of administration in Iowa, 1933.
11. Kansas:
   1. Efficiency and Economy Committee.
      Reports, 1916–17.
12. Kentucky:
   1. Efficiency Commission (Griffenhagen and Associates).
      The Government of Kentucky, 1924.
13. Maine:
   1. National Institute of Public Administration.
      State administration consolidation in Maine; Report on a survey, 1930.
14. Maryland:
   1. Efficiency and Economy Commission.
      Report, 1916.
   2. Reorganization Commission of Maryland (Giffenhagen and Associates).
      A plan of administrative consolidation for Maryland: A report of the organization and administration of the state government, 1921.
15. Massachusetts:
   1. Commission on Economy and Efficiency.[37]
      Reports, 1912–16.
   2. Supervisor of Administration.[37]
      Reports, 1916–21.
   3. Commission on Administration and Finance.[37]
      Report, 1922.
   4. Special Recess Committee to Consider How to Reduce the Cost of Government.
      Report, 1932.
   5. Special Commission on State, County, and Local Taxation and Public Expenditures.
      Report, 1937.
16. Minnesota:
   1. Economy and Efficiency Commission.
      Reports, 1914.
   2. Commission on Reorganization of Civil Administration.
      Report, 1917.
   3. Senate Committee for the Investigation of All Departments of the State Government of Minnesota.
      Report, 1925.
   4. Griffenhagen and Associates.
      Report, 1931.
17. Mississippi:
   1. Joint Legislative Committee to Investigate All State Offices, Boards, Institutions, and Departments.
      Report, 1913.

[37] These were intended to be permanent agencies functioning as a part of the administrative branch.

Administrative Branch—Continued.

17. Mississippi—Continued.
   2. Joint Legislative Committee on the Organization and Management of the State Departments.
      Report, 1917.
   3. Institute for Government Research: Brookings Institution.
      Report on a survey of the organization and administration of State and county government in Mississippi, 1932.
18. Missouri:
   1. State Survey Commission.
      Report, 1929.
19. Montana:
   1. Senate Committee on Economy and Efficiency in the State Administration.
      Report, 1915.
   2. State Economy and Efficiency Committee.
      Report, 1920.
20. Nevada:
   1. New York Bureau of Municipal Research.
      Nevada and Its Government, 1921.
   2. State Survey Commission.
      Report, 1925.
21. New Hampshire:
   1. Legislative Committee to Study the Work of the State Departments.
      Report, 1927.
   2. Institute for Government Research; Brookings Institution.
      Report on a survey of the organization and administration of the State, county and township governments of New Hampshire, 1932.
22. New Jersey:
   1. Economy and Efficiency Commission.
      Reports, 1913–17.
   2. Joint Legislative Survey Committee.
      Report, 1925.
   3. National Institute of Public Administration.
      Report on a survey of the organization and administration of the State Government of New Jersey, 1930.
   4. State Audit and Finance Commission.
      Report, 1930.
23. New Mexico:
   1. Special Revenue Commission to Study Taxation and Retrenchment in the State Government.
      Reports, 1920–21.
24. New York:
   1. Reconstruction Commission.
      Reports, 1919.
   2. Special Joint Commission on Taxation and Retrenchment.
      Reports, 1920–27.
25. North Carolina:
   1. Institute for Government Research: Brookings Institution.
      Report on a survey of the organization and administration of the State and County Government, 1930.
26. North Dakota:
   1. Joint Committee on Economy and Efficiency.
      Report, 1926.

Administrative Branch—Continued.

26. North Dakota—Continued.
    2. Joint Committee on Economy in the Public Service.
       Report, 1929.
    3. Governmental Survey Committee.
       Report, 1933
27. Ohio:
    1. Joint Committee on Administrative Reorganization.
       Report, 1921.
    2. Joint Committee on Economy and Taxation.
       Report, 1926.
    3. Joint Committee on Economy in the Public Service.
       Survey reports on State administration by Griffenhagen and Associates, 1929.
    4. Ohio Government Survey.
       Reports, 1935.
    5. Interim Commission on Governmental and Administrative Reorganization.
       Reports, 1937 (processed).
28. Oklahoma:
    1. Institute for Government Research: Brookings Institution.
       Report on a survey of the organization and administration of Oklahoma, 1935.
29. Oregon:
    1. Consolidation Commission.
       Report, 1919.
    2. Joint Committee on Administrative Reorganization.
       Report, 1930.
    3. Interim Commission on Government and Administration; Reorganization and Research Committee of the Oregon State Planning Board.
       Joint Report, 1937.
30. Pennsylvania:
    1. Economy and Efficiency Commission.
       Report, 1915.
    2. Joint Committee on Finance.
       Report on the organization and administration of the Commonwealth of Pennsylvania, 1934.
31. South Carolina:
    1. Joint Legislative Committee on Economy and Consolidation.
       Report, 1922.
    2. Joint Legislative Committee on Efficiency and Economy.
       Report, 1926.
32. South Dakota:
    1. New York Bureau of Municipal Research.
       Report on administrative organization and management of the government of the State of South Dakota, 1922.
    2. Joint Legislative Committee on Administration and Reorganization.
       Report, 1923.
33. Texas:
    1. Joint Committee to Investigate the Departments of the State Government and the State Institutions.
       Report, 1918.

Administrative Branch—Continued.

33. Texas—Continued.
    2. Committee to Investigate Certain State Departments.
       Report, 1927.
    3. Joint Legislative Committee on Organization and Economy.
       Report by Griffenhagen and Associates, 1933.
34. Utah:
    1. Committee to Study the Operations of the State Government.
       Reports, 1934.
35. Virginia:
    1. Commission on Economy and Efficiency.
       Reports, 1918.
    2. Special Joint Legislative Committee on Investigation of State Departments and Merger and Abolition of Offices, Boards, and Commissions.
       Report, 1922.
    3. Commission on Simplification and Economy of State and Local Government.
       Report, 1924.
    4. New York Bureau of Municipal Research.
       Organization and Management of the State Government of Virginia, 1927.
    5. Senate Committee on Economy.
       Report, 1934.
36. West Virginia:
    1. Efficiency Commission.
       Report, 1917.
37. Wisconsin:
    1. Interim Committee to Investigate State Administration and Taxation.
       Report, 1926.
38. Wyoming:
    1. Special Legislative Committee on Organization and Revenue.
       Report by Griffenhagen and Associates, 1933.

General Comment

A study of special investigations such as has been made in the pages immediately preceding raises a number of questions that it is important to have examined.

Value of Legislative Inquiries.—The first and most important of these is as to the justification of legislative bodies engaging in research work of the character described and the value of the work that they have actually done. To such inquiries but one response can be made. Although the complaint that our legislatures, and especially Congress, push their investigatory work to indefensible lengths and incur unwarranted expense may at times be partially justified, there can be no doubt that, taken as a whole, these investigations have fully justified themselves. They have enabled the legislature to inform itself regarding the action desired by its constituency; afforded an opportunity to interests affected by proposed legislation to be heard; informed the committees regarding factors involved in proposed action; brought into existence a large body of valuable data that otherwise would not have been rendered available; have enabled the legislatures to bring about

reforms in administrative organization and procedure; and have been the means of detecting fraud and misconduct in the conduct of public affairs.

The following, taken from Professor Chamberlain's recent work on legislative processes, illustrates the value that these special inquiries may have.[37]

The investigating commission on workmen's compensation in New York affords an excellent example of the way such a commission works. Very few people in the State knew what workmen's compensation was. Dissatisfaction with the existing method of bringing damage suits for injuries to workmen was widespread, and it was believed that there would be strong support for any substitute which the public could be satisfied was likely to succeed. The commission was instructed to consult with experts, to study the laws and the experiences under the compensation systems of European countries, and to investigate the existing methods of securing relief for persons injured by accidents.

One of the first questions raised in the minds of employers and of the legislators considering the problem was that of the probable cost to employers of compensation, as compared with the existing costs under the damage-suit system. Hence the commission was faced with the need of getting material and information from which to answer the question, at least approximately.

Workmen's compensation was so radical a departure from existing governmental methods that experts familiar with governmental organization, especially in New York State, had to be called in to advise on the set-up and cost of the administration of a proposed law. Grave questions of constitutionality were faced, and a plan had to be devised which would be held valid by the courts. The commission was instructed to bring in a bill if it found that compensation should be adopted, could be made practical in its working, and constitutional.

It is clear that the private organizations and labor unions which favored the act could not assemble the requisite information. Their estimations of comparative expenses of the new and the old systems, of the way compensation would work in practice—and these were vital considerations—could only be guesses. An official commission, by interviewing public officers and judges, employees and members of the bar, could arrive at a much sounder conclusion. The private groups supporting such projects rarely have money enough to pay for the studies of law, including foreign law, and for detailed studies of the existing situation, or to have an adequate report made on foreign experiences. Furthermore, any material which they might collect would not be depended upon by the legislature, which would regard it as biased.

In addition to collecting and weighing material and formulating an opinion, the investigating commission had to inform the legislature as to public opinion in the State, and had also to inform public opinion on the subject of compensation. The commission carried out this double duty through hearings held at different points in the State, and by informal presentation of opinion to the members.

The mass of authoritative information regarding banking practices and conditions throughout the world resulting from the work of the National Monetary Commission of 1908 proved of enormous value in educating Congress and the public in respect to the problems of banking reforms then under consideration, and undoubtedly influenced profoundly the character of the action taken—the creation of the Federal Reserve Banking System. It is difficult to see how, in an equally effective way, could be developed the facts and considerations involved in the recent Congressional inquiries into the munitions industry, and the matter of civil rights as affected by the action of large industrial companies toward their employees. And, as Professor Howard Lee McBain, of Columbia University, pointed out in his article dealing with this matter of Congressional investigations:[38] "It is highly unlikely that Mr. Fall or Mr. Doheny or Mr. Sinclair would ever have been brought to trial had not the Senate Committee on Public Lands and Surveys made an investigation of the naval oil leases." The examination of the budgetary problem made by the House and Senate Select Committees on the Budget, through the holding of hearings at which experts described the budgetary systems of other countries and analyzed the problem as it presented itself to the United States, led directly to the passage of the Budget and Accounting Act, 1921, which profoundly modified the whole system of financial administration of the national government.

As regards the States, it is known that certain of the surveys of the administrative branch made by commissions set up by the legislatures have been followed by legislation based upon their findings. The same is true of inquiries in the field of taxation, judicial organization and procedure, and local government. *State Government*, the organ of the American Legislators' Association, in the issue for November 1937, contains the results of an interesting survey, made by Miss Martha J. Ziegler, of the results following from inquiries made by interim committees and commissions of the State of Illinois during the period 1900 to 1934. Her findings are summarized as follows:

Forty Senate and House committees and 127 joint committees and commissions, which seemed definitely created to study special subjects for the purpose of aiding the legislative body in the performance of its legislative function, were studied. On this basis a few minor agencies, such as those set up to arrange for the erection of statues or monuments, were excluded while a few sessional bodies were included.

Of the 129 joint committees and commissions, 35, so far as could be ascertained, issued no written reports, but a few of these are known to have had some influence upon legislation. At least 13, however, were almost totally inactive. Approximately 25 out of a group of 76 committees and commissions which had issued reports and recommendations appeared almost completely successful with their legislative programs, while about 11 were unsuccessful. Adequate criteria for determining "success," however, were not available. For example, some committees and commissions may have been able to achieve complete success in the eyes of the legislature by simply being

[37] Joseph P. Chamberlain, *Legislative Processes: National and State*, 1936, pp. 97–98.

[38] *Congressional Inquiries and the Constitution*, New York Times, March 11, 1928.

as quiet and inactive as possible. The remaining 40 which made reports seem to have had part of their recommendations adopted eventually, although in some instances the lapse of time was so long that other factors or forces probably should be given chief credit.

In evaluating this showing, it must be borne in mind that many of the interim committees were given no funds with which to employ expert assistance and were expected to do little more than report the results of their own consideration of the subjects assigned them. Even so, the showing is one that would indicate that research work of this kind by legislative bodies is worth while. Mr. Christian Larsen, who made a somewhat similar study for the State of California, found that a surprisingly large number of the major recommedations of committees and commissions of inquiry were enacted into law.[39]

Choice of Agency.—A second question is as to the character of agency that should be made use of in conducting an inquiry after the legislature has become convinced that need for its undertaking exists. The answer that should be given to this depends upon the nature of the proposed inquiry. When the matter to be inquired into is not a complicated one and has a direct bearing upon proposed legislation, it would seem that it could be most advantageously conducted by the standing committee having jurisdiction of the matter or by a joint committee of the two Houses, the membership of which is selected from the memberships of the two committees having jurisdiction. When the subject is one not clearly within the jurisdiction of any particular standing committee, or where consideration of the matter from various points of view is desired, the device of a special or select committee is indicated. An example in which action in this way was desirable is furnished by the House Special Committee on the Budget which framed the Budget and Accounting Act, 1921, and the modification of the rules of the House regarding the consideration of appropriation bills. When the objective is the mere assembling and presentation of facts, action should preferably take the form of directing the inquiry to be made by the appropriate administrative agency rather than by the legislature creating an *ad hoc* body for the purpose, An example of where this desirable action was taken is the direction given by the act of January 29, 1907, to the Secretary of Commerce and Labor to make a special investigation of the conditions of labor of women and children, the published reports of which embraced 19 volumes covering almost every phase of the subject (S. Doc. 643, 61st Cong., 2d sess., 1910).

[39] Christian Larsen, *The Use of Special Committees and Commissions by the California Legislature.* California Bureau of Public Administration, 1937.

When the matter is one demanding not so much the assembling of data as the ascertainment of public opinion, the position held by the special interests affected and the judgment and opinions of expert students regarding the factors of a complicated problem; or when it is desired to inquire into the matter in which certain private interests, such as utility corporations, are conducting their business, it is desirable, if not essential, that the inquiry be conducted by a direct agency of the legislature. For the conduct of an inquiry of this character the legislature has a great advantage over an administrative agency. This consists in the fact that the information desired, in great part, can only be secured through the use of the methods of a grand jury; that is, by the summoning of witnesses, the placing of them under oath, and the compelling of the giving of testimony by them and the production of pertinent papers and records.[40] This authority possessed by legislative bodies to conduct inquests constitutes one of their important powers and is often employed with great public benefit. It is thus difficult to see how the facts regarding the attitude of employers toward their employees, and particularly the employment by them of espionage methods over employees' organizations, could have been otherwise developed to the extent that they have been by the subcommittee of the Senate Committee on Education and Labor under the direction of Senator Robert La Follette.

It goes almost without saying that inquiries touching their own affairs, such as those into campaign expenditures and other acts by candidates for Federal office, the lobby and the like, should be conducted by legislative committees. The same is true when the inquiry is one into the manner in which an administrative agency has conducted itself.

The foregoing considerations are fairly obvious. When one turns, however, to the making of investigations into the organization staffing, and methods of procedure of the administrative branch, many differences of opinion have existed as to whether such inquiries should be conducted by the legislative or executive branch. Most of the economy and efficiency commissions created by the States for an examination into the organization and methods of business of their administrative establishments have partaken of the nature of executive inquiries. Though their establishment was

[40] Where the legislature has created agencies, such as the Federal Trade Commission, the Federal Power Commission, and the Securities and Exchange Commission, with the status of subordinate agencies of the legislative branch rather than parts of the administrative branch, and has conferred upon them inquisitional powers to compel testimony and the production of papers, the inquiries can at times be entrusted to them. After much discussion in Congress, the decision was thus made to have the investigation of the propaganda activities of public utility corporations made by the Federal Trade Commission instead of by a committee of Congress.

authorized, and the funds for their support were voted by the legislature, provision was, in most cases, made that their personnel should be selected by the chief executive and that they should work under the general direction of that officer. This was also the character of the President's Commission on Economy and Efficiency that functioned during the years 1911–13. Though this type of inquiry is the one that generally has commended itself to our legislative bodies, examination, both of the principles involved and of the results achieved, would indicate that the alternative type, that of an inquiry by the legislature itself, is the preferable one. In practice, this means the entrusting of the investigation to a special or joint committee rather than to a commission.

As has been pointed out, the legislature, under our form of government, is the source of all administrative authority and is thus the organ in which is vested, in the final instance, the function of direction, supervision, and control in the administrative field. Logically, therefore, it is the legislature which, as principal, should from time to time institute such investigations as are necessary in order to assure itself that its agents—the administrative services—are performing their duties in an efficient and economical manner. Furthermore, as the source of all administrative authority, upon it falls the duty of determining all large matters of organization and procedure.

To these theoretical considerations should be added the important practical one that, when an inquiry is prosecuted under legislative auspices, its chances of having the reforms recommended put into effect are much enhanced. The unfortunate jealousy, friction, and strained relations often existing between the legislature and the executive makes it difficult for the executive to secure the adoption of proposals emanating from him. It has been disheartening to those interested in improving public administration that the reports of the State economy and efficiency commissions, most of which have been excellent documents, prepared with great care with the aid of a carefully selected corps of competent experts, have so often been productive of such relatively slight results. Indeed, in not a few cases, the recommendations made have failed of even serious consideration. One explanation of this is, without question, the source from which the recommendations have emanated. Had these reports been prepared under the direction of a special or joint committee it is practically certain that they would have received other treatment. This would have been due, not merely to the fact that the recommendations contained in the reports were recommendations of their own representatives, but to the further fact that, in these representatives, the legislature would have had persons who were not only interested in the changes suggested but, through their membership in the legislature, were in a position to take direct action through the framing and introduction of bills, and of explaining, defending, and urging the adoption of these measures upon the floor of the two chambers. Much the most important recommendation of the President's Commission on Economy and Efficiency was the adoption by the Government of a proper budget system. This recommendation received almost no consideration at the hands of Congress. A few years later, however, a similar proposal emanating from a House Select Committee was speedily adopted almost without change. It is true that changed conditions made such a reform more urgent and that a process of education had in the meantime been at work, but the fact that the proposal had the endorsement of its own select committee and that, in the chairman of that committee, the House had someone to pilot the measure through the chamber, were undoubtedly the determining factors in securing action.

It need hardly be said that if this type of inquiry is used it is essential that authority be conferred upon the committee to employ a competent director of research and staff of experts in the several matters to be inquired into, the committee itself sitting as a board to give direction to the inquiry and to pass upon the data and recommendations submitted to it by such director and staff.

Investigating Powers of Congress

Though Congress has from the beginning prosecuted investigations into matters in which it was interested, the scope of its powers to make inquiries of this character has constantly been called in question in the courts as lacking a constitutional basis or as doing violence to certain of the constitutional provisions guaranteeing private rights. Though the issues thus raised are generally described as ones concerning the investigatory powers of Congress, they in fact have to do primarily, if not exclusively, with the methods open to Congress in making such inquiries, rather than with the right of Congress to make the inquiry, and especially the power of Congress or its agencies, committees, and commissions to compel the attendance of witnesses, the giving of testimony, and the production of books and papers by them, and the punishment for contempt of recalcitrant witnesses.

This is not the place to attempt any detailed consideration of the legal questions involved in this matter. It is pertinent, however, to reproduce here an extract from one of the most important decisions of the Supreme Court of the United States in which the power of Congress to make inquiries, and, in so doing,

to compel the giving of evidence and the production of pertinent papers, is firmly upheld when the purpose of the inquiry has a bearing upon the exercise by Congress of its legislative function. In that decision the Court said:[41]

> We are of the opinion that the power of inquiry—with process to enforce it—is an essential and appropriate auxiliary to the legislative function. * * * A legislative body cannot legislate wisely and effectively in the absence of opinion respecting the conditions which the legislation is intended to affect or change; and where the legislative body does not itself possess the requisite information—which not infrequently is true—recourse must be had to others who do possess it. Experience has taught that mere requisitions for such information often are unavailing, and also that information which is volunteered is not always accurate or complete; so some means of compulsion are essential to obtain what is needed. All this was true before and when the Constitution was framed and adopted. In that period the power of inquiry—with enforcing process—was regarded and employed as a necessary and appropriate attribute of the power to legislate—indeed was treated as inhering in it. Thus there is ample warrant for thinking, as we do, that the constitutional provisions which commit the legislative function to the two Houses are intended to include this attribute, to the end that the function may be effectively exercised.

This decision, it will be noted, affirms the investigatory powers of Congress primarily upon the authority of Congress to do what is necessary in order that it may effectively perform its function as a legislative body, rather than upon the function of Congress as a board of directors to investigate the conduct of its administrative agencies. This latter function of Congress, with the concomitant powers to take the necessary steps to assure itself that its orders have been properly carried out, has never, in the opinion of the writer, been properly emphasized either by counsel for the Government in arguing the investigatory powers of Congress, or by the Supreme Court in handing down its decisions. Granting, as it would seem must be granted, that Congress is the body that possesses final authority in respect to administrative action, that it is the body that directs what administrative activities shall be engaged in and how such activities shall be performed, it would seem to follow necessarily that it should have the right to prosecute such inquiries as might be necessary to assure itself that its orders were being properly put into effect and this independently of any claim that the information sought was desired with reference to possible future legislation. Should the issue be raised in this form it is extremely likely that the full power of Congress to investigate any aspect of the organization and operation of the administrative branch would be sustained by the courts.

[41] *John J. McGrain, Deputy Sergeant at Arms of the United States Senate* v. *Mally S. Daugherty* (273 U. S. 135, 1927).

When the investigation, however, is one having for its purpose an inquiry into general economic or social conditions or practices, the power of Congress to compel the giving of testimony and the production of papers would, apparently, have to be justified on the ground that the information sought was needed in order that Congress might properly perform its legislative function.[42]

English Royal Commissions

A consideration of the various ways in which American legislatures proceed in undertaking research work would be incomplete that did not make mention of the important results achieved in England through the employment of the device known as royal commissions. These commissions are so named because, though their establishment may have a statutory basis or may be the result of the initiation of the ministry, they are, technically, created by the Crown which, in so doing, determines their compostion and duties. Though structurally, and as regards the methods of inquiry employed, these bodies are not dissimilar from the commissions created by Congress, actually their work is, on the whole, of a higher character, and their reports have a prestige and exert an influence upon legislation and public opinion that is rarely enjoyed by American commissions. The reasons for this are several.

In the first place, it is the practice of the Crown, acting, of course, on the recommendation of the ministry, to select for membership on the commission persons of great eminence and special competence, whose conclusions will carry weight with the public. Secondly, it is considered a high honor to be asked to serve on a royal commission, and the persons so selected, though receiving no compensation, as do members of American commissions, are willing to give to

[42] Congress has, by statute, provided the means by which its powers to enforce the giving of testimony and the production of papers may be exercised. These provisions of law now constitute sections 191–196, title II of the United States Code. The significant sections are 192, 193, and 194, which read as follows:

"SEC. 192. *Refusal of witness to testify.*—Every person who, having been summoned as a witness by the authority of either House of Congress to give testimony or to produce papers upon any matters under inquiry before either House, or any committee of either House of Congress, wilfully makes default, or who, having appeared, refuses to answer any question pertinent to the question under inquiry, shall be deemed guilty of a misdemeanor punishable by a fine of not more than $1,000, nor less than $100 and imprisonment in a common jail for not less than 1 month nor more than 12 months (act of Jan. 24, 1857).

"SEC. 193. *Privileges of witness.*—No witness is privileged to refuse to testify to any fact or to produce any paper respecting which he shall be examined by either House of Congress, or by any committee of either House, upon the ground that his testimony may tend to disgrace him or otherwise render him infamous (act of Jan. 24, 1862).

"SEC. 194. *Witness failing to testify.*—Whenever a witness summoned as mentioned in section 192 of this title fails to testify and the facts are reported to either House, the President of the Senate or the Speaker of the House, as the case may be, shall certify the fact, under the seal of the Senate or House, to the district attorney for the District of Columbia whose duty it shall be to bring the matter before the grand jury for their action (act of Jan. 24, 1857)."

the work of the commissions their best efforts. Especially is the post of chairman highly regarded, and the excellent results achieved are often in large part due to the conscientious effort and skill with which such officers discharge the duties of their office. Thirdly, great care is taken in framing what are known as the terms of reference, to make clear and definite the nature of the task that is entrusted to the commission. Thus, for example, the commission setting up the India Statutory Commission of 1927 recited that the commission was created:

> for the purpose of inquiring into the working of the system of government, the growth of education, and the development of representative institutions in British India and matters connected therewith; and shall report as to whether, and to what extent, it is desirable to establish the principle of responsible government, or to extend, modify, or restrict the degree of responsible government then existing therein, including the question whether the establishment of second chambers of the local legislatures is or is not desirable.

The organization and work of these commissions have recently been subjected to intensive study by two American students, and we cannot do better than conclude this sketch of them by reproducing from their work some paragraphs in which they sum up the reasons why these commissions have proven to be such excellent research bodies and have produced such important results. They write:[43]

> The most admirable results have been obtained from royal commissions composed of expert or impartial persons. There are two requisites for the successful conduct of an inquiry. There must be, first, thorough and disinterested investigation of the facts pertinent to the subject. Secondly, and even more important, is the mature interpretation of the evidence with a view to the determination of a mode of future treatment of the subject at issue. These two things, patient investigation and unprejudiced weighing of causes and effects, which may be called research and judgment, are best undertaken by experts and nonpartisans.
>
> Expert commissions, i. e., those manned by persons whose special competence in the subject of the inquiry, or in related fields, is recognized, have been used quite frequently for advisory purposes in such technical matters as public health, local government, administration, and other problems in which professional competence is an admitted asset. The chief advantage of this kind of inquiry is that the issue is removed from the arena of political debate and subjected to scrutiny by influential authorities who have no personal concern or commitment of party affiliation. It provides an opportunity for utilizing the services of specialists who are not normally members of legislative bodies and who do not happen to possess official connection with the administrative departments. Being already prepared and trained, specialist commissioners do not have to undergo the "educative" work which so frequently forms the first part of the work of the inexpert commissioners. From the very outset the commissioners bring to the investigation a body of information and experience which enables them to proceed immediately to the heart of the matter, to sifting out indisputable facts, weighing the various interpretations which are offered in explanation of social phenomena, and arriving at a matter of collective judgment. * * *
>
> In conclusion, it may be said that it has been the admirable nature of the personnel of royal commissions in the past which has contributed more than anything else to the satisfactory results obtained from the commission system of inquiry. Whether the members have been expert or biased, representative or impartial, it can rarely be said that they were incompetent or negligent. Whenever the Government of the Day has really sought elucidation of a subject it has received a carefully conducted study of the matter. For the members of these commissions are not only men of position who take their duties seriously. The work is seldom delegated to subordinates—indeed it might be more frequently than it is—but is undertaken personally at considerable sacrifice of leisure, earnings, and even social reputation. But whether from being clever politicians, unquestioned specialists, or sincerely disinterested persons, the fact is that a number of reports have carried sufficient weight to influence policy in the long run; and this has been so continuous that the use of the royal commission has been regarded as a certain and satisfactory way out of all manner of difficulties.

There is, of course, no reason why American commissions should not have as high a character and be productive of as beneficial results as the British commissions. All that is required is the development of the same care in setting up such bodies and spirit of service on the part of those selected as commissioners. Probably the nearest approach that we have had to the creation of a commission of the British type is the National Commission on Law Observance and Enforcement created by the First Deficiency Act of June 1, 1929, of which former United States Attorney General George W. Wickersham was chairman and which included among its other members such eminent citizens as Newton D. Baker and Roscoe Pound. There are a number of subjects which readily come to mind the investigation of which by a commission of the British type would be highly desirable. Among these, mention may be made of the subject of taxation. It is generally recognized that the whole situation as regards taxation in the United States—Federal, State, and local—is unsatisfactory in the extreme. There is much overlapping and duplication as regards objects of taxation between the several layers of government, and it is highly desirable that some arrangement should be arrived at under which the use of the several forms of taxation should be allocated among these layers in such a way as to avoid this duplication under which two or more layers not only use the same tax but, at great avoidable expense and trouble to the taxpayers, maintain duplicate services for its assessment and collection. Furthermore, there is general agreement that the system of Federal taxes needs a thorough over-

[43] Hugh McDowall Clarke and J. William Robinson: *Royal Commissions of Inquiry*, Harvard Press, 1937, pp. 163, 168. For a further consideration of these bodies, see: A. Harrison Cole: *A Finding List of British Royal Commission Reports*, Cambridge, Mass., 1935; Harold F. Gosnell: *British Royal Commissions of Inquiry*, Political Science Quarterly, March 1937; *Report of the Departmental Committee on the Procedure of Royal Commissions*, Parliamentary Papers, 1910 (Cmd. 5235).

hauling and revision with a view to its simplification and making it conform better to existing conditions and needs; and there is scarcely a State in the Union the taxation system of which is held to be satisfactory. The problems presented are ones of great complexity and involve many conflicting interests. The subject is thus particularly one which should be subjected to intensive study by a body of men possessing special technical competence and divorced from political pressure. Functioning along the lines of the British Royal Commission, such a body could make an investigation comparable to that of the National Monetary Commission of 1908 and produce a report that could not fail to be of great aid to Congress and the State legislatures in framing revenue legislation and in preparing the public for the acceptance of such legislation.

IV. LEGISLATIVE STAFF AGENCIES

With the constantly broadening field to be covered by legislation, and the increasing complexity of the substantive content of such legislation, all modern legislative bodies have felt the need of supplying themselves with permanent agencies to aid them in the performance of their duties. Especially is this so in the case of American legislative bodies where, due to the system of separation of powers of which they are a part, the Executive does not, as in the case of parliamentary, responsible governments, participate directly in the performance of the legislative function. In response to appreciation of this need, the National Congress and the State legislatures have created agencies known as legislative reference services, legislative counsel or bill-drafting services, revisors of statutes, legislative councils, and auditors of public accounts, though few, if any, have created all these agencies.

Legislative Reference Services

Intelligent legislation requires not only the exercise of sound judgment, but the possession on the part of legislators of detailed data regarding political, economic, and social conditions and institutions, a knowledge of existing provisions of law, and information regarding the legislation of other jurisdictions and the manner in which such legislation has operated in practice. Only in comparatively small degree do the members of our legislative bodies have this information. The most feasible way in which this lack can be met is through the legislature providing itself with a staff agency to which it can look for securing the data of which it has need.

Starting with New York in 1890, the great majority of the States have provided themselves with an agency of this kind, the movement for this establishment being greatly stimulated by the successful operation, under the leadership of Charles McCarthy, of the Wisconsin Legislative Reference Bureau inaugurated in 1901. A list of these services now in existence follows:[44]

Alabama: Department of archives and history.
Arizona: State library, law and legislative reference library.
Arkansas: State historical commission, legislative reference bureau.
California: State library, law and legislative reference section.
Colorado: Attorney general's office, legislative reference office.
Connecticut: State library, legislative reference department.
Florida: State library.
Georgia: State library, legislative reference department.
Idaho: State law library.
Illinois: Legislative reference bureau.
Indiana: Department of law, legislative bureau.
Iowa: State law library, law and legislative reference department.
Kansas: Legislative council.
Kentucky: State library.
Louisiana: Library commission.
Maine: State library, legislative reference bureau.
Maryland: Department of legislative reference.
Massachusetts: Legislative reference division.
Michigan: Legislative reference department.
Minnesota: State law library.
Mississippi: State library.
Missouri: Library commission.
Montana: State law library, legislative reference bureau.
Nebraska: Board of university regents, legislative reference bureau.
New Hampshire: State library, legislative service.
New Jersey: State library, legislative reference department.
New York: State library, legislative reference section.
North Carolina: Department of the attorney general, legislative reference library.
Ohio: Legislative reference board, legislative reference bureau.
Oklahoma: State library.
Oregon: State library.
Pennsylvania: Legislative reference bureau.
Rhode Island: State library, legislative reference bureau.
South Carolina: State library, legislative reference section.
South Dakota: State department of history.
Texas: State library, legislative reference division.
Vermont: State library, legislative reference bureau.
Virginia: Governor's office, division of statutory research and drafting.
Washington: State library.
West Virginia: Department of archives and history.
Wisconsin: Free library commission, legislative reference library.
Wyoming: State library.

These agencies vary considerably in their character, resources, and functions. In some cases, little more

[44] For this list the author is indebted to *The Book of the States*, published by the American Legislators' Association and the Council of State Governments, vol. II, 1937.

has been done than direct the State library to act in this capacity. In others, provision has been made for the setting up within such libraries of special divisions of legislative reference; and in still others, independent bureaus have been created with a permanent research staff. As regards the scope of their activities, some have this function restricted to the supplying of members of the legislature with data; others, in addition to performing this work, do both drafting and act as revisors of statutes. In a number of cases, as has been pointed out in our account of constitutional documents, these agencies have done valuable work in compiling and publishing, in the form of bulletins, data for the use of constitutional conventions.

During the sessions of the legislature the time of these services is occupied in meeting calls upon them by members and committees for information and in giving aid in drafting bills. In the interim between sessions, the stronger bureaus make research into matters likely to come before the legislature at future sessions, the results of which are published in bulletins or other publications which receive general distribution.[45]

In 1919 Congress created a legislative reference service as a subdivision of the Library of Congress. Though this is much the most important of all the legislative reference services in the United States no special account of its organization and operation is here given, since it is made the subject of special treatment by Mr. M. A. Roberts, the First Assistant Librarian of the Library of Congress. From the outset of its organization in 1925, the American Legislators' Association has sought to act as a clearing house for the State legislative reference services and to this end has created the Interstate Reference Bureau which functions under the general direction of the American Legislators' Association and the Council of State Governments. An account of this service will be found in our consideration of the work of national legislative associations.

[45] For further information concerning these agencies, see: J. B. Kaiser, *Law, Legislative and Municipal Reference Libraries*, 1914; J. H. Leek, *Legislative Reference Work: A Comparative Study*, Doctor's Thesis, University of Pennsylvania, 1925; *The Book of the States*, American Legislators' Association and Council of State Governments, vol. I, 1935, vol. II, 1937; Legislative Reference Libraries: Letter from the Librarian of Congress transmitting special report relative to legislative reference bureaus (S. Doc. 7, 62d Cong., 1st sess., 1911; Legislative Drafting Bureau and Legislative Reference Division (S. Rpt. 1271, 62d Cong., 3d sess., 1913). The Book of the States, vol. I, 1935, gives a sketch of the history and work of each service then in existence. For an intimate account of the inside operation of typical strong services, see *A Law Making Laboratory*, by Edwin S. Witte, chief of the Wisconsin Legislative Reference Bureau; State Government, April 1930; and *A Legislative Aid: The Work and Function of the Legislative Reference Bureau of Illinois*, by Finley F. Bull, Secretary of the Bureau; Case and Comment, January 1917.

Joint Committee on Internal Revenue Taxation

Another congressional staff agency of great importance from the research standpoint is that created by the Revenue Act of February 26, 1926, to assist Congress in the formulation of internal revenue policies and legislation. This act provided for the creation of a body to be known as the Joint Committee on Internal Revenue Taxation and to be composed of five members of the Committee on Finance of the Senate, three from the majority and two from the minority party, to be chosen by that committee, and five members of the Committee on Ways and Means of the House, three from the majority and two from the minority party, to be chosen by that committee. To this committee was entrusted the duty of investigating the operation and effects of the Federal system of internal revenue taxes; the administration of such taxes by the Bureau of Internal Revenue or other agency charged with their administration; the measures and methods for the simplification of such taxes and particularly the income tax and such other matters having to do with the internal revenue system as the committee might deem desirable; and to report its findings to the Senate Committee on Finance and the House Committee on Ways and Means and, in its discretion, to either or both Houses with such recommendations as it deems advisable.

The Revenue Act of May 29, 1928, imposed upon this committee the further duty of examining all proposals for refunds of any income, war-profits, excess profits, estate or gift tax in excess of $75,000 and of reporting annually to Congress the results of its examinations.

In order that it might efficiently perform these duties, the committee was given full investigatory powers and authority to employ, within the limits of the appropriations made for its support, such technical and other employees as it found necessary. In pursuance of this authorization the committee in 1937 had the following staff:

Chief of Staff	$9,600
Corporation auditor	6,600
Counsel	5,700
Junior auditor	4,200
Secretary	3,900
Junior auditor	3,900
Attorney	3,600
Statistician	3,600
Legal assistant	3,600
Technical assistant	2,700
Technical assistant	2,640
Stenographer and assistant clerk	2,100
Stenographer and assistant clerk	1,800
Total	$53,940

The total appropriation for the committee for the fiscal year was $58,000.

The research work of this committee has been of a most important character. This is partially revealed by the list of its publications that follows:

1. Tentative plan of procedure, 1926.
2. Chart of State and local taxation, 1926.
3. Depletion: Oil and gas, 1927.
4. Evasion of surtaxes by incorporation, 1927.
5. Plan of procedure, 1927.
6. Report of the Joint Committee, vols. I, II, and III, 1927.
7. Report of the Joint Committee, 1927 (H. Doc. 139, 70th Cong., 1st sess.).
8. Earned income, 1928.
9. Payment of taxes in view of disclosures, 1928 (S. Doc. 157, 70th Cong., 1st sess.).
10. Life insurance companies, 1928.
11. Capital gains and losses, 1928.
12. Refunds and credits, 1928, 1929 (H. Doc. 43, 71st Cong., 1st sess.).
13. Depletion, 1929.
14. Refunds and credits, 1929, 1930 (H. Doc. 478, 71st Cong., 2nd sess.).
15. Earned income, 1930.
16. Codification of internal revenue laws, 1930.
17. Refunds and credits, 1930, 1931 (H. Doc. 223, 72d Cong., 1st sess.).
18. Taxes collected under naval air reserve investigation (S. Doc. 138, 72d Cong., 1st sess.).
19. Refunds and credits, 1931, 1932 (H. Doc. 535, 72d Cong., 2d sess.).
20. Federal and State death taxes, 1932.
21. Double taxation, 1932.
22. Codification of internal revenue laws, 1933.
23. Refunds and credits, 1932, 1933 (H. Doc. 279, 73d Cong., 2nd sess.).
24. British tax system, 1934.
25. Refunds and credits, 1933, 1935 (H. Doc. 145, 74th Cong., 1st sess.).
26. Taxing power of Federal and State governments, 1936.
27. Refunds and credits, 1934, 1937 (H. Doc. 188, 75th Cong., 1st sess.).
28. Codification of internal revenue laws, 1938.

It will be noted that, with the exception of the annual reports of the committee on refunds and credits, few of the reports have been published as congressional documents.

Legislative Counsel

Legislative reference services meet but one of the needs of a legislature—that of providing the data required in formulating the substantive content of legislative proposals. With the substantive provisions of bills determined, the problem is then prosecuted of incorporating them into correct bill form. This is a matter requiring technical skill of the highest order. It is not sufficient that an act shall make known its general purposes: it must be so framed that it will set forth specifically and in a language that is not susceptible of misconstruction, the several duties, obligations, and powers conferred by it. Unless this is done with great care, difficulties will arise in its execution. In many cases, acts are found unworkable, or, at least, fail to accomplish their purposes, because the scope of the obligations, powers, and duties is not defined with accuracy and provision is not made for needed reservations and exceptions. In no small degree the fact that much legislation is brought before the courts for construction is due to this failure. An unfortunate use of words, an improper location of a qualifying clause, or a misplaced punctuation mark may give to a provision a meaning contrary to the purpose intended. Even in comparatively simple bills the meeting of these requirements is not an easy matter; in the case of long and complicated measures it is a matter of great difficulty. Especially is this so when the proposal is one to modify or supplement legislation already upon the statute books. The drafting of bills is thus a special art to be acquired only by special study and long practice.

Comparatively few members of our legislative bodies have had an opportunity to become proficient in this art. If this work of bill drafting is to be properly performed it is therefore imperative that the legislative body shall provide itself with an officer or organ whose function it is, not to determine legislative policy, but to see that the substantive provisions of bills for putting this policy into effect are set forth in proper language, arrangement, and form. This function may be performed either in the original drafting of a proposal or in the way of revising a measure before it is reported favorably by a committee, or is put upon its third reading and final passage.

In the Federal Congress, provision for an office of this kind was first made by an act approved February 24, 1919, which provided for the creation of an office to be known as legislative counsel, to be under the direction of two legislative counsels, one to act as an aid to the Senate to be appointed by the President of the Senate, and the other to act as an aid to the House to be appointed by the Speaker of the House, each to be appointed "without reference to political affiliations and solely on the ground of fitness to perform the duties of the office." Authorization to employ the necessary personnel and to meet necessary office expenses was also given. As regards the duties of this office, the act provides that:

> The office of legislative counsel shall aid in drafting public bills and resolutions or amendments thereto at the request of any committee of either House of Congress but the Library Committee of the Senate and the Library Committee of the House, respectively, may determine the preference, if any, to be given such requests of the committees of either House respectively.

It appears from the foregoing that, strictly speaking, the legislative counsel is authorized to give this assistance only to committees. In point of fact, this limitation has not been observed. Thus, Mr. Beaman, legislative counsel for the Senate, in testifying before the House Committee on Appropriations in 1938, in support of the estimates for his office for 1939, said:

> According to the law which created us, we are only authorized to work for the committees. We have, since the inception of the office, with the full knowledge of this subcommittee and its predecessors, and the full committee and the leadership of the House generally, aided individual Members to the extent that it is possible to do so without interfering with our committee work.

The tendency has been for the Members and committees to rely to a constantly increasing extent upon these officers in the drafting of important legislation. It is important to note, moreover, that the work of the office does not cease with the first drafting of measures. As Mr. Frederic P. Lee, legislative counsel for the Senate, points out in his extremely interesting account of the history and work of his office:[46]

> Commonly appearances are made before the committees of either House in executive session. In addition, in the case of important measures, members of the office are frequently on the floor to assist the chairman of the committee or ranking minority member. Also members of the office appear before conference committees of the two Houses to aid in drafting the agreements reached in conference and the preparation of conference reports and statements of the managers of the House. Appearances in committee are of the utmost importance in executing speedily and with accuracy the desires of the committees and in presenting and explaining the legal considerations involved in various drafts prepared.

Finally, the officers do a large amount of research work in the way of investigating and preparing memoranda on legal and other questions. Thus, to quote again from Mr. Lee's article:

> A form of drafting aid that has developed since the creation of the office is the preparation of memoranda or opinions in response to requests either for legal materials or for the opinion of the office in connection with pending legislative matters. Compliance with such requests has taken up a substantial portion of the time of members of the office. Usually the questions involved are the constitutional powers of the Congress or the interpretation of existing statutory law. The opinions may be exemplified by those denying the authority of Congress to regulate rents in the District of Columbia under the Federal taxing power, but supporting the power of Congress to regulate such rents, during the continuance of the emergency, under its general police powers with respect to the District of Columbia; sustaining the constitutionality of the Packers and Stockyards Act as a regulation of interstate and foreign commerce; sustaining the constitutionality of the Ship Mortgage Act provisions for foreclosure of vessel mortgages in the Federal courts in admiralty; denying the power of Congress to regulate grain futures under the taxing powers; supporting the power of Congress to provide for a national referendum upon the eighteenth amendment; supporting the power of Congress to enact the provisions of the Revenue Act of 1926 imposing a Federal estate tax against which may be credited State inheritance taxes up to 80 percent of the amount of Federal estate tax; and sustaining the power of the Senate to originate a bill providing for a bond issue in connection with Boulder Dam. Rarely are questions asked upon points which have been decided by the courts. The Congress, inasmuch as it is usually dealing with novel subject matters that have not yet been the subject of litigation, must commonly deal with correspondingly novel legal problems.
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> A closely associated type of drafting aid is the preparation of legal arguments to be included in committee reports which are in support of the validity of proposed legislation. As illustrations there may be cited the arguments sustaining the validity of the Air Commerce Act of 1926 and the validity of the McNary-Haugen bill.
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> In the case of opinions, the opinion given is that of the office. The opinion is not a mere brief or argument written to support a position previously taken by a committee or Members of Congress. On the other hand, there are many instances in which briefs or arguments are, upon request, written to support a previously announced position without regard to whether such position conforms to the legal views of the office. Such briefs or arguments, however, do not, in any instance, purport, as do formal opinions, to express the legal views of the office.

The importance of this office is partially indicated by the size of its staff and compensation fund. As reported to the House Committee on Appropriations at its hearings in 1938 on the budgetary estimates for 1939, this staff and the compensation paid its members in 1937 were as follows:

House office:	
Legislative counsel	$10,000
Assistant counsel	6,500
Assistant counsel	6,000
Assistant counsel	4,100
Assistant counsel	3,100
Clerk	3,280
Assistant clerk	1,800
Total	34,780
Senate office:	
Legislative counsel	7,200
Assistant counsel	4,200
Assistant counsel	3,000
Law assistant	2,400
Law assistant	2,100
Clerk	3,000
Assistant clerk	2,300
Total	24,400
Total House and Senate offices	59,180

Additional appropriations were made for general office expenses.

The extent to which the State legislatures have made provisions for the performance of the function of bill

[46] Frederic P. Lee, "The Office of Legislative Council," *Columbian Law Review*, April 1929.

drafting, and the direction that this provision has taken, is set forth in the following summary of conditions contained in the *Book of the States*, vol. I, 1935.

Twenty-six of the 52 agencies (i. e., agencies doing legislative reference work) do bill drafting, and of these, 18 carry on bill drafting in the same department as the library service and legislative reference. Although the Attorney General's office very rarely carries on the other types of legislative reference service, in 22 States it does all, or part, of the bill drafting. Private lawyers are hired to act as bill drafters in three States: Delaware, Nevada, and Wyoming. Five States have created separate departments to do bill drafting and statutory revision. Connecticut has a statutory revision commissioner who also does bill drafting. His work and that of the legislative reference bureau are complementary and close coordination and cooperation is maintained between the two agencies. The Massachusetts house and senate counsels, the New York legislative bill drafting commissioner and the Rhode Island law revision commissioner are similar examples. In Vermont the board of legislative draftsmen is solely a bill drafting agency and legislative research and statutory revision are done by two other distinct agencies.

Revisor of Statutes

The statutory law of a nation or State should constitute a consistent whole and its several provisions be grouped together according to a logical arrangement and scheme of classification to the end that the law regarding any particular matter may readily be obtained. If this end is to be achieved, it is furthermore necessary that this law be purged of ambiguities and inconsistencies, that modifications in, and additions to, the law as originally enacted, introduced by subsequent legislation, be incorporated in such original statutes, that redundances and repetitious provisions be eliminated and, generally, that the statement of the law be as direct, terse, and clear as possible. These ends are only in part achieved by the preparation of codes such as have been described in our chapter dealing with legislative proceedings and documents, since the purpose there sought is a consolidated statement of the law as it exists at the time of the undertaking of the codification, rather than a restatement, and much less a revision, of the law. It results that many, if not most, codes represent a statement of the law in a far from desirable form. Thus, Mr. Fitzgerald, chairman of the House Committee on the Revision of the Laws, in reviewing the work involved in the preparation of the United States Code, said:[47]

The present code, admirable as it is, and an immense improvement over the chaotic condition that existed before, when no one could be certain of the law even after exhaustive research, is cumbersome, verbose, and replete with absurdities, contradictions, illogical distinctions, and complexities which tend to bewilder and confuse anyone seeking to know the law. * * * There are instances of sections of statutes carried into the code which, while in fact inoperative, obsolete, useless, and confusing, are neither specifically repealed nor superseded except by the change or progress of affairs. Such sections are those relating to Indian agents which no longer exist, provisions for decoration of officers distinguishing themselves in Indian wars, and so forth.

The Committee on Revision of the Laws having the preparation of the code in charge is responsible for the statement that, in their opinion, were the code purged of all obsolete provisions and the retained provisions restated in proper form, a reduction of its bulk by one-fourth or one-third could be had.

There are few, if any, directions in respect to which the Congress can do a more important work in the way of facilitating research than in taking the steps that will lead to a thorough revision of the form of statement of the Federal law now in force. This is urged in the strongest way possible by the chairman of the House Committee on the Revision of the Laws. Mr. Fitzgerald, in the speech in the House to which reference has been made, after pointing out the need for the purging of the code of all obsolete provisions, continues:

All of this is but a preparation for a real revision of the statute law. The most competent, well-trained, careful, and sensible specialists should be employed under the direction of the Committee on the Revision of the Laws, or otherwise, to prepare a restatement of the present law, one title at a time, in the most simple, clear, and precise terms. As each title is completed and approved by the appropriate department, bureau, or commission of the Government, and carefully checked by the Legislative Reference Service of the Library of Congress, and by such committees of the House and Senate as will be willing to give the matter attention in a reasonable time, a bill may be introduced in Congress embodying the new statement of the law conforming to the understood policy, intent, and purpose of Congress in the original legislation, but with such amendments as will prevent unjust discriminations and remove ambiguities, contradictions, and other imperfections, both of substance and of form. It is essential that this revision work be done each title separately, one at a time, because of the inability of Congress to deal with bulky measures proposing any changes whatever in the current law.

By way of reinforcing and amplifying this recommendation by the chairman of the House Committee on the Revision of the Laws, the following points may be emphasized:

1. It is desirable that this work of statutory revision shall be undertaken directly by Congress rather than by being entrusted to an administrative agency, such as the Department of Justice, or an *ad hoc* organization, and that, to this end, the actual work be entrusted to a committee such as the present House Committee on Revision of the Laws, or a joint committee of the two Houses. This is desirable since it is certain that Congress will be reluctant to accept any revision that is not made by its own agents, and action upon the consolidated bills representing the titles to the code will be difficult to be had unless there is in Congress a committee and Members informed in respect to the work and interested in promoting action.

[47] Cong. Record, July 27, 1931, p. 6313.

2. The work should be of a continuing character consisting of: (a) The keeping of the code compilation to date through the preparation and issue of supplements and, from time to time, new editions of the code; and (b) the preparation of consolidation bills relating to specific titles of the code or more special topics having for their purpose to restate the law in accordance with the principles above laid down, such bills to be reported one by one accompanied by reports pointing out the nature of the changes effected in making the restatement.

3. The committee having the work in charge should be provided with a permanent, highly paid, expert staff to perform the work under the general direction of the committee.

4. In performing their duties this staff should seek the cooperation of the committees of Congress and the administrative agencies of the Government the work of which has to do with the subject matter of the several bills; and the bills, as first drafted, should be submitted to such agencies for their comments and suggestions which comments and suggestions should be included in the reports accompanying the bills.

5. As conditions and the subject matters of legislation undergo change in character of relative importance, it will be found desirable to effect modifications in the scheme of classification now employed in the code.

It is a matter of interest that, according to the compilors of Scott and Beaman's *Index Analysis of the Federal Statutes*, the preparation of a scientifically devised index constitutes the first step in undertaking such a work of revision and restatement of the federal law. In the preface of their volume they thus state:

It is the belief of the authors that for the first time in the history of our legislation there exists a reasonably reliable ground work for preparing a scientific and complete revision of our laws. The preparation of a detailed and scientific index being considered as a fundamental prerequisite to an accurate, comprehensive and inexpensive revision of the statutes, the British Parliament in 1869 placed the preparation of such an index in the hands of Mr. Thring, afterwards Lord Thring, and Mr. Ilbert, subsequently knighted as Sir Courtney Ilbert. The British revised statutes are considered models of form and exactness, and the experience of both English and European legislatures shows conclusively that no satisfactory revision, codification, or consolidation of the Statutes at Large can be prepared without first making in scientific fashion a most detailed index to the subject matter found in the mass of existing enactments; besides, Lord Thring, Sir Courtney Ilbert and other experienced lawyers in statute law work state that this method is by far the least expensive.

The problem of statutory revision and restatement in the States is, in all essential respects, similar to that of the Federal Government. It has been pointed out in our consideration of legislative reference services that certain of these services are entrusted with the duty of acting as revisors of statutes. According to the *Book of the States* [48] existing provisions for the effecting of statutory revision are as follows:

Five legislative reference bureaus undertake statutory revision functions in addition to library services, legislative research and drafting. They are the California Legislative Counsel Bureau, Colorado Legislative Reference Office, Kansas Revisor of Statutes, Pennsylvania Legislative Reference Bureau, and the Virginia Division of Statutory Research and Drafting. Some States—Connecticut, Iowa, Maine, Massachusetts, and Rhode Island—have separate statutory revision agencies which sometimes do bill drafting. Four States have code commissioners. Vermont and Rhode Island have law revision commissioners and Maine and Wisconsin have revisors of statutes.

Of these several agencies, the Wisconsin revisor of statutes is outstanding for the comprehensiveness and technical excellence of its work. As described by Mr. Witte in his article *A Law Making Laboratory* to which reference has been made in our account of legislative reference services:

In Wisconsin every bill, unless it is a private law or a merely temporary measure, is drawn as a repeal, or amendment of, or an addition to the existing statutes by section and number. There are no blanket or implied repeals, and every new enactment is given a number which fits into the statute. The simple decimal system of numbering statutes is used as it is capable of indefinite expansion. In every bill which amends any section of the statutes, the old matter is printed with a line stricken through it and the new matter is printed in italics. No one, on reading a Wisconsin bill can possibly be confused as to the manner in which it affects the existing statute. * * *

These bills (correction bills), prepared by the revisor and introduced at the end of the session, reconcile all conflicts in the new laws. Another important service of the revisor consists of the preparation of "revision bills" between sessions. These represent piecemeal revision of the statutes. They consolidate, reconcile, and clarify all sections relating to the particular subject dealt with and they repeal any dead material.

Wisconsin, it will thus be seen, has in operation a system for both the current codification and revision of her statutory law, and one, moreover, which makes it possible for the current work of legislation to be performed with the maximum of information regarding the change that proposed legislation will have upon existing law.

Legislative Councils

The State legislatures, as has been indicated, labor under a number of handicaps in performing their functions. One of the most serious of these, which has not yet been mentioned, is that they, with few exceptions, meet only every other year and that their sessions are, by constitutional limitations, restricted to a short period of time, the most usual limitation being 60 days. This period is an exceedingly short one in which to reach a decision regarding legislative policies, translate these policies into properly drafted bills, and perform the necessary operations involved in having these measures considered in committee and on the floor of the House and in securing an adjustment of differences arising between the two chambers. This situation would be greatly improved if arrangements could be made by which all legislative measures of

[48] Volume 1, second edition, 1935, p. 199.

general importance, at least, could be worked out and embodied in properly drafted bill form before the convening of the legislature; or, to state this another way, if the legislature, upon convening could have before it something in the nature of a legislative program embodied in drafted bills upon which it could immediately begin work.

By far the most interesting attempt to meet this need has been the creation, in recent years, by certain States, of what are known as legislative councils, the prime, if not the exclusive, function of which is to formulate, in advance of the meeting of the legislature, a legislative program and to draft the bills for putting such program into execution.

The proposal for the creation of a body of this character found first expression in the model State constitution drafted under the auspices of the National Municipal League and published by it in 1927. Included in that draft were provisions for the creation of a legislative council to be composed of members of the two chambers elected by the process of proportional representation with the single transferable vote, which members, acting with the governor, should have as their duties:

> To collect information concerning the government and general welfare of the State and to report thereon to the legislature. Measures for proposed legislation may be submitted to it at any time and shall be considered and reported to the legislature with its recommendations thereon. The Legislative Council may also prepare such legislation and make such recommendations thereon to the legislature in the form of bills, or otherwise, as, in its opinion, the welfare of the State may require.

This recommendation has been acted upon by eight of the States,[49] the initiative being taken by Wisconsin, in 1931. Of these, the council created by Kansas in 1933 has been especially active, and a brief account of its organization and work will serve as an exposition of the nature and operation of these bodies generally.

The Kansas Legislative Council is composed of 27 members: 10 senators and 15 representatives, appointed by the presiding officers respectively of the two Houses, and approved by a majority vote of the members of each; the President of the Senate, who is ex-officio chairman of the Council, and the Speaker of the House who is ex-officio vice chairman of the Council. To ensure that the Council will, as far as practicable, have a non-partisan character, the act creating the Council provides that:

> The party representation on the Council shall be in proportion generally to the relative numbers of the two major parties in each House, but, in no event, shall the majority party in either House be represented by more than two-thirds of the members of said Council from either House.

[49] Connecticut, Illinois, Kansas, Kentucky, Michigan, Nebraska, Virginia, Wisconsin.

To quote the Director of the Research Department of the Council, Dr. Frederic H. Guild:[50]

> The Kansas Council was created to collect information concerning the government and general welfare of the State and to prepare a legislative program, in the form of bills or otherwise, for the regular session of the legislature. In consequence, it is, in fact, a general interim committee authorized to investigate or study any important issue of public policy or question of State-wide interest. Its second and fundamental function, that of preparing a legislative program, is dependent upon proper exercise of the first function.

In carrying out its dual function, the Council has organized a research staff which is an investigative body analogous to a legislative reference service and which has prepared and published in mimeographed form numerous bulletins bearing upon matters likely to become the subjects of legislation, while the Council itself holds quarterly meetings for the development of its legislative program.

As regards the manner in which the council has actually functioned, as a program drafting agency, Dr. Guild, in his bulletin, states that the council "has been definitely more successful" than has similar work in the past; that 60 percent of the council's bills became laws in 1933 special session and that 26 council bills were passed at the regular session.

In considering the composition and character of duties that should be assigned to an agency of this kind, the most important problem presented is that of determining the relations that shall exist between it and the governor. As is well known, a marked feature of recent political development in the United States has been the increasing extent to which American chief executives have deemed it to be one of their prime responsibilities to formulate a legislative program and to use the powers of their office and those derived from their positions as heads of their political parties to secure affirmative action upon such programs, a development which has, in general, received the endorsement of the American people and which has been welcomed by most students of American political institutions and conditions.

In view of this, it is apparent that, unless proper precautions are taken, the creation of legislative councils as legislative program formulating bodies may run counter to this development and result in the legislature being confronted with two legislative programs: one formulated by its own council and the other by the governor. This situation can be met either by making the governor a member of the council or, preferably, by the council, as a matter of policy, working in close cooperation with the governor. It would appear that these considerations have been

[50] Kanaas Experiment with a Legislative Council: Estimate of Accomplishments, May 15, 1933, to March 27, 1936. Research Department, Kansas Legislative Council, Bulletin No. 42, 1936.

fully appreciated by the Kansas Council. Thus Dr. Guild, in his bulletin, writes:

> It will not do, however, to ignore the influence of the governor upon such a program. The relationship of the chief executive to the council has not yet been fully determined. It will scarcely be possible to have two different legislative programs. During the past 20 years the executive has assumed an important position in the planning and recommendation of a major program for the legislature. No governor could contemplate with pleasure the possibility that a legislative council would leave him either without a program, or with the choice of affirming a portion of the council's program, or else of proposing a conflicting policy. Probably no legislative council could long endure if its programs were constantly to be opposed to that of the governor.
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> Thus far, there has been no definite clash of interests, partly because the council has felt it is under no urge to press a definite, complete program. It has been satisfied to make certain that all of the essential material for such a program had been prepared and was ready for legislative decision. As a matter of fact, the council at its November 1934 meeting, the last preceding its report to the regular session, evidenced no particular concern as to whether its proposals should or should not be "recommended" to the legislature. By that time it seemed to be general council opinion that the final decision on the exact nature of a solution should not be anticipated by the council, but should be left to the regular legislative committees and that it was the primary function of the council, not to make such a decision, but to have material in the best possible form for the legislature.

It will be seen from the above that the Kansas Council has interpreted its duties to act as an aid in the formulation of a legislative program rather than to take to itself the task of formulating a definite program to be recommended for adoption by the legislature. In taking this position it has undoubtedly acted wisely.[51]

Auditor of Public Accounts

In the preceding pages, emphasis has been placed upon the legislature being, under our form of government, the source of all administrative authority, and upon its consequent responsibility, not only of giving directions in respect to administrative organization, methods, and activities, but of subsequently taking steps by which it may assure itself that its directions are being faithfully and efficiently carried out.

In seeking to meet this latter responsibility, the Congress, and to a lesser extent the State legislatures, have, as has been pointed out in our chapter dealing with special investigations, repeatedly created special and joint committees to inquire into the workings of certain, or all, of the administrative services. In view of the fact that this responsibility is a continuing one, a method of action far preferable to that of special investigations is that of the creation by the legislature of a permanent agency through which it may exercise a current supervision and control over the administrative services.

Considering this problem as it presents itself in the case of the national Government, Congress has had, in fact, two such agencies—the General Accounting Office and the House Committee on Expenditures in the Executive Departments. Unfortunately, neither of these bodies has been able to realize on the opportunities for keeping in touch with the conduct of administrative affairs, of making investigations of administrative conduct when conditions appeared to be unsatisfactory and of keeping Congress currently informed regarding the manner in which its administrative agencies were performing their duties.

The General Accounting Office, presided over by a Comptroller General, was created by the Budget and Accounting Act, 1921, and was intended to be a legislative agency through which the Congress might assure itself that its orders regarding the raising and expenditure of public funds were being properly carried out and through which it might secure such further information regarding administrative action as it might desire. The act thus expressly directed that:

> (a) The Comptroller General shall investigate, at the seat of Government or elsewhere, all matters relating to the receipt, disbursement, and application of public funds, and shall make to the President, when requested by him, and to Congress at the beginning of each regular session, a report in writing of the work of the General Accounting Office, containing recommendations concerning the legislation he may deem necessary to facilitate the prompt and accurate rendition and settlement of accounts and concerning such other matters relating to the receipt, disbursement, and application of public funds as he may think advisable. In such regular report, or in special reports at any time when Congress is in session, he shall make recommendations looking to greater economy and efficiency in public expenditures.
>
> (b) He shall make such investigations and reports as shall be ordered by either House of Congress or by any committee of either House having jurisdiction over revenue, appropriations, or expenditures. The Comptroller General shall also, at the request of any such committee, direct assistants from his office to furnish the committee such aid and information as it may request.
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> (c) The Comptroller General shall specially report to Congress every expenditure or contract made by any department or establishment in any year in violation of law.
>
> (d) He shall submit to Congress reports upon the adequacy and effectiveness of the administrative examination of accounts and claims in the respective departments and establishments and upon the adequateness and effectiveness of departmental inspections of the offices and accounts of fiscal officers.

It needs but a reading of this provision of law to show that in the General Accounting Office, Congress has an agency exceptionally well situated and equipped to make, on its behalf, any inquiry regarding admin-

[51] For an excellent consideration of legislative councils see Reports and Studies, New York State Constitutional Convention Committee, 1938, vol. VII, ch. 7.

istrative conditions and actions that it might desire. Furthermore, it was not necessary that such inquiry should be directed by formal action of either House, or by the two acting concurrently, but might be demanded by any committee having jurisdiction over the raising, appropriation, or expenditure of public funds. And, finally, the General Accounting Office, acting on its own initiative, could at any time make such investigations as it deemed desirable and make such recommendations to Congress regarding the conduct of administrative affairs as it saw fit. That this office has failed lamentably to meet expectations as regards the exercise of its investigatory function is unquestionable. Responsibility for this must be divided between the office, which, from the first, seemed to fail to appreciate its responsibilities and opportunities in this field, and Congress and its committees, which equally failed to avail themselves of the resources of this office.

In apportioning responsibility for lack of action, an especial measure of blame would seem to fall upon the House Committee on Expenditures in the Executive Departments. This Committee was created as one of the standing committees of the House in 1927 to take the place of the 11 standing committees on expenditures in the several departments and on public buildings which for years had been moribund so far as any important action by them was concerned. That, as in the case of the General Accounting Office, it was the expectation of those responsible for its creation that, in this committee, the House would have an agency through which it could keep in current touch with the operations of the administrative branch, is evident from a statement by Mr. Martin B. Madden, the first chairman of the House Committee on Appropriations after the passage of the Budget and Accounting Act, 1921. In an article [52] describing the new budget system, after calling attention to the faulty system then existing under which responsibility for the scrutiny of expenditures was divided among 11 different committees, he wrote:

> The remedy for this situation is the abolition of the 11 committees and the creation of a single virile committee on public expenditures. Such an organization functioning with the General Accounting Office would, in my opinion, be a factor for an incalculable amount of good. Practically the only systematic attention now given by Congress to the investigation of expenditures is the time devoted by the appropriating committees in the course of the examination of the budget estimates. The work must of necessity be incomplete. The time available for visaing budget estimates and the magnitude of the work makes it impossible for any committee or committees to perform the two duties simultaneously and do justice to both. The creation of a centralized committee on public expenditures would relieve the appropriating committees and at the same time would provide an agency whose thorough investigations would be of incalculable value to the appropriating committees in the performance of their duties.

[52] "The New System in Government" *Saturday Evening Past,* June 9, 1923.

Like the General Accounting Office, this committee has not been able to accomplish what had been hoped. It has not found a way to work in cooperation with the General Accounting Office for the investigation of administrative conditions and the formulation of plans for improving administrative organization and practices.

In view of the foregoing, it is a matter of interest that in the bill making provision for the reorganization of the administrative branch (S. 3331, 75th Cong., 3d sess., 1938), which was discussed at length by the Congress in its last session, consideration was given to the situation as above described. Not only did the bill reemphasize the function of the proposed reorganized General Accounting Office as an investigatory agency attached to and subject to the direction of Congress, but it made provision for a new committee to be known as the Joint Committee on Public Accounts which should be composed of four members each, two from the majority and two from the minority party, selected from the membership of and by each of the following six committees: Senate Committee on Finance, Senate Committee on Appropriations, Senate Committee on Expenditures in the Executive Departments, House Committee on Ways and Means, House Committee on Appropriations, and House Committee on Expenditures in the Executive Departments. The provision that half the membership should be selected from the majority party and half from the minority party was made with the intent that, so far as practicable, the committee should have and act in a nonpartisan character.

A serious omission in the General Accounting Act, 1921, and the rules of the two chambers adopted at that time was the failure to provide that the reports of the General Accounting Office should be referred to a specified committee for consideration and action. Due to this omission, the reports of the Comptroller General, inadequate as they have been, have received little or no attention at the hands of Congress. The bill above referred to has sought to correct this. It thus provided that "the Auditor General shall make such investigations and reports as shall be requested by either House of Congress or by the Joint Committee on Public Accounts, or by any other committee of either House having jurisdiction over expenditures, appropriations, or revenue"; that all such reports shall be made to the Joint Committee on Public Accounts when the Congress is not in session; that it shall be the duty of the Joint Committee to examine and study

all such reports submitted to it or to Congress, and "to submit to the Senate and the House as promptly as possible such findings and recommendations with respect to any such reports as the Joint Committee deems advisable." Power was given to the committee to subpoena witnesses, to administer oaths, and to require the giving of testimony and the production of records and papers.

If provisions along these lines should be embodied in law, Congress would have, in the proposed Auditor General's Office and the new Joint Committee on Public Accounts, instrumentalities of research that would obviate the necessity in the future of setting up special committees to investigate the administrative services, while giving to it the means of exercising a current supervision of the conduct of administrative officers that it does not now have. It is unfortunate that the failure of this bill to receive favorable action has postponed this important reform.

All that has been written regarding the need that Congress has for a permanent agency through which it may keep in touch with the administrative agencies and, if need be, inquire into their acts and procedures, a need that can best be met by creating the Office of Auditor of Public Accounts and a Joint Committee on Public Accounts, applies with equal force to the States. Few things would contribute more to increasing the faithfulness and efficiency with which the administrative affairs of the States are conducted than action in this way.

General Comment

It has, it is believed, been abundantly demonstrated that the American legislature has need of a number of research or technical agencies if it is efficiently to perform its duties. It has, furthermore, been shown that, to a considerable extent, this need has been recognized by American legislative bodies and at least partial provision made for meeting it. The description of the manner in which they have done so raises the question whether a greater concentration of the work to be done in a fewer number of agencies than is now predominantly the case would not result in a more efficient and less expensive system from the organizational and operation standpoints.

Our examination has revealed that American legislative bodies are now making use of no less than five different kinds of staff agencies: Legislative councils, to which, at times, research divisions are attached; legislative reference services; legislative counsels; revisors of statutes, and auditors of public accounts. It appears, moreover, that, as regards the first four of these agencies, not only do their duties fall in the same general field, but that, to a considerable extent, they have need of the same kind of expert skill and knowledge on the part of their staffs.

The recent development of legislative councils, with their great potentialities for rendering services to their parent bodies, suggests that to them be given the duties now so generally entrusted to the separate agencies—legislative reference services, legislative counsel, and revisor of statutes. Dr. Guild, in his account of the experience of the Kansas legislative council, has shown that such a body cannot effectively discharge its function of formulating legislative proposals without having facilities for the making of researches into the subject matter of such proposals, and that such proposals cannot be put into proper form without the aid of skilled bill draftsmen. And it is evident that close working relations should exist between these several services and the revisor of statutes. One of the major recommendations of this study therefore is: That legislative councils be created by all of the States that have not already done so; that existing separate agencies in the form of legislative reference bureaus, legislative counsel, and revisor of statutes be made subordinate units of such councils; and that, where such agencies are not in existence, the statute setting up the council authorize that body to create divisions for the performance of their functions. Action in this way would eliminate, or obviate, duplication of organization and activities; give to the legislature a single strong body with the technical officers having to do with research, bill drafting, and codification, brought together in a single mutually helpful staff; and a centralization of equipment in the form of a reference library, legislative records, and data regarding conditions in other jurisdictions. Prime responsibility for all the work would rest with the council as a collegiate body, while immediate direction, supervision, and control over the staff could be exercised by an executive secretary to the council who, it need hardly be said, should be a permanent officer.

The duties of the council as above laid out, it will be noted, have to do exclusively with the performance by the legislature of its legislative function. For the performance of its function as a board of directors to supervise and control the administrative branch much the most effective method of action is for the legislature to make provision for an auditor general of public accounts, who will be a direct representative of the legislative branch, and a joint committee on public accounts along the lines comprehended by the reorganization bill now under consideration by the Federal Congress. The functions of such auditor general, it cannot be too strongly emphasized, should extend far beyond that of making merely a fidelity audit: that is, an examination having in view merely the

ascertainment that a proper accounting can be had of all receipts and expenditures and that full compliance has been had with all provisions of law regarding the receipt, custody, and disbursement of public funds. They should embrace the duty of making what is technically known as a "service audit," that is, an inquiry having for its purpose the ascertainment, not only of the fidelity with which financial affairs have been conducted, but the judgment and efficiency with which administrative officers have exercised the powers conferred upon them. In other words, it should be one of the prime duties of the auditor general to act as the investigating agency of the legislature through which the latter may currently keep itself informed regarding the manner in which its administrative officers are performing their duties. To this end, the auditor general should have conferred upon him full investigatory powers. The function of the joint committee on public accounts would be to review and pass upon the reports of the auditor general and to bring to the attention of the legislature all matters requiring legislative action developed by such examinations.

With a legislative council of the scope suggested, an auditor general of public accounts, and a joint committee on public accounts, the State legislatures would have an integrated staff fully equipped to enable the State legislatures efficiently to perform both their legislative and administrative control functions.

V. NATIONAL LEGISLATIVE ASSOCIATIONS

No account of the relation of American legislative bodies to research would be complete that did not mention and describe the work of certain national organizations having for their purpose to promote cooperative action on the part of American legislatures and to improve the substantive content and manner of statement of the law: The American Legislators' Association and its affiliated organizations; the National Conference on Uniform State Laws; and the American Law Institute.

American Legislators' Association

The first of these organizations, the American Legislators' Association, was organized in 1925 through the efforts of Mr. Henry W. Toll, at that time a member of the Colorado Senate, and who has ever since been its directing head. It has its headquarters at Chicago as one of the group of national organizations operating in the governmental field in close association with the University of Chicago. It publishes a monthly journal, *State Government*, the first issue of which appeared in April 1930.[53] It has promoted and been primarily responsible for the creation of a number of services and organizations, which function in cooperation with it, having for their objective the rendering of aid to State legislatures and securing cooperation between them in the attainment of common ends. The more important of these are the Council of State Governments and the Interstate Reference Bureau.

The character of the Council of State Governments, as set forth in successive numbers of *State Government*, is as follows:

> The Council of State Governments is a part of the governmental structure of the United States. It is a joint agency created by 30 State governments. By legislative action, each of these States has established a Commission on Interstate Cooperation to perfect the participation of the State as a member of the Council of State Governments. * * * Twenty-four of these States have enacted statutes in this connection declaring the Council to be a "joint governmental agency" * * * The Council seeks to develop more active cooperation between groups of States in the various regions of the United States and also between all of the 48 States in order to overcome problems which no State alone can solve and over which the Federal Government has no jurisdiction. The Council performs research and compiles bulletins for the Governor's Conferences; and the Governors' Conferences contribute to the support of the Council.

The Council has a joint staff with the American Legislators' Association and the two work so closely together that it is difficult for the outsider at all times to distinguish between them in respect to responsibility for work undertaken. It will be noted, however, that, while the American Legislators' Association, in principle at least, works in the legislative field and for the benefit of legislators, the Council of State Governments has the function of working in all the fields of State government. Especially does it cooperate with the several national organizations of State officials, and particularly with the Governors' Conference, the National Association of Attorneys-General, and the National Association of Secretaries of State.

As set forth in the statement of the character of the Council given above, a primary function of the Council is the organization of interstate commissions and councils for the consideration of and taking of action upon, matters affecting a group, or all, of the States. Among the bodies of this character the proceedings of which were set forth in summary form in the *Book of the States*, vol. II, book II, 1937, are: The Tax Revision Council; Interstate Commission on Conflicting Taxation; Interstate Commission on the Delaware River Basin; and Interstate Commission on the Ohio River Basin.

[53] In December 1925, the Association began the publication of a monthly, four-page leaflet, *The Legislator*. This publication was suspended during 1927 and 1928, but reappeared in 1929 in mimeographed form. In April 1930, it was superseded by the periodical mentioned above.

From its outset the American Legislators' Association has emphasized its function as a body to aid the members of the State legislatures in securing the data needed by them in the handling of their legislative problems; and to this end, it has sought to coordinate the work of the legislative reference services existing in the majority of the States. To quote from the *Book of the States* (vol. II, p. 112):

> From its inception, one of the aims of the Association was to supply the legislators with information which would aid them in the solution of the problems which faced them as lawmakers. * * * The Interstate Reference Bureau was established as a clearing house to which legislators and other State officials could send requests for authoritative data on their specific legislative or administrative problems. In addition to this service, the Association was keenly interested in the promotion of the establishment of legislative reference bureaus in each of the States.
>
> The inquiry service was especially popular, and Federal, State, and local officials availed themselves of it. On the whole, there was no dearth of authoritative data, but there was a lack of an established channel through which this information could be made available to the individual legislator. This Bureau, and the legislative reference bureaus provided facilities through which he could conveniently acquaint himself with the principles or standards set up by specialists, with the most reliable, up-to-date statistics, and with the experience of other States as to problems to be met and the best technique for meeting them.[54]

National Conference of Commissioners on Uniform State Laws

The National Conference of Commissioners on Uniform State Laws had its origin in the appointment in 1889 by the American Bar Association of its Committee on Uniform Laws, and the successive creation by the States of Commissioners on Uniform State Laws to cooperate with each other in the drafting and recommending for adoption by the States of model laws, the first State to take action in this way being New York, which passed the necessary legislation in 1890. These Commissioners of the several States effected an organization known as the National Conference of Commissioners on Uniform State Laws, the first formal meeting of which was held in 1892. These meetings are held in connection with the annual meetings of the American Bar Association. The Conference is an official body since it is composed of members appointed by the several State governments and its expenditures are chiefly met from appropriations made by the several State legislatures.

[54] For fuller information regarding the American Legislators' Association and its subordinate and affiliated agencies, see: *The Book of the States*, vol. I, 1935, and vol. II, 1937, and the monthly journal of the association, *The State*.

To date, the Conference has drafted over 50 laws, many of which have been very generally adopted by the States.[55]

American Law Institute

The American Law Institute was organized at a conference held in Washington, D. C., in 1923, its articles of incorporation stating its purpose to be "the clarification and simplification of the law and its better adaptation to social needs, to secure the better administration of justice and to encourage and carry on scholarly and scientific legal work." In point of fact, the Institute has directed its efforts almost wholly to the attempt to restate the common law in a manner that will facilitate the acquisition of knowledge regarding it and that will be generally accepted by the bar and the courts as an authoritative statement of the law. It is liberally financed by the Carnegie Corporation, supplemented by grants from the Laura Spelman Rockefeller Foundation.

As in the case of the National Conference on Uniform State Laws, the Institute proceeds by taking up one by one specific legal topics. Its first restatement, after 9 years of continuous labor by a reporter, aided by a council, and the preparation of numerous drafts for consideration by the Institute, was adopted and promulgated in 1932. The Director of the Institute, Dr. William Draper Lewis, in a contribution to the November 1932 issue of the American Bar Association Journal gives the following interesting description of the work which incidentally serves to make known in an exceptionally clear way the fundamental nature and objectives of the Institute's work.

> The restatement of contracts and other restatements that will follow it are essentially different from any other legal work. The restatement is not a digest of decisions or statutes and it is not a legal encyclopedia, treatise, or monograph. All other works on the common law cite and discuss the decisions of the courts. Not being a legal work with an author or group of authors, the restatement does not need to cite decisions or other authority. To do so would be inconsistent with the fact that it is itself an authority because it represents the opinion of the profession as organized in the Institute of what the law is. At the same time, though the rules of law stated are expressed in the orderly form of a scientific code, to have legislatures give it the rigidity of a statute would destroy one of its chief purposes which is to preserve the common law system

[55] For information regarding the work of this organization, see: Reports of the Annual Meetings of the American Bar Association; Reports of the Proceedings of the National Conference of Commissioners on Uniform State Laws; Manual, National Conference of Commissioners on Uniform State Laws, and W. Brook Graves, *Uniform State Action: A Possible Substitute for Centralization*, 1934. For copies of the laws drafted by the Conference and data regarding their adoption by the States, see: *Uniform Laws Annotated*, a compilation published by the Edward Thompson Co., in eleven volumes, which is kept to date by annual cumulative pocket supplements.

of expressing and developing law by the judicial process; not to destroy that system by ossifying existing legal rules in all their minutiae.

In spite of its essential difference from any other legal work, the restatement is a natural, and indeed inevitable, development of our legal institutions. The common law, though it tends to correspond as nearly as may be to the sense of justice in the community, has been developed as stated solely by the legal profession working mainly through the operation of the courts in the process of deciding cases. The vast and ever-increasing volume of decisions and the numerous instances in which the decisions are irreconcilable has resulted in unnecessary uncertainty as to what the law is. The leaders of the profession who founded the Institute recognized that to preserve the common law system it is necessary for the legal profession, by which that system has been developed, to provide an agency which will counteract this undue tendency to uncertainty. The Institute is this agency. The function of the courts is to decide the controversies brought before them. The function of the Institute is to state clearly and precisely in the light of the decisions the principles and rules of the common law.

The sections of the restatement express the result of a careful analysis of the subject and a thorough examination and discussion of pertinent cases—often very numerous and sometimes conflicting. As stated the accuracy of the statements of law made rests on the authority of the Institute. They may be regarded both as the product of expert opinion and as the expression of the law by the legal profession. * * *

In the restatement of contracts, the profession has what it has never had before—a positive assertion of a legal rule, enunciated after years of study and expert advice, by a body which is representative of the profession in the best sense of that word. * * *

Furthermore, though the Institute in this Restatement is not engaged in reforming law, by giving an authoritative statement of the rules of that great body of law which we lawyers call "common," we are reducing greatly the cost of litigation and we are inevitably promoting the intelligent improvement of the law.

In addition to its work of restating the common law, the Institute has rendered a great service to the improvement of judicial administration through the preparation of a *Model Code of Criminal Procedure*, the official draft of which was published in 1930.

Generally speaking, it appears that the work of the Institute supplements in an important way that of the National Conference of Commissioners on Uniform State Laws. Both are seeking to improve the substantive content and form of the law and in so doing are facilitating greatly the task of our legislative bodies.[56]

[56] For information regarding the Institute, see: *The American Law Institute: A Short Summary of Pertinent Facts*, published by the Institute in 1932; the *Reports of the Annual Proceedings of the American Bar Association* and articles in *The American Bar Association Journal*.

SECTION 6
RESEARCH IN AMERICAN UNIVERSITIES AND COLLEGES

Contents

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RESEARCH IN AMERICAN UNIVERSITIES AND COLLEGES

By Raymond M. Hughes

Introduction

The Federal Government, in carrying on an extensive program of research in a wide variety of fields, is of necessity interested in the work and accomplishments of all research agencies. Among the more important of these agencies are the universities and colleges.

The purpose of this report is (1) to show the particular research activities of the universities that are of concern to the Government, and to point out the chief contributions which the universities make to the research program of the Nation; (2) to discuss research personnel, most of which receives its initial training in the universities; (3) to discuss the present status of research in the universities; (4) to describe the various ways in which the efficiency of research is being promoted; and (5) to suggest methods which might be widely used to enhance in value the research output of the universities. The word "research" is used in the broadest sense throughout the study.

In preparing this report a study was made of all reports bearing on income, expenditures, and research made by the universities to the Office of Education for 1935–36. Material on research available from the four national research councils and from various other sources was used. A preliminary discussion on research in the universities was prepared and sent to 200 leading institutions of higher learning, with a covering letter containing certain estimates relative to research expenditures and other matters concerning the respective institutions. It was hoped to secure rather complete returns. About 60 institutions responded with useful information. The nature of the subject permits only estimates and prevents any attempt to speak accurately.

It seems desirable, however, despite the lack of specific data, to attempt to look at the whole field of research in the universities. Such an over-all survey may open up useful discussions of important matters. Most research workers and administrators are so concerned with their own immediate interests in research that they do not consider enough the work as a whole or sufficiently relate their work to the entire research enterprise of the country.

The Chief Contributions of the Universities to Research

Any consideration of the relation of the Federal Government to research must include a study of what is done by the universities and colleges. While the Government carries on an immense amount of necessary research, it must also rely on the colleges and universities, as it does on industry and business, for very material help in this important field. The Government is dependent on the universities and colleges in eight distinct ways.

1. As centers in which undergraduates are recruited to research.
2. As the chief centers of initial training in research.
3. As sources of personnel for temporary appointment in Government service.
4. As centers of research where Government workers can secure advanced training.
5. As important centers of "pure research."
6. As local centers of origin of research problems and of distribution of research findings.
7. As local agencies with which the Government can cooperate in solving local and regional problems.
8. As sources of aid in solving research problems of national concern.

Recruitment of Undergraduates

The Government is interested in the universities and the colleges as centers where able youth are recruited to scholarly work and research. It is of vital importance to the Federal Government that there be a sufficient number of able men and women trained for research to supply the demands in the Government itself, in business and industry, and in the universities. Amid the many attractive, well-paid openings available to the more brilliant college graduates there is no one except their teachers to point out the advantages of scholarship and research as a life work. It is therefore very important that the colleges and universities be staffed with capable and inspiring teachers who are able to recruit a reasonable proportion of the most competent youth to research as a vocation.

Centers of Initial Training

The universities are the chief centers where men receive their initial training in the methods and techniques of research. This fact is rather well brought out by an analysis of the starred men in *American Men*

of Science, sixth edition. Of the men starred in the first edition in 1904, 388 are still living. Of these, 72.6 percent held the Ph.D. or Sc.D.; of the 250 starred for the first time in the sixth edition, 96.5 percent hold the Ph.D or Sc.D.

Total living	With Ph. D.	With D. Sc.	With M. D.	Without doctorate
Starred in first edition: 388.	255 65.7 percent	27 7 percent	30 7.7 percent	76. 19.6 percent.
Starred only in sixth edition: 250.	206 82.5 percent	10 4 percent	14 5.6 percent	20. 8 percent.

Inquiry of one of our great industrial corporations, which conducts extensive research and also employs a large number of engineering graduates, reveals the fact that practically all their research men hold the doctorate. Each year it is increasingly true that the universities, the Government, industry, and business, when employing men for research, look for those who have university training and whose competence has been certified by the award of the doctorate.

The demand for such men and women is shown strikingly in the increasing numbers of degrees conferred.

Year	Number Ph. D.'s conferred	Number institutions conferring Ph. D. degree [1]	Year	Number Ph. D.'s conferred	Number institutions conferring Ph. D. degree [1]
1876	44	25	1931	2,183	
1890	164		1932	2,368	
1900	342		1933	2,462	
1910	409	38	1934	2,620	
1920	532	44	1935	2,649	84
1926	1,302	62	1936	2,683	
1928	1,447	69	1937	2,709	86
1930	2,024	74			

[1] *Graduate Study in Universities and Colleges in the United States*, Office of Education, 1934, p. 19.

Source of Temporary Personnel

The faculties of the universities afford the Government an important source from which competent research men may be secured for temporary or permanent service. There is an increasing flow of research men between the universities and the Government which is accelerated in times of emergency. Not only are the Government services greatly strengthened by having the university staffs to draw upon, but at the same time the universities are benefited by the familiarity with the work of the Government brought to them by returning staff members.

Advanced Training Centers

The Government is interested in the universities as centers of study and research where Government agencies can send staff members for work on special problems and for advanced training. Problems are constantly arising which require new knowledge and new techniques adequately to deal with them. In such cases the Departments of War and of the Navy, and to some extent the Department of Agriculture, are sending staff members to the universities that are strongest in the field of interest, for special training. This procedure has proved very stimulating to the services and should find wider use.

Centers of "Pure" Research

The universities are the chief centers of "pure" research. The distinction between research in pure and applied science is very difficult to draw. They constantly overlap. Perhaps a more intelligible classification is made by Julian Huxley in *Science and Social Needs*, p. 253. He says:

> * * * you would find it impossible to draw any sharp line between pure and applied science.
>
> * * * I am now more than ever convinced that any such line is merely arbitrary, and that often you cannot draw it at all. But, of course, research can be at very different degrees of remove from practice; and it is useful to be able to classify the different kinds of research.
>
> For that purpose, I have come to the conclusion that the simple alternative of pure versus applied is quite inadequate. You want at least four categories. At one end is background research, with no practical objective consciously in view—like atomic physics, or experimental embryology. Then basic research, which must be quite fundamental, but has some distant practical objective—as is the case with soil science, or meteorology, or animal breeding. Those two categories make up what is usually called "pure research."
>
> Then you have ad hoc research, with an immediate objective, like research on discharge tubes for lighting purposes, or on mosquitoes for getting rid of malaria. And finally, what industry calls development, or pilot research, which is the work needed to translate laboratory findings into full-scale commercial practice.
>
> Of course, these categories all overlap and interlock, but they are convenient pigeonholes.

While pure research is actively carried on in some Government agencies (notably in the Bureau of Standards, Geological Survey, Department of Agriculture, the Public Health Service, and the Smithsonian Institution) and in some industrial research laboratories (notably by Bell Telephone and General Electric) the Nation must look chiefly to the universities and the great research foundations to broaden our horizons of knowledge. It is not only a matter of national pride but also a matter of national security and prosperity that our nation should advance basic knowledge fully in proportion to our national resources. Germany, Austria, England, France, Italy, and Russia have in the past made great contributions to knowledge through university research. Until recent years our part has not been remarkable. It would seem that our responsibilities in this field are now large and our facilities for meeting them great. It cannot be too strongly emphasized that the applied science and the

industry of tomorrow are built on the findings in pure research of today. Anything that the Government may do to stimulate and finance pure research in our universities and colleges will probably pay a high return on the investment.

Origin and Distribution of Research Findings

The universities are important local centers of origin of research projects, of distribution of research findings, and of education of the people in the value and importance of research. While much research of national importance can and should be carried on in the Capital, there is a great deal of research of high significance to the different States and regions that can be carried on much more efficiently and conveniently in the areas concerned. The United States Government recognized this 75 years ago when it established the land-grant colleges and shortly thereafter appropriated money for the support of agricultural experiment stations in these colleges. This money not only made possible necessary research in the several regions but it aroused local interest in and local support for research. Detailed study of the accomplishment of the agricultural experiment stations in strengthening agriculture and increasing the money value of its products shows an enormous return on the money invested.

While certainly the results of a considerable percentage of research wherever done are, if published, equally available in every other part of the country, it is also true that variations in such matters as climate, geology, disease conditions, business, and industry make much State and regional research essential. It is also true that if research is stimulating and profitable in the wealthy States, it is relatively equally stimulating and important in the less wealthy States. The greatest prosperity of the whole country can be attained only through the reasonable development in every State of research men and research facilities suitable to their needs.

Another reason for the interest of the Federal Government in the development of research centers in the universities and colleges throughout the Nation is the vital importance of disseminating knowledge of research findings and of introducing improvements in agriculture, business and industry based on these findings. In agriculture, there has been a system of agricultural extension operating out through the States from the institutions in which agricultural experiment stations are maintained. The pressing problems of production and disease throughout the States are quickly brought to the institution through the extension staff and the results of the research designed to answer these problems are carried back to the people through the same staff. It is infinitely easier to carry knowledge out through the State from a State center than to carry knowledge into each State from Washington. There is every reason why research in public and private institutions in each of the various States should be regarded as of vital interest and concern to the Federal Government.

It is largely as the farmers, businessmen, and manufacturers of a State accept the results of research as useful to them, that they come to an appreciation of its value and importance. Such contact with research findings reaches them largely through contacts with local research institutions and local news agencies. A very important responsibility of every research institution is so to publicize its findings that the people will become accustomed to research methods, will respect authoritative research findings, and will be willing to be guided by them. Incidentally, they will become more ready to support research financially.

Congress is increasingly interested in research and increasingly willing to be guided in legislation by the findings of research. Activities in research in the several States is largely responsible for this present attitude.

Agencies of Local Cooperation

The universities and land-grant colleges provide local agencies with which the Federal Government can cooperate effectively in research aimed at the solution of regional problems. Many matters of national concern can only be studied locally. The relation of the Department of Agriculture to the land-grant colleges illustrates this cooperative relationship. Aside from the direct support of the agricultural experiment stations, the United States Department of Agriculture expends directly from Washington in salaries and operating expenses over $5,000,000 a year on projects carried on cooperatively between the Department and the experiment stations in the 48 States—an average of over $100,000 a year per State.

Research Problems of National Concern

The universities can often afford valuable aid to the Government in solving problems of national concern. Through the many Government agencies innumerable problems are brought to the attention of the Government. While the great majority can be dealt with adequately by agencies within the Government, there are always some problems of an importance and an urgency that call for the promptest possible solution. There are some that can best be attacked at certain universities where unique facilities have been developed. For the solution of such problems the universities and colleges can often make large contributions.

Research Personnel

The universities are of prime importance to all research enterprises as the institutions that give initial training in research to most research workers. In view of the great importance of this feature of the work of the universities a rather extended discussion of research personnel seems desirable. Inasmuch as men entering research at present almost without exception hold the Ph. D. degree, a study of our Ph. D. graduates should throw considerable light on our research personnel. While only about one-third of this group continue active in research, almost all the abler research men are included in the group.

The College as a Source of Research Personnel

It is first worthy of note that a surprising number of research personnel in the United States are of foreign birth and training. This country will probably continue to attract a certain number of able men from abroad.

A study of recent Ph. D. graduates of nine of the great universities shows that their undergraduate work was completed as follows:

Place	*Percentage*
Institutions conferring the Ph. D. degree	26
Other universities of equal rank	16
Secondary universities or other large institutions of complex organization	25
Colleges	33

Yale, Johns Hopkins, and Chicago receive, respectively, 45, 41, and 39 percent of their Ph. D. graduates from colleges, but the University of California only 14 percent. Our colleges remain a very important source of research personnel and the enthusiasm and vitality of college teachers is of crucial importance to the universities and to research. In the large institutions, engineering colleges on the one hand and business schools on the other tend to attract many of the ablest youth who in small colleges would have majored in the physical and social sciences. As a result, many of the ablest graduates of our large institutions are quickly absorbed by industry and business. To the student of high ability in our smaller colleges the graduate school remains attractive.

Place of Initial Training in Research

While industry and the Government will continue to develop and train within their departments a few notable research men who have not been trained in the graduate schools, the great majority of their research personnel and all recruits to the university staffs receive their initial training in research in the universities and colleges.

Table I lists the total number of Ph. D. degrees conferred by each of the 86 institutions conferring the doctorate in each of the 44 fields in which Ph. D. degrees are listed for the 3 years 1934–35, 1935–6, and 1936–37.[1] During this period the 86 institutions conferred 8,041 Ph. D. degrees as follows:

11 institutions conferred 50 percent of the doctorates.
14 institutions conferred 25 percent of the doctorates.
18 institutions conferred 15 percent of the doctorates.
43 institutions conferred 10 percent of the doctorates.
86 institutions conferred 100 percent of the doctorates.

It is worthy of remark that a number of the institutions, hitherto less notable, are advancing rapidly in importance as research centers.

A study of Table I raises numerous questions relative to the future training of Ph. D. candidates. Where will 2,700 and later 3,500 Ph. D. graduates be employed each year? Should there be more differentiation in the types of training offered within each discipline, as for pure research, for applied research, or for teaching? Are we admitting and graduating too many with the doctorate? Are the institutions conferring these degrees all sufficiently concerned to see that every graduate secures suitable employment? Are many institutions thinking more of numbers than of quality? In what disciplines have we an oversupply and in what an undersupply of men with the doctorate? Conferences of heads of departments in each discipline from institutions conferring the doctorate in their respective fields might consider the facts involved and the problems confronting them as a group to great advantage. No one wants the Ph. D. degree cheapened or hundreds of men with this degree out of employment in the field for which they have been trained at great cost.

Research Men Training Research Workers

The only generally accepted list of most distinguished research men is that of the starred men in *American Men of Science*, edited by Dr. J. McKeen Cattell. This list includes only men in the natural sciences and no similar list is available for the social sciences or for the humanities. We were generously given access to the proof sheets of the 6th edition (1938) of *American Men of Science*. This edition lists 28,000 names, of which 1,556, or 5.6 percent, are starred. These starred men are employed as follows:

	Number	Percent	Number under 66 years	Percent
Universities and colleges	1,135	73.0	794	76.0
Federal Government	128	8.2	70	6.6
Industry and business	131	8.4	87	8.3
Private foundations	120	7.7	93	8.7
State governments	9	.6	4	.4
Retired	33	2.1	0	.0
	1,556	100.0	1,048	100.0

[1] The figures are taken from *Doctoral Dissertations Accepted by American Universities*, by Donald B. Gilchrist.

Of the 1,556, 508 are over 65 years of age and presumably are less active than the 1,048 who are 65 or younger. In Table II [2] are listed the total number of starred men and the number 65 or under in each of our universities and colleges. To save space, 21 institutions, having only one starred man, and he 66 years of age or older, are not listed.

It is interesting to note that if we summarize Tables I and II we find that:

Number of institutions	Percentage—	
	Of doctorates conferred	Of outstanding scientists employed
11	50	49
14	25	27
18	15	10
44	10	5.5

We can safely assume that the ablest research men in the humanities and social sciences are distributed in about the same proportion as the men in the natural sciences. Evidently most men are trained where the ablest research workers are located.

The Proportion of Ph. D. Graduates Becoming Productive Research Men

Two studies have been made of the productive work of the Ph. D. graduates. Of 1,188 Ph. D. graduates in mathematics, 1862–1933, not over one-third continued in active research.[3] In 1927 Dr. M. W. Jernegan sent a questionnaire to 500 men holding the Ph. D. in history. From the replies he concluded that less than 25 percent were consistent producers.

Other studies seem to indicate that about three-fourths of our Ph. D. graduates are employed where research is a very minor interest. It is certainly true that many on whom the Ph. D. is conferred have very little interest in research. It may be remarked here that probably increasing numbers will be employed in teaching in our stronger high schools and especially in junior colleges connected with high schools.

Probably a fair estimate would be that from one-fourth to one-third, or from 700 to 900 out of 2,700 receiving the Ph. D. in 1937, will continue active in research in the sense that they continue to publish after receiving the doctorate; whether a larger number would carry on research if opportunity offered is uncertain. It may be that these figures do not give adequate recognition to men engaged in research in industry and business who do not publish. If, as seems probable, from 40,000 to 60,000 men and women are actively engaged in research in the country from 1,200 to 2,000 would be required for replacement annually. If only 700 to 900 of the 2,700 Ph. D. graduates continue in research work in spite of the large numbers graduated the supply of men with taste and talent for research is less than the demand. Far too little is known of the life work of men with the doctorate. We need some searching studies into the occupations of men with the doctorate and into the demand for, and the supply of, research men in each field.

Number of Research Workers Employed in the United States

The sixth edition of *American Men of Science* includes 28,000 men and women in the natural sciences who are rated as research workers. On the assumption that there is a slightly smaller number, 22,000, in the humanities and social sciences, we have about 50,000 research workers in all.

In the agricultural experiment stations in 1935–36 4,000 research men were employed on work costing $16,000,000. An expenditure of $4,000 per man, including salary, supplies, etc., was the cost on the average. In the University of Chicago survey it was estimated that $7,000 was spent per man engaged in research. If we average these figures and accept $5,500 as the cost of research per man employed we would have:

$$\frac{50,000,000}{5,500} = 9,100 \text{ in universities.}$$

$$\frac{65,000,000}{5,500} = 11,800 \text{ in the Government.}$$

$$\frac{150,000,000}{5,500} = 27,200 \text{ in industry and business.}$$

$$48,100 \text{ research workers.}$$

Another approach to this matter is as follows: Dr. Wm. A. Hamor of the Mellon Institute states in a letter that "the number of industrial research workers at present is said to be approximately 25,000, embracing scientists and engineers engaged in basic, production, plant, and merchandizing investigations. Some authorities, however, believe that 20,000 is a much closer calculation." As the above does not include research of commercial establishments which conduct inquiries in banking, marketing, and other social-science fields we could certainly add 5,000 in such employment. In the Government 10,000 seems the lowest figure we can use considering the money spent. In all universities and colleges 100,000 are on the faculties. Of these, 16,649 are on the faculties of the fifteen institutions spending over $1,000,000 each on research, where research is a major activity with a large percent of the staff. Another 13,110 are on the staffs of 39 institutions spend-

[2] Several other tables showing the distribution of starred men in the Government, in the foundations, and in industry are in the Appendix, pp. 191–193.

[3] Dean R. S. B. Richardson of Brown University. Am. Math. Montbly. vol. 42, p. 199.

TABLE I.—*Distribution of doctorates for 3 years*

	Degrees	Chemistry	Education	English literature	Physics	Modern history	Economics	Zoology	Psychology	Botany	Physiology	Mathematics	Romance literature	Engineering	Agriculture	Classical literature and history	Religion	Geology	Political science	Philosophy	Sociology
Number of degrees granted	------	1,449	871	469	455	401	347	343	331	306	262	237	237	181	178	173	170	168	160	151	141
Number of institutions granting degrees	------	68	51	46	60	53	41	63	42	43	46	42	33	23	24	31	20	29	30	32	35
1. Columbia	601	81	178	18	24	21	42	13	43	12	11	6	27	7	1	12	------	11	9	24	14
2. Chicago	488	67	28	22	20	24	21	17	14	20	33	24	11	------	------	25	41	14	15	3	12
3. Harvard	413	45	------	38	13	43	30	22	14	23	9	15	21	------	1	13	1	20	21	22	9
4. Cornell	385	49	14	37	24	10	26	16	9	26	20	7	7	8	34	7	------	5	1	5	6
5. Yale	381	42	50	56	17	21	7	9	20	11	12	7	7	9	1	11	24	9	5	6	15
6. Wisconsin	375	65	12	24	22	25	25	9	8	21	15	9	21	2	15	5	------	6	14	5	9
7. California	316	41	31	10	20	23	19	23	9	17	12	14	14	8	3	3	------	3	13	4	1
8. Illinois	295	94	2	9	20	10	26	12	5	8	5	12	15	13	8	13	------	4	6	------	------
9. Michigan	291	38	16	11	20	6	6	23	14	14	11	11	9	38	1	4	1	6	------	6	5
10. New York	285	49	138	9	12	5	3	7	10	------	6	6	5	------	------	3	4	2	3	1	2
11. Iowa	266	40	26	17	10	15	14	11	45	7	11	7	7	7	------	3	2	6	13	1	3
12. Ohio	262	62	30	11	10	14	13	8	23	16	2	12	6	5	2	1	------	2	3	4	5
13. Minnesota	245	45	22	6	13	6	10	11	14	18	9	1	7	3	29	------	------	6	1	------	5
14. Johns Hopkins	181	40	6	15	13	4	6	14	7	4	3	5	12	6	1	4	------	8	5	------	------
15. Pennsylvania	167	10	10	20	6	10	12	12	6	12	4	4	7	1	------	5	------	1	10	6	7
16. Iowa State College	145	43	------	------	5	------	------	7	1	9	6	3	------	7	15	------	------	------	------	------	------
17. Massachusetts Technological	143	61	------	------	33	------	------	1	------	------	1	9	------	22	1	------	------	5	------	------	------
18. Princeton	136	16	------	17	13	7	8	6	4	------	2	10	6	------	------	7	------	16	5	2	------
19. Stanford	125	20	11	12	6	12	5	8	6	2	1	4	8	5	------	2	------	5	7	2	1
20. Pittsburgh	119	14	34	5	5	------	4	12	6	6	------	4	5	------	------	9	4	------	1	------	3
21. Northwestern	113	25	7	9	5	6	11	5	5	------	13	------	1	------	------	------	2	2	2	1	3
22. Catholic	112	7	19	8	1	14	1	2	6	4	1	3	7	------	------	17	4	------	------	10	4
23. California Technological	92	16	------	------	34	------	------	------	------	4	------	7	------	15	------	------	------	9	------	------	------
24. Texas	82	16	15	9	5	15	3	3	3	2	------	2	1	2	------	------	------	------	1	------	------
25. Southern California	81	2	23	9	1	13	3	2	1	------	4	------	4	------	------	1	------	2	------	5	5
26. Washington, Seattle	80	16	14	7	2	------	3	9	------	8	------	1	------	------	------	------	------	2	3	1	------
27. Duke	78	11	5	4	4	10	4	10	4	4	1	3	2	------	------	3	------	------	7	3	3
28. Virginia	71	16	2	12	10	2	5	3	5	4	1	3	2	------	------	------	------	------	------	4	1
29. Pennsylvania State	69	34	11	3	3	------	1	------	1	------	------	------	------	3	13	------	------	------	------	------	------
30. Missouri	68	12	14	3	2	3	------	3	------	3	------	5	1	------	12	1	------	------	2	------	------
31. North Carolina	64	15	4	9	3	6	5	1	1	2	------	1	7	------	------	3	------	------	------	------	6
32. Nebraska	63	16	11	2	------	2	2	2	2	5	1	3	------	------	6	1	------	------	------	1	1
33. Purdue	58	33	------	------	8	------	1	2	------	3	3	------	------	1	1	------	------	------	------	------	------
34. Maryland	58	22	------	------	------	2	------	1	------	3	1	1	------	------	2	------	------	------	------	------	------
35. Brown	57	13	------	6	1	1	2	1	3	1	4	8	4	------	------	------	5	------	------	2	------
36. Fordham	54	5	15	6	------	4	1	1	3	------	1	------	4	------	------	1	------	------	6	------	1
37. Western Reserve	51	16	6	8	------	4	------	1	2	1	4	1	1	------	------	1	------	------	------	------	------
38. Indiana	47	15	4	1	12	2	------	4	1	3	------	1	------	------	------	------	------	1	1	1	------
39. Cincinnati	45	14	5	4	2	------	------	1	------	1	4	4	------	------	------	1	------	2	------	1	1
40. George Peabody	42	1	22	2	------	5	1	------	8	------	1	------	1	------	------	------	------	------	------	------	------
41. Washington, St. Louis	39	5	1	------	2	1	------	2	1	5	2	3	------	------	------	4	------	2	1	------	1
42. Georgetown	39	2	------	------	------	5	------	------	------	2	------	------	------	------	------	------	------	------	2	------	------
43. Radcliffe	38	1	------	4	1	4	7	3	1	3	------	------	2	------	------	------	------	------	------	5	------
44. Colorado	38	19	3	------	------	1	------	1	1	------	2	1	------	------	------	------	------	2	------	------	------
45. Kansas	37	10	3	2	5	1	------	5	3	3	------	------	------	------	------	------	------	1	------	------	1
46. Rutgers	36	6	7	------	2	------	------	1	1	1	2	------	------	1	11	------	------	------	------	------	------
47. Rochester	36	8	------	------	9	------	------	1	1	1	10	------	------	------	------	------	------	1	------	------	------
48. St. Louis	34	6	4	------	2	4	1	2	------	------	1	------	------	------	------	5	------	------	------	4	4
49. Southern Baptist	34	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	33	------	------	------	------
50. Bryn Mawr	33	1	------	2	1	5	------	1	------	------	2	4	1	------	------	2	------	------	------	2	4
51. Michigan State	33	8	------	------	1	------	1	1	------	4	1	------	------	------	7	------	------	------	------	------	1
52. Clark	29	4	1	------	------	3	2	------	6	------	1	------	------	------	------	------	------	------	------	------	1
53 Kentucky	27	6	4	2	4	1	1	2	2	3	------	2	------	------	------	------	------	------	------	------	------
64. Boston	27	2	1	4	3	------	------	------	------	------	4	------	------	------	------	------	8	------	------	5	------
55. Vanderbilt	24	2	------	2	------	10	3	------	------	------	2	------	------	------	------	------	------	------	------	2	------
56. Rensselaer	24	6	------	------	2	------	------	------	------	------	------	2	------	14	------	------	------	------	------	------	------
57. Oklahoma	24	------	14	------	------	3	------	6	------	------	1	------	------	------	------	------	------	------	------	------	------
58. Louisiana	23	8	3	3	------	2	------	------	------	1	------	1	------	------	------	2	------	1	------	------	------
59. Temple	23	------	19	------	------	1	2	------	------	------	------	------	------	------	------	------	------	------	------	------	1
60. American	21	6	2	------	------	3	5	------	------	------	------	------	------	1	------	------	------	------	------	1	1
61. Boston College	21	------	2	7	------	3	------	------	------	------	------	------	------	------	------	2	6	------	------	------	------
62. George Washington	20	3	6	------	------	1	3	5	------	------	1	------	------	------	------	------	------	------	1	------	------
63. West Virginia	19	6	1	------	------	------	------	3	------	------	------	2	------	1	5	------	------	------	------	------	------
64. Syracuse	17	5	------	------	------	------	2	------	2	3	------	------	------	------	------	------	------	------	2	1	------
65. Niagara	15	------	8	1	------	1	------	------	------	------	1	------	------	------	------	------	1	------	------	2	------
66. Hartford	14	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	13	------	1	------	------
67. Drew	13	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	7	------	------	2	3
68. Florida	13	6	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
69. Rice	12	2	------	------	4	------	------	1	------	------	1	4	------	------	------	------	------	------	------	------	------
70. Notre Dame	12	12	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
71. Carnegie	11	7	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
72. Massachusetts State College	10	2	------	------	------	------	------	------	------	------	1	------	------	------	3	------	------	------	------	------	------
73. Lawrence	10	8	------	------	2	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
74. Dropsie	10	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	7	------	------	------	------
75. North Dakota	8	------	3	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	1	------	1
76. Brooklyn Polytechnic	8	6	------	------	1	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------
77. Oregon	6	------	3	------	------	1	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------
78. Oregon State	6	2	------	------	1	------	------	1	------	------	------	------	------	------	2	------	------	------	------	------	------
79. Washington State	6	1	------	------	------	------	------	------	------	1	------	------	------	------	1	------	------	------	------	------	------
80. Union Theological	5	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	5	------	------	------	------
81. Arizona	4	------	1	------	------	------	------	------	------	------	------	------	------	------	1	------	------	2	------	------	------
82. Tulane	3	1	------	------	------	------	------	2	------	------	------	------	------	------	------	------	------	------	------	------	------
83. Marquette	3	------	------	1	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	1
84. Claremont	1	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
85. Duquesne	1	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
86. Biblical Seminary	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	1	------	------	------	------

1934–35 to 1936–37 by university and subject

Bacteriology	Entomology	Germanic literature	Horticulture	Anatomy	Anthropology	Pharmacology	Genetics	Geography	Law	Art and archeology	International law	Medieval history	Paleontology	Astronomy	Metallurgy	Oriental literature	Medicine and surgery	Public health	General literature	Music	Library science	Mineralogy	General history	Slavic literature	Meteorology	Seismology
125	116	110	57	57	45	42	40	37	35	35	31	30	29	28	28	28	27	23	21	19	11	10	8	3	2	2
30	27	25	15	25	8	11	14	13	6	15	17	18	10	12	10	9	11	7	10	10	2	7	4	1	2	2
2	1	8	------	3	4	------	------	------	8	2	2	2	3	------	1	6	------	------	1	------	------	1	------	3	------	------
10	------	11	------	6	5	------	2	7	------	1	3	3	6	5	------	6	1	------	------	------	10	------	1	------	------	------
------	2	6	------	------	13	------	1	------	------	6	3	5	3	6	------	1	------	------	2	1	------	------	4	------	------	------
10	31	6	16	2	------	------	1	1	1	1	------	------	1	1	------	1	------	1	2	1	------	------	------	------	------	------
5	1	7	------	1	7	------	------	------	------	3	2	2	1	2	3	3	------	3	1	------	------	------	------	------	------	------
12	4	14	3	------	------	6	5	1	1	2	4	1	------	3	1	------	------	------	4	1	------	1	------	------	------	------
1	9	4	2	2	7	------	5	3	1	1	------	2	5	4	------	------	2	------	------	------	------	------	------	------	------	------
7	7	10	2	------	------	------	------	------	------	------	2	1	------	------	------	------	2	------	------	1	1	------	------	------	------	------
2	2	1	------	4	1	4	3	5	------	1	------	1	1	1	8	1	------	11	5	------	------	------	------	------	------	------
2	1	7	------	2	------	------	2	------	------	2	3	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------
2	2	1	------	3	------	------	------	------	------	------	------	------	1	------	1	------	------	------	3	8	------	------	------	------	------	------
------	12	7	5	1	------	2	------	1	------	2	------	------	------	------	2	------	------	------	1	------	------	1	------	------	------	------
2	8	2	------	7	------	1	5	------	------	------	------	1	------	------	5	------	7	------	------	------	------	1	------	------	------	------
4	1	3	------	1	------	------	------	------	------	8	1	------	------	------	------	1	------	8	1	------	------	------	------	------	------	------
3	------	2	------	------	8	------	------	------	------	------	1	------	------	1	------	4	4	1	------	------	------	------	------	------	------	------
23	15	------	5	------	------	------	6	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
2	1	------	------	------	------	------	------	------	------	------	------	------	------	------	5	------	------	------	------	------	------	1	------	------	1	------
------	------	------	------	------	------	------	------	------	------	1	------	2	3	2	------	9	------	------	------	------	------	------	------	------	------	------
2	1	1	------	1	------	------	1	------	------	------	------	------	1	------	------	------	------	------	------	------	------	1	------	------	------	------
2	------	3	------	------	------	------	------	------	------	------	------	------	1	1	------	------	------	------	------	------	------	------	------	------	------	------
2	1	------	------	6	------	1	------	------	------	------	------	------	------	------	------	------	4	------	------	1	------	------	------	------	------	------
------	------	3	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	1	------	------	------
------	------	------	------	------	------	------	2	------	------	------	------	------	3	1	------	------	------	------	------	------	------	------	------	------	------	1
------	------	------	------	------	------	------	4	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
2	------	------	------	------	3	------	------	------	------	------	------	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------
3	------	1	1	------	------	4	------	3	------	------	1	1	------	------	1	------	------	------	------	------	------	------	------	------	------	------
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
------	------	------	5	------	------	------	1	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------
------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
------	1	------	3	------	------	------	------	3	------	------	------	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------
------	------	------	2	------	------	2	2	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
4	3	3	3	1	------	12	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
5	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
------	2	------	------	1	------	------	------	------	------	------	------	3	------	------	------	------	------	------	------	------	------	------	------	------	------	------
------	------	1	1	------	------	1	------	------	1	------	------	------	------	------	------	------	------	------	------	2	------	------	------	------	------	------
------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
1	------	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------	3	------	------	------	------	------	------	------	------	------
------	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
2	------	3	------	3	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
1	------	------	------	1	------	2	------	------	21	------	1	1	------	1	------	------	------	------	------	------	------	------	------	------	------	------
------	------	------	1	------	------	------	------	------	------	3	2	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------
4	------	------	------	2	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------	1	------	------	------
------	2	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
1	3	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
2	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	2	------	------	------	------	------	------
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TABLE II.—*Location in universities and colleges of men starred in American Men of Science (6th ed.)*

	Total		Chemistry		Physics		Zoology		Botany		Mathematics		Geology		Psychology		Physiology		Anatomy		Pathology		Astronomy		Anthropology	
1 = Total number starred men; 2 = Starred men 65 and under	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
1. Harvard	113	83	10	9	12	9	18	12	11	7	12	11	12	6	7	6	7	4	3	3	11	6	7	7	3	3
2. Columbia	77	50	9	6	8	5	12	7	[1]10	5	9	4	2	1	10	9	3	2	1	1	8	7	1		4	3
3. Chicago	64	54	5	5	7	7	11	9	5	3	7	5	5	4	5	4	5	5	1		5	5	6	5	2	2
4. Yale	64	41	5	4	9	5	6	4	3	1	6	4	7	4	8	6	4	4	2		6	4	3	2	5	3
5. California	63	47	11	11	6	6	9	5	11	8	4	2	4	2	5	4			1	1			10	6	2	2
6. Johns Hopkins	55	36	8	6	9	5	8	4	1	1	4	3	6	4	1	1	5	4	2	2	10	5			1	1
7. Cornell	45	26	5	2	8	6	5	1	11	10	4	1	2		3	1	2	2	1	1	3	2			1	
8. Princeton	41	34	8	6	8	7	6	4	1	1	7	7	3	2	3	3			1				4	4		
9. Michigan	41	28	7	5	5	4	7	6	5	4	6	5	4	1	1		2	1			2	1	2	1		
10. Stanford	39	28	4	4	4	3	8	5	5	2	4	4	4	3	5	3			2	2	3	2				
11. Illinois	37	25	11	9	5	2	5	4	4	3	8	4	2	1	1	1	1	1								
12. Minnesota	34	29	6	5	3	1	4	3	5	5	1	1	2	2	3	3	2	2	6	5	1	1	1	1		
13. Pennsylvania	33	25	1	1	2	1	6	3	5	3	5	5			2	1	4	4	1	1	5	4	1	1	1	1
14. Wisconsin	33	22	7	5	3	3	4	2	5	2	5	3	3	3	1		3	3			2	1				
15. Massachusetts Institute of Technology	29	22	9	7	11	9	1				5	4	2	1									1	1		
16. California Institute of Technology	27	25	4	4	12	11	4	3	1	1	4	4	2	2												
17. Washington (St. Louis)	21	14	1		2	2	1		[2]6	3	1	1					5	5	2	1	3	2				
18. Ohio State	19	12	5	3	5	4	3	1	2	1	2	2			1		1	1								
19. Brown	16	10	3	3	1		4	1			6	5			2	1										
20. Iowa	15	11	1	1	2	2	4	3	1		2	2	2	2	3	1										
21. Northwestern	14	9	2	1	1		1	1			3	2	1	1	1		2	1	1	1	1	1			1	1
22. Rochester	12	11			1	1	4	4					1		1	1	3	3	1	1	1	1				
23. North Carolina	12	7	4	2	2	2	2	1	1						1	1					2	1				
24. Virginia	11	10	3	2	1	1	3	3	1	1	2	2											1	1		
25. New York University	10	7	2	2	1		2	2			1	1			1		1	1	1	1	1					
26. Cincinnati	10	6	1	1	2	1					3	2	3	2			1									
27. Texas	8	6	1				3	3			3	2	1	1												
28. Western Reserve	8	4	1				2	1			1	1					1	1	1		2	1				
29. Missouri	7	5			1		2	2	1	1					1	1	1				1	1				
30. Indiana	7	2			1		3	2	1						1				1							
31. Institute of Advanced Study	6	6			1	1					4	4					1	1								
32. Pittsburgh	6	5	1	1	1	1	1	1									1	1					2	1		
33. Wesleyan	6	5			2	1	1	1							1	1	1	1					1	1		
34. Dartmouth	6	4			2	1	1				1	1	1	1			1	1								
35. Kansas	6	4	2	1	1	1					1	1	1	1	1	1										
36. George Washington	5	4	2	1	3	3																				
37. Rice Institute	5	4	1	1	1	1	1		1		2	1														
38. Swathmore	5	4					1	1			1	1			1	1							2	1		
39. Iowa State College	4	4	1	1			1	1	2	2																
40. St. Louis University	4	4											1	1			2	2	1	1						
41. Amherst	4	3			2	1	2	2																		
42. Duke	4	3					2	2			1	1			1											
43. Rutgers	4	3					2	2	2	1																
44. Bryn Mawr	4	2					1	1			1	1	1		1											
45. Tulane	4	2					1	1											1		2	1				
46. Purdue	4	1			2	1			2																	
47. Mount Holyoke	3	3					2	2					1	1												
48. Nebraska	3	3					1	1	2	2																
49. Pennsylvania State	3	3	1	1	1	1			1	1																
50. Connecticut State College	3	2					1	1	1	1			1													
51. Temple	3	2					1	1							1						1	1				
52. Colorado	3	1					1		1		1	1														
53. Smith	3	1			1				1						1	1										
54. West Virginia	3	1					1		1	1	1															
55. Vassar	3							1			1				1											
56. College of City of New York	2	2					2	2																		
57. Trinity	2	2			1	1	1	1																		
58. Union	2	2					1	1															1	1		
59. Vanderbilt	2	2																	1	1	1	1				
60. Buffalo	2	1																	1	1	1					
61. Clark	2	1			1	1							1													
62. Michigan State	2	1			1				1	1																
63. Oregon State College	2	1	1	1	1																					
64. Oberlin	2	1	1	1			1																			
65. Syracuse	2	1					1	1	[1]1																	
66. Worcester	2	1			2	1																				
67. Case	2				1																			1		
68. Hamilton	2		1				1																			
69. Tufts	2						1						1													
70. American	1	1													1	1										
71. Antioch	1	1	1	1																						
72. Arizona	1	1											1	1												
73. Barnard	1	1							1	1																
74. Boston University	1	1			1	1																				
75. Catholic University	1	1			1	1																				
76. Chapman	1	1					1	1																		
77. Cleveland College	1	1	1	1																						
78. Colorado College	1	1									1	1														
79. Duquesne	1	1	1	1																						
80. Goucher	1	1							1	1																
81. Hawaii	1	1					1	1																		
82. Howard	1	1					1	1																		
83. Kansas State	1	1					1	1																		
84. Lafayette	1	1	1	1																						
85. Lehigh	1	1									1	1														
86. Maine	1	1					1	1																		
87. Maryland	1	1							1	1																
88. Oklahoma	1	1							1	1																
89. Oregon University	1	1																	1	1						
90. Pomona	1	1							1	1																
91. Pratt	1	1	1	1																						
92. Sarah Lawrence	1	1					1	1																		
93. South Carolina	1	1	1	1																						
94. Stevens Institute	1	1													1	1										
95. Washburn	1	1																					1	1		
96. Washington (Seattle)	1	1			1	1																				

[1] Including New York Botanical Garden
[2] Including Missouri Botanical Garden.

ing from $250,000 to $1,000,000 where many persons are active in research; and 13,317 are on the staffs of 63 institutions spending from $25,000 to $250,000. About 60,000 more teach in colleges, and no inconsiderable number of these carry on research. It would seem that at least 15,000 men and women carry on research in universities and colleges. On the above basis we would have:

Industry	20,000
Commercial, business	5,000
Federal	10,000
Universities and colleges	15,000
Total	50,000

It would seem safe to conclude that we have between 40,000 and 60,000 research workers, and not far from 50,000.

Number of Outstanding Research Men and Women

Assuming that 10 percent are such, 5,000 would be 10 percent of 50,000 as estimated above.

In the sixth edition of *American Men of Science* 1,577 men are starred. Assuming that there are nearly as many research men in the social sciences and humanities as in the natural sciences (4,202 Ph. D.'s conferred in natural science, 3,827 in social science and humanities, 1934–1937) we may estimate 1,443 men of equal ability in these fields or about 3,000 in all. Owing to the fact that the starred group in *American Men of Science* tends to be weighted of necessity in favor of men in universities and foundations as against those in industry, business, and Government, owing to the fact that the latter groups are not nearly so free to publish extensively, it seems reasonable to assume that there are at least 1,000 more men in industry, business, and Government as able as these 3,000. We estimate that there are 4,000 in the country as able in research as the starred men in *American Men of Science.* Further, as only 5.6 percent of the men are starred, this is certainly a conservative list. It is further restricted because, while men in *American Men of Science* are listed in about 300 categories they are starred in only 12. This tends to eliminate from favorable consideration men notable in borderline fields.

It seems reasonable to say that between 4,000 and 6,000 research workers in America are men and women of very notable ability and are of vital importance to the country.

Place of Employment of Ph. D. Graduates

Between 70 and 75 percent enter employment in colleges and universities, and between 25 and 30 percent enter employment in industry, in business, and in the Government. It seems probable that later many migrate from teaching into industry and the Government service.

The Status of Research in the Universities

In view of the fact that the universities are an important national research agency, especially as the chief source of personnel, it seems desirable to attempt to evaluate in as many ways as possible the research being carried on in the universities.

The Definition of Research

It seems necessary at the start to point out that there is much confusion in the use of the term "research." Use of the term in the universities and colleges is confused as to definition and purpose by the difference in emphasis from institution to institution, and from department to department within the same institution.

There are from 10 to 20 institutions that are in every sense universities. The staffs of all departments are selected with a view to research ability. Facilities and time are specifically available for research. In 80 to 100 other institutions research is a recognized part of the work of certain departments, but not of all. Some conduct research at a high level. Part of the staff only is selected with large emphasis on research ability. In perhaps 50 or 100 additional colleges the administration gives some encouragement to research. In the remaining 1,200 institutions classed as colleges—approximately 650 4-year colleges, 300 2-year colleges, 150 teachers' colleges and 100 normal schools—research is very slightly or not at all encouraged, is almost wholly a matter of individual initiative, and is carried on in spite of very full teaching schedules. Of necessity "research" has a different meaning in these very different environments.

Of the 2,700 receiving the doctorate and 20,000 receiving the master's degree each year, many who have been initiated into research find teaching positions where research is not encouraged and where facilities are very poor. Such productive scholarship as they are able to carry on would rarely be regarded as research by men in the great universities, but their scholarly efforts and ambitions are very important to them and are in great need of encouragement. Many of these men and women are of real potential value as research workers. For the best development of the great universities, teachers who are appreciative of scholarship and research and who will inspire able youth to scholarly achievement are needed in all of the colleges. A heavy responsibility rests on the universities, and other research centers, to aid and stimulate these isolated scholars in any possible way.

It is apparent that only the broadest definition will cover what is spoken of as "research" in universities and colleges differing so widely; also, only the broadest definition will cover investigations, so classed in the Government, in business, and in industry. It is in this broad sense that "research" is discussed in this paper.

Lack of Organized Research

University research is left largely to the initiative and direction of the individual professor. While most of the research carried on by industry, business, and Government is organized and directed to the solution of specific, immediate problems, a large part of the research in the universities is independent and unorganized, controlled and directed chiefly by the interests of the individual professor, and it is directed toward the solution of more basic and less immediate problems. The very emphasis on the importance of training research workers tends to lessen the emphasis on the type of research conducted. So long as the research gives the desired training in methods and technique it serves its most important purpose. Furthermore, the university as an institution is largely free from responsibility for solving any specific problems. Aside from the obligations of the agricultural experiment stations and certain other specially financed research institutes within the universities, the research undertaken properly originates in the scholarly curiosity of the staff members and must be largely free and individual. University research workers generally are strongly opposed to any suggestions of organization or checking up on research.[4]

However, in research foundations where training of graduate students is not carried on, and in research institutes within universities, where the research findings are the sole object, there is more leadership, organization, institutional planning, and mobilizing of research forces to solve problems than is found throughout the universities. Also, almost invariably the research is organized in projects and each project is pushed to a conclusion, in a way less often found in ordinary university research.

Freedom of Research in Different Areas of Knowledge

In the discussion of freedom in research with men connected with private and public universities and in the Government service respectively, the fact was brought out that the men in each type of service felt entirely free themselves but regarded men employed in the other two services as far from free. The facts seem to be that, depending partly on the source of support, partly on the type of control and on differences in the attitude of heads of departments in the Government and of executives of universities, each department and institution is not free in certain limited areas. Fortunately, in areas where one type of employment limits research, men in other types of employment are free to carry on such research. Where a State university may not be free to study and criticize a branch of a State government, a Federal agency, an endowed university, or a research foundation will be entirely free to carry on the study and publish its findings. Where some private universities may not be free to study and report on certain aspects of capitalism, research foundations or public universities may be free to make such studies.

A study to determine areas of useful research where freedom is restricted would seem desirable. If these fields were studied by the various types of institutions it seems probable that some suitable division of labor could be arrived at through which all the needed research could be well done with embarrassment to no one.

Notable Facilities

While in many fields competent men are the only seriously important factors in research, since the necessary facilities can be secured with relative ease, it is important that the Government know, first, where research facilities difficult of duplication are located and, second, where research centers are so well developed through the assembly of men, books, and all needed facilities that research can be carried on, and with relative ease:

1. Types of research facilities difficult of duplication, of which there are probably between 100 and 200 altogether in the country:
   a. Heavy testing machinery.
   b. Astronomical equipment.
   c. Botanical gardens.
   d. Hospital and medical school equipment.
   e. Aeronautical testing laboratories.
   f. High temperature testing laboratories.
   g. Low temperature testing laboratories.
   h. High-voltage research laboratories.
   i. Animal breeding records and stock.
2. Examples of university research centers of importance, of which there may be 100 or more:
   a. The Food Research Institute at Stanford University.
   b. Biological research at the University of Chicago.
   c. Social science research in the South at the University of North Carolina.
   d. Institute of Human Relations at Yale.
   e. Economic geography at Clark.

[4] In contrast with the great freedom in research, it is worthy of note that since the universities regard the granting of the Ph.D. as an important university responsibility, the training and examination of the candidate is carefully organized, and is not left to the independent judgment of any one man as is the case with research.

Rather than duplicate all these facilities in Washington or in regional laboratories and take men vital to education away from the universities, all research centers and facilities of importance should be so coordinated with the Government as to be available to cooperate when needed. It would seem that this could best be done through the agency of the research councils acting in service to the Government.

Expenditures for Research

Of the 1,450 American colleges and universities, 150 spent in 1935–36 about $265,000,000. Of this amount, about $50,000,000 was spent on research. The remaining 1,300 institutions spent about $155,000,000 and of this, $1,000,000 or more was spent on research. It may be said with confidence that about $50,000,000 a year is spent on research by American universities and colleges.

The most painstaking recent effort to estimate the cost of research in a great university, which has been published, was made in connection with the *Survey of the University of Chicago* based on figures for 1929–30. The assumption is that the work and therefore the expense of a university can be divided between teaching and research. In Volume II of the *Survey*, the following report is given on the cost of research.

Reports from each staff member on the proportion of his time spent on research resulted in the following summary:

Field	*Percentage*
Humanities	26.2
Social sciences	22.5
Physical Sciences	35.6
Biological Sciences	29.8
Professional Schools	14.6
Average total	26.9

Type of Expenditure		*Amount*
Total regular staff salaries for teaching and research		$2,243,393
Time spent on research, 26.9 percent	$584,673	
Special research salaries	82,547	
Oriental Institute	351,177	
Medical science, special research	140,841	
Apportionment library funds	111,482	
Apportionment equipment funds	196,780	
		1,467,500
Proportional amount retiring allowance	45,237	
Proportional amount faculty administration	39,744	
Proportional amount general administration	190,158	
Proportional amount building and grounds	189,765	
		464,904
Expenditure for research from items outside budget		625,399
Total research		2,557,803
Total expenditures		7,882,907

On the above basis, the University of Chicago in 1929–30 spent 32.5 percent of its total expenditures on research.

A similar study was made at the University of California based on figures for 1928–29.

The cost of education and research was found to be:

Field	*Activity*	*Percentage*	
In agriculture	Teaching:		
	On the campus	18.20	
	In extension	40.57	
			58.77
	Research	41.23	
In academic departments	Teaching:		
	On the campus	69.63	
	In extension	3.33	
			72.96
	Research	27.04	
Total expenditures for research			$2,350,000
Total expenditures			9,470,000

The University of California thus spent 25 percent of its expenditure in 1928–29 for research. The estimate of total cost includes the salary of the staff in proportion to the time spent on research; special research funds; and proportionate allocation of library, equipment, general administration, and operation of plant expenditures to research.

From the results of these two studies, personal conferences at three institutions of a different type, and personal knowledge of two other institutions, estimates were made of the expenditures on research of 180 of the strongest institutions in the country. In a personal letter to the presidents the estimates for their respective institutions were given and a request was made that they be corrected or confirmed. The total estimates of the amount spent annually for research in these 180 institutions was $51,000,000. Twenty-four privately supported institutions responded: Eight confirmed the estimate, seven increased it, and nine reduced it. For these 24 institutions the estimate submitted was $8,324,000 and the estimate returned was $8,080,000, or a reduction of $244,000. Thirty-five publicly supported institutions responded: 17 confirmed the estimate, 9 increased it, and 8 reduced it. For these 35 institutions the estimate submitted was $12,230,000 and the estimate returned was $13,200,000 or an increase of $972,000. Thus, for these 59 institutions the estimate of $20,554,000 spent for research was $728,000 too low.

While it is recognized that these figures are all far from exact, they do confirm the estimate that about $50,000,000 a year is being spent by the colleges and universities on research, defining research in a broad way.[5]

[5] More detailed estimates are given in the Appendix, pp. 190–191.

Sources of Funds for Research

Research now under way in the universities is financed chiefly from six sources: Appropriations by States, Federal grants, sales of products, endowments, grants from foundations, and special gifts. While only a rough approximation can be made of the amounts received from some of these sources, estimates are suggestive. The figures given attempt to represent the year 1935–36:

Source	*Amount*
Appropriation by States, Department of Agriculture, experiment stations	$7,283,000
Estimate of other State appropriations spent for research	7,000,000
Federal grants to universities for agricultural experiment stations	4,995,000
Sales and other income for research	2,000,000
General endowment income	17,000,000
Grants from foundations for research	8,000,000
Special gifts from outside the foundations	4,000,000
Total (approximate)	50,000,000

The estimates of the last three items are probably close as to total but rather uncertain as to distribution among the three sources.

Research Projects Under Way

While in the agricultural experiment stations, and in certain other research organizations within the institutions, research is all organized on the project basis, most university research is not so organized. An estimate, however, of the number of projects under way is helpful in grasping the extent and the importance of research.

In 1935–36, in the 54 agricultural experiment stations, 4,000 men were carrying on 7,223 projects at a cost of $16,000,000 ($5,000,000 from the U. S. Department of Agriculture, $11,000,000 from States and other sources). The average expenditures per man employed were $4,000 and the average expenditures per project were $2,200. The variations in cost for individual projects were, of course, very wide. About 15 percent of the experiment station projects are completed or dropped annually. By the nature of the research in agriculture and the necessarily large scale on which many experiments are carried out, the projects in the stations cost more than the average university project.

An endeavor was made to find out how many research projects were under way in the universities. Eight institutions made fairly definite reports on their expenditures for research and on the number of research projects. Three were great universities and five were institutions of lesser scope. They reported a total of 8,170 projects under way at a cost of $8,316,000. This gives an average cost of $1,018 per project, about half the cost of 7,220 projects in agriculture.

A rough estimate of the number of projects and their average cost is as follows:

Agency	Amount	Number of projects	Average cost per project
Agricultural experiment stations	$16,000,000	7,223	$2,220
Universities	34,000,000	33,300	1,018
Total	50,000,000	40,500	

It may be concluded that about 40,000 projects are under way at an average cost of about $1,250.

Number of Projects Completed or Dropped Each Year

The only accurate figure on the number of research projects completed or dropped each year comes from the agricultural experiment stations. In 2 consecutive years 13 percent and 17 percent respectively of experiment station projects were concluded. In the universities some 6,000 to 8,000 projects carried on by graduate students are completed in 2 or 3 years, at the rate of about 40 percent a year. Of the 40,000 projects under way in any year, probably 10,000 are brought to conclusion in that year. On this basis the average cost of carrying a research project to conclusion is $5,000, although the variation is wide—probably from a few hundred to several hundred thousand dollars.

It may be roughly estimated that the completion of a project in agriculture extending over about 6½ years costs $15,000. The completion of a project by a candidate for a doctor's degree extending over about 2½ years costs $2,500. Projects other than these averaged about 4 years and each costs for completion about $4,000. It is evident that the cost of these studies is considerable and that this cost fully warrants great care in selecting projects.

On the basis of expenditures of $50,000,000 on research annually by the universities and colleges, $65,000,000 by the Government, and $100,000,000–$150,000,000 by industry and business, it is concluded that the universities carry on about 20 percent of the research of the Nation.

Efforts to Advance Research in Universities and Colleges

Research in the universities and in many colleges has grown to be a major part of the work of the institutions. The research and the training of research workers in the universities has become of very great importance to the Nation. On the whole, research in the universities has grown gradually as a result of the initiative of the individual professor. Within recent years larger and more complex projects have arisen and more cooperation has been necessary. The subject of this chapter is to consider what is being done in

different places and by different agencies to promote research and to make it more effective.

Action by the Universities

Reduced Teaching Loads.—University teaching schedules have been reduced to give time for research. While the regional standardizing agencies recognize 15 or 16 class hours a week as a reasonable teaching load for a professor in a college, a number of our universities regard 8 hours and many others 10 or 12 hours as the normal teaching load in view of the research they expect their professors to carry on. It is of interest that a number of the best colleges have reduced the normal teaching load to 10 or 12 hours for the same reason.

Improved Library Facilities.—Greatly improved library facilities have been provided by the universities and colleges. Eight of the great universities have libraries adequate in all fields, and staffs competent to give the best service. They are each spending $300,000 to $600,000 a year on their libraries. Ten more, each spending from $100,000 to $200,000 have libraries excellent in certain fields and fully competent staffs and are building fine library services. About 10 others, while at present less well served, are spending as much and are well on the way toward libraries adequate to their needs. A few score colleges have libraries fully adequate for their needs as undergraduate colleges. Beyond this it can scarcely be said that libraries approach what is desirable in view of the work attempted by the various institutions.

It is clearly evident that the majority of college and university presidents and boards of trustees have no adequate conception of what a library should be in books, periodicals, and service in a modern educational institution. It is the heart of its scholarly life and no institution of distinguished scholarship can be built around a poor library. A poor library never attracts distinguished scholars. Many faculties would do well to educate their president and trustees in the vital necessity of a good library and especially in the importance of the best library staff and service.

It has been rather carefully estimated that a thorough study of a problem in a good library prior to and during the prosecution of research on it will save on the average 10 percent of the total cost in time and money. It seems certain that many institutions committed to a research program could save money by spending more generously on their libraries.

Fluid Research Funds.—In recent years a few institutions have recognized the advantage of having a fluid research fund available throughout the year to give assistance to research projects as needs arise anywhere in the institution. In 1935–36, 30 privately supported institutions and 68 publicly supported intitutions reported funds specifically budgeted for research. However, only a relatively small number had a fluid fund available for any purpose. Most budgeted funds were for specific research, as agricultural experiment stations, medical research, social science research institutes, etc. Certainly relatively small grants from a fluid research fund to individuals who need help is a great and much appreciated encouragement.

Committees on Research.—Recently a variety of types of committees have been formed to aid research in the universities and they are reported to be very helpful. At Harvard University a Steering Committee on Research in the Physical and Biological Sciences, consisting of representatives of the fields involved, has been appointed by the President. Its business is to learn the needs of the faculty in these fields and to satisfy these needs so far as possible. This committee has proved valuable.

At Cornell University a Committee on Research made up of three professors, three administrative officers, and three trustees is rendering valuable service.

At the University of Wisconsin the dean of the graduate school is chairman of a committee on research consisting of nine professors. Their chief duty is to make grants from a fluid research fund which totals over $100,000 annually. Grants are made to individuals and they requisition the funds directly. Small grants are made to young and untried staff members who have problems of promise, and larger grants to proven men on work in established lines.

Committees on Interdepartmental Research.—The Massachusetts Institute of Technology has formed a series of committees on joint projects made up of representatives of the several departments concerned in the study. Committees are now established on corrosion, acoustics, heat transfer, air conditioning, and housing. Harvard University has a Committee on Geophysics with six departments represented. More and more institutions are recognizing the fact that problems do not fit within departmental lines and that no successful attack on them can be made by a single department. Methods of readily crossing departmental lines in research are of great importance.

Research Institutes.—For 50 years the agricultural experiment stations have been organized within their respective institutions as separate research units designed for research in agriculture. In recent years a variety of similar research units are being organized in other fields. Social science research institutes, engineering experiment stations, cancer research organizations, institutes of business research, and organizations in other fields are proving valuable. Each of these

units ordinarily has a director and a budget of its own; definite programs of research are planned and staffs are employed suitable for carrying out the program. The training of research workers either is not carried on or is of secondary importance.

Central Facilities.—Various central facilities for the aid of research workers are being provided by the universities. Central statistical service, insuring proper statistical treatment, and expert aid and equipment for dealing with statistical data are organized in some institutions. Central drafting services, instrument shops, skilled mechanics, glass blowers, etc., are available to all departments in many institutions.

Activities of the Learned Societies

The third edition of the *Handbook of Scientific and Technical Societies and Institutions*, published by the National Research Council, lists 930 scientific and technical societies in the United States in the natural sciences. Probably about 1,500 such scholarly organizations exist for all fields. Many of these are national in scope. National, regional, and local meetings of research scholars are organized; research is reported and discussed and the acquaintance of the scholars in a field is promoted. A great many of these organizations publish journals open to research papers of their members. The services of these societies in stimulating and organizing research have been very great. They have done much to educate the public and college officials in the value of research.

Aid From the Foundations

The foundations have made very large grants to universities and colleges in recent years. Much of this has gone into endowment and indirectly into research. Much has also gone into direct grants for research, although no figure seems to be available as to exactly how much. Some facts quoted from *Philanthropic Foundations and Higher Education* by Ernest Victor Hollis lead to the conclusion that their support for research has been large.

From 1902 to 1934, 9 foundations gave $338,936,030 to universities and colleges. Of this sum $248,142,181 went to 20 institutions. Grants to medical schools totaled $154,000,000.

From 1923 to 1935, 9 universities each received from $4,000,000 to $15,000,000 in foundation grants.

Since 1918 the foundations have spent $55,000,000 on natural and physical sciences, largely on basic research.

In the decade 1921–30 the foundations made grants of $27,000,000 to the social sciences and of $29,000,000 to the humanities.

They have contributed $2,000,000 toward the production of encyclopedias, dictionaries, abstracts, and indices, all most valuable tools for research.

Foundations have provided a total of $27,000,000 for scholarships and fellowships and are now supplying money for this purpose at the rate of $1,500,000 a year.

Certainly the foundations directly and indirectly have given very large financial aid to research, and by the direction of many of their grants have greatly stimulated research in certain areas—recently in the social sciences.

Activities of the Councils

The four national councils have been organized within the last 20 years to secure more centralized action in related fields. The National Research Council has a direct relationship to the Government which the other councils lack. In many ways, the other three councils could serve more effectively if they could be related to the Government in some manner analogous to the relationship now held by the National Research Council.

The National Research Council.—The National Research Council, as the active agent of the National Academy of Sciences, is organized for the purpose of aiding and stimulating research in the mathematical, physical, and biological sciences, and of assisting the Federal Government. During the war its activities were very great and its services to the Government most distinguished. Since the war much has been done on a peace basis.

This Council maintains ten divisions: Federal Relations, Foreign Relations, Educational Relations, Physical Sciences, Engineering and Industrial Research, Chemistry and Chemical Technology, Geology and Geography, Medical Sciences, Biology and Agriculture, Anthropology and Psychology. Under these Divisional Committees some 165 special committees are organized to aid and promote research. Larger funds to meet the expenses of these committees would materially advance their services. As it is, a considerable number—generally those with adequate finances—are active, and are doing valuable work. Four illustrations of different types of service rendered by the Council may be given.

1. *Highway Research.*—Since 1921 the National Research Council has been under contract with the Department of Agriculture to render services in the encouragement and coordination of research in the highway field. The Council maintains a Highway Research Board which has numerous contacts with State highway commissions, with engineering departments of educational institutions, and with corporations dealing in highway construction materials and road-making machinery.

The sixteenth annual meeting of the Board was attended by over 400 persons. There are 49 committees,

each responsible for a special line of research. Much of this research is financed by the industry. All concerned seem to feel that the Council, in its unique relationship, has contributed much to the advance in highway construction.

2. *The Division of Engineering* of the Council brought attention to the untold millions of dollars damage by marine borers to wooden structures in sea water. A committee was set up by the Council of engineers, chemists, physicists, biologists, and bacteriologists and after a 3-year study a very valuable report was published on the best way for the early detection of damage by ship worms in harbor structures.

3. *A Committee on Sedimentation* in the Division of Geology and Geography has been actively studying this field in geology for 15 years. At intervals of 5 years comprehensive treatises on the subject have been published, setting forth the latest findings in the field. The Division of Geology and Geography has also published a bulletin, *Suggestions of Needed Research in Geology and Geography*, that has been very acceptable to men in the science as indicated by the rapid sale of the edition.

4. The National Research Council has also awarded the postdoctoral fellowships that have been so generously financed by the Rockefeller Foundation. The value of these can scarcely be overestimated.

This Council seems to be ideally organized to secure cooperation between men of different departments and institutions, including the various Government agencies, to attack and solve any given problem. It is also in a very strong position to stimulate research in any or all fields of the natural sciences. It is, however, very limited in its financial resources.

The Social Science Research Council.—The Social Science Research Council represents seven national societies in the fields of anthropology, economics, history, political science, psychology, sociology, and statistics. This Council, working largely through 23 committees, surveys the fields of the social sciences and plans needed research, administers grants for research, maintains predoctoral and postdoctoral fellowships in social sciences, and makes grants-in-aid. It has done much through fellowships, carefully administered, to strengthen the personnel in the social sciences.

The American Council on Education.—The American Council on Education represents 30 of the national associations in all fields of education, elementary, secondary and higher, as well as 364 of the leading universities and colleges. It operates largely through its executive and planning committees and through a series of special committees to plan and carry on research in many special fields of education.

The Problems and Plans Committee of the Council consists of a group of the ablest men in education in America who carefully review, in quarterly meetings, the most vital needs of the country in research in education. Projects that have been endorsed by this Committee and approved by the Executive Committee have usually obtained adequate funds and have been actively prosecuted. The present extensive study of the problems of American youth is typical of such studies.

Bringing together representatives of all levels of education, the Council has endeavored to coordinate them and maintain a constant survey of all of American education.

The American Council of Learned Societies.—The American Council of Learned Societies, representing 20 national societies, endeavors to cover the fields of literature, philology, philosophy, art, music, history, and anthropology. It has bent its resources to enlarge the scope of humanistic studies and to implement scholarship in its fields.

1. *To enlarge the scope of humanistic studies*, the Chinese and Japanese languages have been promoted in six universities. Arabic and Islamic have also been encouraged. An endeavor has been made to extend the geographical interest of scholars, greatly centered in Europe, all round the earth. A general effort has been made to extend the linguistic competence of American scholars. The scientific study of music and the history of ideas have both been encouraged.

2. *Various enterprises to implement scholarship* have been undertaken. Study aids, in the form of fellowships at all levels and of varying amounts up to $2,500, have been awarded to a considerable number of scholars. From $15,000 to $40,000 a year has been so spent. As much as $40,000 a year has been given in subventions to aid in the publication of books of high scholarly value, not commercially profitable. Direct grants of from $100 to $500 in a total of as high as $20,000 a year, have been made to scholars to enable them to prosecute promising studies. Another very important service which the Council has rendered has been to pay the expenses of the travel of scholars appointed by the Council to Committees. These Committees, considering problems of national importance to scholars, have done much to stimulate and vitalize research.

Aid From the Government

It is especially interesting to learn what the Government—which is now spending more on research than any other one agency, and more than all the universities combined—is doing to promote or assist research. The Government, in the Department of Agriculture, the Coast and Geodetic Survey, the Geological

Survey, the Naval Observatory, the Bureau of Standards, the Public Health Service, and the Smithsonian Institution is doing an enormous amount of research more or less analogous to, and parallel with, work in the universities. In the Department of Labor, the Social Security Board, the Bureau of the Census, the Treasury, the Department of Commerce, masses of data of the highest importance to the social sciences are constantly being collected and studied. Increasingly, research is being recognized as essential in these branches of Government. In the National Research Council the Government has an organization through which it can form contacts with the universities and industry in the fields of natural sciences.

The Department of Agriculture.—Perhaps no one research organization is so large or has had so wide and varied experience in developing a variety of techniques to deal with research as has the United States Department of Agriculture. Of necessity it has had to deal with 54 separate agricultural experiment stations in the 48 States and 3 areas outside the States. Their work is in many different fields of research and some 4,000 workers are attached to the stations. Much is done outside the experiment stations, in Washington and the States, through the many agencies in the Department. Of Federal, State, and local funds $37,000,000 is spent annually on agricultural research, an industry amounting to $8,000,000,000 in the United States. Research expenditures thus amount to 0.46 percent of the annual income of the industry.

Out of this experience the Department of Agriculture has developed seven procedures for dealing with research problems, which are as follows:

1. Research is carried on by employees in the Department in Washington and on research farms nearby.

2. In special research laboratories in various States wholly paid for and staffed by the Department. Regular Department funds are granted to bureaus which organize and direct the work, e. g., the Forest Products Laboratory at Madison, Wis.; the Agricultural Waste Laboratory at Ames, Iowa; and the Sweet Potato Starch Laboratory at Laurel, Miss.

3. In cooperative regional laboratories located in agricultural regions. Expenses are borne jointly by the States interested and the Federal Department—all cooperating under the leadership of a Federal project leader assigned to the regional laboratory.

In swine breeding research, Iowa, Minnesota, Missouri, Nebraska, and Oklahoma cooperate. The office is at Iowa State College, Ames, Iowa. The research work is conducted on station farms in Minnesota, Missouri, Nebraska, Iowa, and Oklahoma.

The Soy Bean Products Laboratory is located at the University of Illinois, Urbana, Ill. The States of Illinois, Indiana, Iowa, Ohio, Michigan, Wisconsin, Minnesota, and North Dakota cooperate with this laboratory.

4. Through leadership in organizing cooperative research between several experiment stations, where all expense is carried by stations, e. g., research on the physical development of college girls. Here the home economics departments of some six or eight stations met under the leadership of the Department, agreed on a plan of study and schedules, and are carrying out comparable studies of the girls on their respective campuses.

Another investigation on the nutritional status of college women is organized and financed in the same way.

5. Through projects financed by the Adams, Bankhead-Jones, or Purnell Funds, proposed and outlined by the experiment stations in the States and approved by the Department. Before approval the Department assures itself that (a) it is not duplicating other work; (b) that it is well planned; (c) that it is worth while. Twenty-six hundred projects of this type are under way.

6. Of the several Federal funds for agricultural research in the States, only the recent Bankhead-Jones appropriation calls for matching by the States. The Adams, Hatch, and Purnell Funds are free gifts to the States. However, under the stimulus of these funds all but three or four States have appropriated generously to agricultural research. In 1935–36, in addition to the $4,995,000 Federal funds, the experiment stations received $7,282,000 from the States and had from sales, fees, and other sources $4,148,000 additional. With this $11,430,000 of State and local funds, over 4,600 projects were under way. These are independent of Federal supervision but all possible advice or assistance is given by the Department when asked for. It is further noteworthy that by the appropriation act "the Secretary of Agriculture shall * * * coordinate the research work of the Department of Agriculture with that of the State agricultural colleges and experiment stations in the lines authorized in said acts, and make reports thereon to Congress."

7. Where especially valuable work of broad significance is under way in a station or group of stations, or elsewhere, the Department frequently enters into an agreement with the institutions or directors of the stations to provide additional staff members and help finance the expense of the project. This is frequently done in connection with the stations and occasionally with outside institutions, e. g., Harvard University in meteorology and the National Research Council in highway engineering. A rather good illustration is in corn development. Some years ago 12 experiment stations were found to be working independently on corn improvement. The Department of Agriculture first coordinated the 12 stations in one corn improvement program. The Department then gave assistance in men and money in places within the group where such assistance would best promote the program.

The foregoing methods are of interest both in relating the Government to research in the several States and in securing cooperation between research agencies. Recognized leadership, centralized information, and ability to make grants of funds all seem essential to secure effective cooperation between different institutions.

Regional coordination.—The directors of the Northeastern States Agricultural Experiment Stations have appointed each director referee in one field, as, for example, animal and dairy husbandry, agricultural economics, poultry, vegetable gardens, entomology, etc. Each director, in the field in which he is referee, is expected to keep in touch with all research in the

area, to act as a clearing house of information on common problems, and to aid in promoting cooperation and in preventing useless duplication.

The Bureau of Standards.—The Bureau of Standards, since its establishment, has been devoted almost entirely to research and has a large number of distinguished men on its scientific and technical staff of over 600. The Bureau has maintained a very hospitable attitude toward scientists in the universities and in industry. From 60 to 100 representatives of industries are working as research associates on problems of interest to their employers, supported by their employers but as guests of the Bureau, where they receive all possible aid. For example, the Portland Cement Association maintains a staff of six men working under Dr. P. H. Bates in the Bureau on fundamental research on the atomic structure of cement. This work has proved highly valuable to the association.

The Tennessee Valley Authority.—The Tennessee Valley Authority has called together representatives of the land-grant institutions in its area and presented to them problems of the area that needed solution. Numerous cooperative researches are growing out of these conferences.

Other Methods of Aiding Research

In astronomy, more perhaps than in any other field of knowledge, the research work is organized, coordinated, and unified. There are only 10 or 12 important research centers and the total number of research workers is relatively small. The character of the work and of the equipment used encourages cooperation. There seems to be no embarrassment to these scientists in the full knowledge by their associates of the nature of the research they are carrying on. It would seem that their policies of division of the field and coordination of effort could be copied with advantage in other fields of knowledge.

In an increasing number of institutions which recognize their financial inability to maintain many strong research departments or departments adequately manned to carry on research in all recognized fields within departments, research staffs and efforts are being limited to restricted areas where it is possible for them to do outstanding work with the resources available. It would seem that all but the greatest universities would do well to follow this lead.

Conclusion

From the foregoing survey it appears that the aid to research has taken four chief forms: (1) Providing financial assistance from some central fund where it will apparently yield good returns in research results; (2) arranging useful cooperation between departments, institutions, or agencies in prosecuting research; (3) canvassing the progress in research in a field, as is done by committees of several councils, publishing periodically treatises summarizing the work in the field and planning and outlining new problems that call for solution; (4) aiding in the development of personnel through fellowships.

Efforts Needed to Stimulate and Advance Research

In the present-day world research is one of man's necessities. While politically there are divisions, the world is largely one intellectually, and leadership in this intellectual world toward peace, prosperity, and happiness is increasingly a matter of research—research to find new materials, methods, and operations and research better to utilize knowledge developed in the United States or in other countries for the good of the people of America.

If research is of significant importance to the welfare of the people it must be of serious concern to the Government, and it becomes the Government's function and the citizen's duty to promote and advance research in all fields, everywhere—in the Government itself, in industry and business, and in the universities and research foundations. The following suggestions as to the efforts needed to advance research have been gleaned from various sources. Some seem more significant and practicable than others, but all have a place. More study and counsel is needed to develop sound procedures by which research can be promoted.

Integration of Research Work

Integration of the research work of the Nation may be too large and unwieldy a job, impossible of accomplishment, yet it does seem very desirable that there be more information available about what is under way in research in the Nation as a whole. This need is illustrated by the general ignorance among university men of the vast amount of research in progress in the Federal Government, and also by the seeming lack of appreciation of the significance of the place the Government occupies relative to all social science research. In a different way it is illustrated by the lack of appreciation by great numbers of college executives in various positions of the importance of research in the life of today and of the true responsibility of the colleges relative to this work and to the preparation of personnel for it.

No unification or organization of research is suggested, but further study might develop some way through the research councils or some Government agency by which a clearer picture might be had of research in the Nation, and which would show more

clearly the relation of each part to the whole. As an illustration, one thing that could be done would be for the Department of Agriculture to publish cards, similar to the Library of Congress catalog cards, one for each project under way in the Department and in the experiment stations, for distribution to the stations and to all who care to buy them. The same advantage could perhaps be attained if the Department would mimeograph for distribution lists of active projects in each subject matter field, similar to those now prepared in the field of Home Economics.

Improvement of Research Personnel at the Ph. D. Graduate Level

Recruitment to the Graduate School of More Able Men.—The first problem in the improvement of research personnel is very plainly to recruit an abler group of young men and women to go through training for research. A recent remark by an official of a large industry to the effect that any company desiring to secure the ablest young men at a certain great technical institution must select and engage them at the end of the freshman year indicates the way industry looks upon the matter. Undoubtedly in many instances the most brilliant and competent youth can be identified in high school or during their freshman year in college. If teachers and professors of sufficient enthusiasm and interest in their students would concern themselves for the future of scholarly work and research at this period, undoubtedly a considerably increased number of the youth most capable of distinguished work in research would be recruited to that field.

Provision of More Scholarships and Fellowships.—It would seem that a better administration of such student aid as is now available, stressing aid to those of greatest ability rather than to those of greatest poverty, together with larger funds for student aid, might result in more able youth preparing for research.

On the basis of the rather slight data available it seems probable that while about 30 percent of the youth of college age among the people in the upper three deciles of economic ability go to college, less than 1 percent of those in the lowest three deciles enter college. A more careful search for the ablest youth in the lower economic levels, supported by reasonable funds, might accomplish a good deal. The National Youth Administration has made a start in this direction and has rendered a very great service, but the amount each youth can receive is so small and the labor on National Youth Administration projects and other work necessary to earn a living so great that it often prevents the able students from demonstrating their real ability.

As our dependence upon research increases it will become increasingly necessary to maintain an adequate supply of research workers, and we cannot hope to draw this supply exclusively from the higher income groups. A far more serious effort to find and train competent youth in the lower levels of economic ability must be made if we are to keep pace with our needs in this respect.

Some are skeptical of the advantage of scholarships and fellowships. A careful study of this matter accompanied by some carefully planned experiments in granting scholarships of varied amounts and on varied conditions might prove of great value. Competitive Federal scholarships and fellowships might go far to arouse interest as well as to develop some able men. Scholarships to the military and naval academies have proved very valuable. Scholarships of a similar type aimed to prepare research men for Government service might well prove even more valuable. Harvard University has recently begun the award of generous undergraduate scholarships to men of high promise throughout the country. The results of this experiment will be interesting.

Greater discrimination in admissions to the graduate school.—Many of the graduate schools admit any college graduate who pays his fees. While perhaps only a few of the less worthy continue to the doctorate, the tone of the school is lowered and standards are affected. If the emphasis could be strongly shifted from numbers enrolled to the quality of the graduates much good might be effected.

The policy at Princeton University is interesting in that the governing board has limited the number of graduate students to 250. Inasmuch as the total number of graduate students in any department is rather definitely fixed, there is a strong internal pressure to encourage the less competent to drop out with a master's degree, while a promising college graduate is admitted to take his place. It seems probable that from this policy, Princeton has 250 of the most promising graduate students in the country constantly enrolled.

Teachers' College at Columbia has limited those faculty members who direct research to productive scholars, who in turn limit the students who do graduate work under their direction to those interested in the particular field of the professor's specialty. This policy has introduced a form of limitation which will reduce the number of candidates for the Ph. D. degree in that institution and should materially improve their quality as research men.

Many graduate schools, and particularly those which have entered on this work more recently, seem to have no very clear policy designed to limit enrollment to

those who will profit by graduate work. The problem is largely complicated by the great number of high school teachers whose chief desire is for a master's degree in order to secure a salary increase. A more clear-cut and effective policy on the admission and classification of graduate students promises much.

Limitation of number writing theses under one faculty member.—By limiting the number of candidates writing doctoral theses under one professor, the quality of Ph. D. graduates would be improved. A canvass of 1 great university showed few men directing more than 3 or 4 theses and only 3 directing 10 or more. While research leaders certainly vary in ability, deans of graduate schools should assure themselves that departmental ambition does not lead to overloading men with direction of thesis work so as greatly to debase the service they render graduate students.

Raising the standard of graduate schools.—By raising the standard of adequacy of the graduate schools conferring the doctorate the quality of research personnel would also be improved. There are now 86 institutions in the United States conferring the doctorate in one or more fields and undoubtedly this number will be increased to about 100 within 1 or 2 decades. The full competency of some of these institutions adequately to train men for the doctorate in certain fields in which the degree has been conferred by them is open to question. On the other hand, it is probable that none of these institutions desire in any way to go further than their resources fully warrant. The following section is an effort to set up a tentative and suggestive basis for estimating the fitness of a department to attempt to train men for the Ph. D. degree.

The essential needs of an institution to enable it adequately to train research workers are:

Material.—Able college graduates of the quality of mind and the background of scholarship and culture suitable for training for leadership in research.

Faculty.—Department staffs of men of brilliant research ability and experience who excel in character and in teaching ability. Mediocre professors with the Ph. D. degree cannot train able research workers.

Libraries.—Libraries with generous funds and library staffs selected to give adequate service to research men. Liberal supplies of books and journals in the fields related to the departments in which the doctorate is conferred.

Research equipment and facilities or access to such facilities.

Fluid research funds available to serve emergency current research needs in any department.

Departmental Training.—Recognition of the types of graduate training that can be best provided by each department; the limitation of each department to the kinds of service it is able to render well; the limitation of admission of graduate students to the capacity of the department and to those who wish, and will profit by, the types of training available. Three distinct types of training serve rather sharply defined occupational demands: (1) Research workers in pure science; (2) research workers in applied science; and (3) teachers with knowledge of research technique, with broad scholarly training, and with intellectual enthusiasm.

Limitation of Admission of candidates for the doctorate to those who desire to carry on research in the specific field of a qualified member of the staff.

Placement of graduates.—Institutions vary greatly in their assumption of responsibility for the placement of the men on whom they confer doctorates. It seems that a heavy responsibility rests upon a university that encourages a young man or woman to spend 3 to 4 years studying for an advanced degree to prepare him to fill some useful position and to secure a suitable position for him on graduation. In some institutions where this attitude has been stressed over a period of years, it has had a salutary effect on the selection of graduate students for the doctorate, on their training, and on the limitation of numbers.

Offering opportunity for research in Government departments.—Facilities and occasions for research in Government departments are great and often unique. It would seem that the Government would greatly profit by participating to some degree in the training of men in research. It might well open opportunities for research in Government departments to a limited number of graduate students, especially in the social sciences. Certain of those so trained would later prove valuable Government employees. Cooperative relations could be established with the universities so that such work in limited amount could be carried on with very little intrusion on regular Government service.

Improvement of Research Personnel at the Postdoctoral Level

Until rather recently the training in research required for the doctorate, together with the training on the job, seemed adequate in all research areas. As the use of research increases in all fields there is an increasing need both for further training and for restimulating research workers. Methods of accomplishing these ends are of increasing importance.

Postdoctoral fellowships.—Postdoctoral fellowships, awarded by the councils and generously financed by the foundations, have been of great value. About 1,100 of these fellowships have been awarded by the National

Research Council in the natural sciences; 78 by the American Council of Learned Societies in the humanities; and 258 by the Social Science Research Council in the social sciences. While some of the awards seemingly brought disappointing returns, perhaps 20 percent were highly gratifying. There is a strong feeling that these postdoctoral fellowships are an important factor in the research development of the Nation and should be maintained as generously as possible. Possibly Federal grants for this purpose should be made. Certainly a supply of highly trained research men is of vital importance to the Nation today. A careful report on results so far secured from fellowships and the probable number it is seriously desirable to award annually might throw important light on this subject.

Research activities of college teachers.—A considerable amount of potential research ability is lost each year in the small colleges. While many of their staff members have had training in research methods and are eager to carry on some research, the lack of facilities and the absence of the stimulating influence of contacts with other research workers in the same field discourage creative work.

It would seem worth while, and indeed a duty of the universities, to concern themselves with these isolated research workers. The universities frequently have in connection with their own broad programs minor problems that would provide suitable ground for cooperative effort. Many problems that might seem trivial or uninteresting if considered singly, take on fresh meaning if part of a larger program. To take a particular example, often the physicist or astronomer in a small college is himself a one man department and has no one with whom to discuss his work.

It would seem to the obvious advantage of the larger institutions to encourage in each field of study cooperative efforts in which the teaching staffs of the neighboring smaller institutions could take part. In some cases the work would have to be done in the laboratories and libraries of the larger institution during summer vacations or times of sabbatical leave. In other cases, particularly when the cooperating institutions were geographically close together, more frequent work in the larger laboratory would be possible. And again, cases might arise where equipment would be lent to the smaller institution for the purposes of the cooperative investigation.

In general it might seem that experimental work would more easily be carried out in the larger laboratory and the data thus obtained would be reduced and examined at the smaller institution. Theoretical work could be carried on anywhere provided frequent visits to the larger institution were possible for staff consultation and use of library facilities. In the social sciences such cooperative research could often be carried on more easily and advantageously than in the natural sciences.

The mutual advantages of such cooperation seem obvious, both in advancing research and in the intellectual development of those taking part in the work. These advantages will be realized most fully when both institutions make their own fair contributions in support of the cooperative project. The nature of the research must be such that it is worth doing in itself, that it contributes to the general research program of the larger institution, and that it is intellectually stimulating to the investigators engaged in it. Under such circumstances the expenses incurred, if any, should be divided appropriately between the two institutions and should never be borne by one institution alone. No formal organization is proposed and any arrangement entered into should be continued only as long as is mutually advantageous.

Finally, such cooperative programs may be suggested as appropriate for grants-in-aid from national or local agencies assisting research, such grants-in-aid to cover approximately one-third of the cost of the project, the remaining two-thirds being shared between the cooperating institutions. Such a plan seems sufficiently flexible to stimulate cooperation and yet to guarantee that the project is one of real mutual advantage.

The enthusiasm and alertness of the college staffs would be stimulated. More brilliant students would be recruited to research and many of them would be directed to the research institutions near at hand. Many colleges have expressed an interest in this plan and it seems quite worth a careful trial. If a small grant were available a competent person could make an attempt to develop and work out such relationships in one or two States.

Personnel Records of the Ablest Research Workers.—In view of the importance and volume of the research work done by the Government and the necessary constant change in personnel, it seems essential to high efficiency that the Government have access to accurate personnel records. Such records would be equally useful to the universities and to industry. As has been said earlier, there are about 50,000 research workers in the country and perhaps 8 to 12 percent are persons of high ability. Such a record should contain brief, up-to-date sketches of from 4,000 to 6,000 men and women. Two methods by which such lists could be prepared and made available have been suggested:

The Government Could Prepare and Maintain Personnel Records.—Each Government agency could be asked to prepare such a list of the research workers

in its specific field—seven to ten percent of the ablest. This list would be kept on file in the agency and a duplicate sent to some central agency, presumably the Civil Service Commission.

The National Councils Could Sponsor Starred Scholars in All Fields.—It now seems probable that the American Council of Learned Societies will sponsor the publication periodically of a volume entitled *American Scholars in the Humanities and Social Sciences* which will supplement *American Men of Science*, the two volumes including as nearly as possible all research workers in the Nation. Such a publication would be of great value in making generally available information about the scholars in these fields. If a comprehensive list of the special fields of activities of all these scholars were prepared and if the councils assumed the duty of selecting to be starred the 8 to 12 percent ablest in each field, it would be exceedingly useful to the Government and to others. It would also be useful if, further, as soon as a man passed 65 years of age his name were double starred and all single-starred men were 65 or younger. New editions of such a publication every 5 years would keep this list pretty well up to date. When notice is taken of the fact that names in *American Men of Science* are listed in some 250 special fields and that for starring they are grouped in only 12 fields, and further that of these 12, 5, physiology, anatomy, pathology, astronomy, and anthropology, are rather small fields, it is apparent that a much larger number of fields would make starring simpler and the lists of starred men more useful. Possibly Government financial help could be secured to enable the national councils to sponsor the selection of the men to be starred.

Improvement of the Leadership in Research

Several agencies, already active in some degree, could markedly advance research if their leadership activities could be broadened and increased.

Committees of the Councils.—Some committees of each of the councils are very effective and are doing most useful work. Others are quite inactive. The chief deterrent in many cases is lack of funds (1) to employ permanent executive leaders within the councils; (2) to meet the expenses of committee meetings; and (3) to provide small grants to stimulate certain work in the respective fields. It appears highly probable that the active effective leadership of these councils could and should be increased. If money will do it, either foundation or Federal funds are badly needed here.

Faculty Committees on Research.—Every institution where faculty committees on research are set up and where they have some funds at their disposal reports very interesting progress. These committees are quite acceptable to faculty members. They usually get at the actual facts more accurately than it is possible for any college official to do. The very general organization or appointment of such committees seems most desirable. Each committee should have some money available for distribution by it and it is remarkable how much even a very small fund so distributed can accomplish.

Directors of Research Organizations Within the Universities.—A study of the leadership of the directors of the agricultural experiment stations reveals great variation in the quality of leadership in research. Some stations over a period of years have turned out a much larger volume of research and research on a higher level than others. While certainly this difference is not all chargeable to the director, much of it is due to his planning and organizing the work, selecting able staff members, and developing a fine esprit de corps. Much more would be accomplished throughout all separately organized research units if the directors were all equal to their responsibilities. The importance of adequate leadership that is sympathetic and helpful cannot be overstressed.

University and College Presidents.—Any broad survey of universities and colleges emphasizes how much depends on the breadth of view, understanding, and helpfulness of the presidents. This is peculiarly true of their attitude toward research. Many are wholly ignorant of its importance either in itself or in its influence on professor and student. Many men are drafted into these difficult positions who have had no close contact with research but would readily support it if they grasped its importance in an educational institution. It remains for the men on the faculty interested in research to win the interest of the president in this work, rather than condemn him for lack of interest which he has never had a chance to develop.

Boards of Trustees.—Undoubtedly much of the progress of the great universities in research has been due to the intelligent support of the trustees. Such support is dependent on the understanding of the significance of research by a majority of the trustees and their willingness to follow the lead of the president and deans in supporting this work. The trustees of most American colleges need much education in the value and importance of research, and they are entitled to such education. Their instructors must be the president, deans, and professors. The research under way should be of such interest that it can be explained to the members of the board in a way that will command their interest and support.

Until the president and the board of trustees are led to believe in and take an active stand for the support of research, very little support will be forthcoming.

Department Heads.—It is astonishing how an able head of a department can inspire, energize, and encourage his staff. Unfortunately, many heads of departments are not of that type. It is extremely difficult to rise above the leadership under which one works, especially so for a young man. Every department is entitled to able and inspiring leadership. The deans and presidents who do not provide it fail in perhaps their most important duty. Research and the development of research workers would be enormously stimulated by abler leadership by department heads throughout the colleges and universities.

Increasing Cooperation in Research

As research problems increase in complexity and in number, cooperation between research agencies and individuals, between institutions, and between different departments within institutions becomes increasingly important. Within industry and Government research agencies such cooperation is largely secured by direction and organization. For much of the needed cooperation in universities it is necessary to rely apparently on a coming together of the men interested in a common problem. There are four agencies which can help in securing cooperation in this manner.

The Councils.—The councils are very acceptable to scholars. Important problems, difficult of solution by a single agency, are selected by a planning committee, and a special committee is appointed to find a solution. As the council can draw on all scholars in the country, very strong committees can be formed. In every case where an able chairman is selected and money is available for the necessary meetings these council committees have proved to be powerful research agencies. Funds available to the councils to enable them to maintain such committee work on a generous scale is much needed in some cases. The only sources from which such funds seemingly can come is from the foundations or from the Government. There are many reasons why Federal support for the several research councils seems desirable and wise.

Federal Research Agencies.—Some of the Federal research agencies are in a position to secure valuable cooperation and of these the Department of Agriculture has accomplished much. All of these techniques are more or less available for use by other Government agencies.

The National Learned Societies.—These national learned societies in each field have done a great deal to break down institutional jealousy and to bring men in the same field into association and friendship. They have also provided forums where new discoveries and theories can be intelligently discussed and tested. It would seem that perhaps their chief opportunity lies in securing more cooperation between scholars in the same field but in different institutions. It would be a useful experiment to provide a few of these societies with modest funds to pay traveling expenses and see how much their usefulness could be extended.

Interdepartmental Committees on Specific Research Subjects.—Interdepartmental committees for specific research subjects as in operation at the Massachusetts Institute of Technology have been described. These committees could well be multiplied in many institutions. Problems of importance do not recognize departmental boundaries and generally lie across them. Unless adequate interdepartmental unity of attack is organized by setting up suitable interdepartmental committees, problems are likely to be passed over or ineffectively dealt with by one department. This rather new device should be widely used.

Providing Adequate Publication for Research

As the literature of scholarship increases, many new problems arise and become increasingly acute. In fields where a very large number of research men are active, as in chemistry, large sums of money are available from many sources to meet publication expenses of all sorts. In smaller fields this is often not the case.

Abstracts Journals.—With increased volume of technical publication the need for good abstracts journals is increasing. This need is perhaps most keenly felt in the smaller institutions and is least evident in the 10 to 20 greatest research institutions where all periodicals are available. The financing of abstracts journals is a serious problem and subsidy from foundations or from the Government probably must be provided if abstracts journals are maintained in all the important fields where they are needed.

Publication of Learned Books.—Increasingly, as fields of knowledge are subdivided, more and more learned technical books in need of publication cannot be published commercially because of limited demand and sale. Many of these books should be published. Many at present are subsidized by universities; some have been subsidized by the councils. Increasing funds are needed for this purpose.

Publication of Scientific Journals of Research.—As the volume of research increases the expense of publication of learned journals increases, and the difficulty of securing the publication of research findings also increases. These publications are very valuable. Some have wide circulation and are readily financed. Others with smaller circulation are difficult to finance. Many are subsidized by the universities. It would seem to be a worthy responsibility for the several councils to survey the publication needs and problems

in their respective fields with a view to securing funds to aid publication where it is seriously embarrassed. The councils could well act here as an intermediary between either the foundations or the Government and the scholars in the different fields.

Financing Research in Universities and Colleges

Ordinarily, the question of money is the first one raised when research is discussed. While it is always important, it is probably not usually the main question. Most men capable of research manage to carry on, and much of the most valuable research work has been done by men and women with very little money or time available. Perhaps, however, as the complexity of research increases, money becomes increasingly a vital matter. Some suggestions have been made as to how research could be advanced by better financing.

Relations of the Government and the Foundations to Financing.—When the universities entered on research it was supported by income from endowment. This source of income for research has been greatly increased in recent years and is now probably the greatest single source of funds. The States have provided very generous support for research in State institutions. It now becomes apparent that the two significant agencies to which research in the universities must turn for large financial help are the foundations and the Government. At present the Government is giving the universities and colleges in grants for research in the neighborhood of $6,000,000 a year, chiefly for research in agriculture. The foundations are probably giving to the universities for this purpose a somewhat larger sum.

Bills before Congress now indicate that the Federal Government will be asked to give more largely to research and the magnitude of future research projects makes it probable that Government aid will be needed. It is to be hoped that support by the foundations may also increase.

It is evident from studies made by this Committee that the funds derived from these two great agencies should be coordinated. If the relations between Government and the national councils become increasingly intimate, as they should, the coordination of research provided for by the Government and the foundations will naturally be effected through the councils. The councils might also point out important areas where larger State support would prove of great value.

Fluid Research Funds.—Probably no single enterprise costing as little would stimulate research as much as the general availability in every university and in many colleges of a fluid research fund granted to faculty members by a faculty committee. The amount of such funds might range from $50,000 to $200,000 in the great universities; from $10,000 to $50,000 in smaller research institutions; and from $1,000 to $10,000 in colleges. From information available very few institutions have such funds. They would certainly be very valuable in 200 of the stronger institutions and stimulating in every college in the country. In many institutions they could be set up by altering the allocation of present funds. An interesting experiment might be tried by one of the foundations by offering small grants to a few colleges, on condition that an equal sum be added from regular income and the total administered by a faculty committee which would make grants to promising research projects under way by the faculty.

Grants to the Councils for Operation.—The councils seem to have justified themselves, and to offer promise of increased usefulness. The foundations have granted the councils very large sums for specific projects and these funds have been carefully and effectively administered. If they are to serve as they should, some of the councils, notably the National Research Council, need much larger funds for operating expenses, salaries, traveling expenses of committee members, etc. So far this money has come from the foundations. It would seem that their adequate financing is of great importance and that fully adequate funds should be provided by the foundations, by the Government, or jointly by both. The councils certainly are capable of serving the Government usefully and seem fully to warrant Government aid. The councils appear to have been too modestly led considering the strategic importance of their positions to all American research, and some clarification of their expectations of support is most desirable. The councils are well situated to administer grants for subsidizing publication of abstracts journals in various fields and other scholarly journals.

Federal Grants for Business Research.—For 50 years the Government has contributed to agricultural experiment stations in every State, and has seen this work improve greatly both in its value and quality and in the esteem of the people. During the early years of this period industry and busines were less active in research, operating largely by custom and rule of thumb. More recently, however, both business and industry have become dependent upon scientific knowledge. Perhaps if institutes of business research and engineering experiment stations had been started along with research in agriculture greater advance would have been made. At any rate, many requests are now being made for Federal aid to research in these fields.

In business research the great corporations are able and willing to organize and maintain their own in-

vestigations. But there is an extremely large number of small businesses and industries. In 1933 there were 211,586 corporations with assets of less than $50,000, besides a very large number of unincorporated enterprises. All of these enterprises would profit from business research and the application of the results of such studies. If it were properly organized both centrally in Washington in the proper Department and also in the States, such research could be of great profit to the people. Federal grants to the States for this purpose would stimulate State appropriations and contributions from business and the ultimate sum spent would be large. Research on business, seriously pressed in each of the 48 States, would make an important force to fight depressions and other economic ills.

If such Federal grants are made, they should be in the form of grants to the States, to be assigned by each State to the proper institution for its most effective use.

Another important but neglected item in the field of business and industrial research is research in labor problems. Much valuable material of this nature is currently collected by the Bureau of Labor Statistics, but the problem is one which should be studied locally as well as by the Federal Government.

Engineering Experiment Stations.—There are now 38 engineering experiment stations established in land-grant institutions. These are spending over $1,000,000 annually from State and local sources on research in engineering. For many years Congress has been urged to make grants to the States for this work. Such grants are needed for the same reasons put forward above for research in business. The small industry could be much aided by research, but is unable to employ competent personnel or provide the necessary equipment. Industry throughout the Nation would be greatly aided by such research. Should funds be granted to the States for this purpose the funds should be appropriated by the States in which such experiment stations now are organized to strengthen their work, and in other States to the public institution best fitted to conduct such work for its organization.

In both business and engineering, the experience of agriculture would indicate that the best results would be obtained by appropriating a small initial fixed amount, perhaps $20,000 to each State. As the work got under way this amount could well be increased by regular increments to from $40,000 to $60,000 a year. After some such amount is reached, further grants should be made as in the Bankhead-Jones Act, making grants in amounts proportitonal to the needs of the several States.

Conclusion

The research and the training of research workers, as carried on in the educational institutions of America, are matters of great importance to the Nation. This study is in the nature of an introduction to the study of research in the universities and colleges as a whole. So far both research and graduate training have developed in each institution quite independently. They have assumed very large proportions. This study indicates that more unity and coordination will yield better and greater returns for the money and effort expended. It is hoped that this report will suggest where further studies of various aspects of research in the universities and colleges are needed. Developments in all lines have been rapid. Further and continuous study is needed to guide future developments toward the greatest service to the people.

APPENDIX

Amount Spent by the Universities and Colleges on Research

The following grouping of institutions gives an idea of the sums spent on research. About one-third of these estimates have been confirmed by the authorities in the respective institutions. The remainder are based on the best evidence available and comparison with institutions of similar type. The list is not complete. Quite a number of colleges that are undoubtedly spending money on research are omitted. The estimates are probably too low rather than too high.

Spending on Research in Excess of—

$2,000,000:
- California.
- Chicago.
- Columbia.

$2,000,000—Continued.
- Harvard.
- Illinois.
- Michigan.

$1,500,000–$2,000,000:
- Cornell.

$1,500,000–$2,000,000—Con.
- Minnesota.
- Wisconsin.
- Yale.

$1,000,000–$1,500,000:
- Massachusetts Institute of Technology.
- New York University.
- Ohio State University.
- University of Pennsylvania.

$500,000–$1,000,000:
- Duke.
- Indiana.
- University of Iowa.
- Iowa State College.
- Johns Hopkins.
- Missouri.
- Nebraska.
- Northwestern.

$500,000–$1,000,000—Con.
- Pennsylvania State College.
- Princeton.
- Purdue.
- Rochester.
- Rutgers.
- Stanford.
- Texas Agricultural and Mechanical.

$300,000–$500,000:
- Cincinnati.
- Florida.
- Kansas State College.
- Kentucky.
- Louisiana.
- Michigan State College.
- University of Texas.
- Virginia.
- Washington (St. Louis).

$300,000–$500,000—Con.
Washington (Seattle).
Western Reserve.
$250,000–$300,000:
Alabama Polytechnic Institute.
California Institute of Technology.
Carnegie Institute of Technology.
University of Kansas
University of Maryland.
Massachusetts Agricultural College.
Mississippi Agricultural College.
University of North Carolina.
University of Oklahoma.
Oklahoma Agricultural College.
Oregon State College.
Virginia Polytechnic Institute.
Washington State College.
$200,000–$250,000:
Arkansas.
Arizona.
$200,000–$250,000—Con.
Boston University.
Brown.
Clemson.
Colorado State College.
George Washington University.
Montana State College.
North Carolina State College.
North Dakota State College.
Southern California.
Tennessee.
$150,000–$200,000:
University of Colorado.
Hunter.
Maine.
New Hampshire.
College of City of New York.
University of Puerto Rico.
St. Louis.
South Dakota State College.
Syracuse.
$150,000–$200,000—Con.
Tulane.
Utah Agricultural College.
Vanderbilt.
Wyoming.
$100,000–$150,000:
Bryn Mawr.
Catholic University.
Connecticut State College.
Delaware.
Fordham.
Idaho.
Nevada.
New Mexico Agricultural College.
University of Oregon.
Rhode Island State College.
Temple.
Vermont.
Wellesley.
$50,000–$100,000:
Alabama.
Antioch.
Brooklyn College.
Brooklyn Polytechnic Institute.
$50,000–$100,000—Con.
Emory.
Georgia.
Marquette.
North Dakota.
Notre Dame.
Radcliffe.
Rensselaer.
Rice.
$25,000–$50,000:
Baylor.
Clark.
Colorado School of Mines.
Detroit.
Drexel.
George Peabody.
Georgia School of Technology.
Goucher.
Lawrence College.
Lehigh.
Miami University.
Montana University.
Montana School of Mines.
University of Utah.
Wesleyan.
Wayne University.

TABLE III.—*Location in Government service of men starred in American Men of Science (6th ed.)*

	Total		Chemistry		Physics		Zoology		Botany		Mathematics		Geology		Psychology		Physiology		Anatomy		Pathology		Astronomy		Anthropology	
1. Total number starred men 2. Starred men 65 and under	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Department of the Interior	37	23																								
U. S. Geological Survey	33	20			1	1							32	19												
Bureau of Mines	3	2	2	1									1													
National Park Service	1	1											1	1												
Department of Agriculture	32	10																								
Bureau of Plant Industry	16	4							16	4																
Bureau of Chemistry and Soils	7	3	6	3					1																	
Bureau of Entomology	3	1					3	1																		
Bureau of Biological Survey	3	1					3	1																		
Weather Bureau	2				2																					
Forest Service	1	1							1	1																
Department of Commerce	23	17																								
Bureau of Standards	21	16	5	4	16	12																				
Bureau of Fisheries	1	1					1	1																		
Coast and Geodetic Survey	1												1													
Smithsonian	19	11																								
Smithsonian Institution	5	2			1		4	2																		
National Museum	11	6					6	2	1	1			3	3											1	
Bureau of American Ethnology	2	2																							2	2
Zoological Park	1	1					1	1																		
Navy Department	8	3																								
Naval Observatory	6	1																					6	1		
Naval Research Laboratory	2	2			2	2																				
Department of the Treasury	6	5																								
Public Health Service	6	5	2	2													1	1			3	2				
Library of Congress	2	1			1								1	1												
Tennessee Valley Authority	1	1	1	1																						
Total	128	70	16	11	23	15	18	8	19	6			39	24			1	1			3	2	6	1	3	2

TABLE IV.—*Location in Government service of men starred in American Men of Science—by percentage (2d and 6th ed.)*

	Total men starred where there are 3 or more (2d ed. 1910) (0.5 refers to part time)	Percent of total (2d ed. 1910)	Total men starred (6th ed. 1938)	Percent of total (6th ed. 1938)	Starred men under 66 (6th ed. 1938)	Percent of starred men under 66 (6th ed. 1938)
U. S. Geological Survey	25.5	2.5	33	2.1	20	1.9
Department of Agriculture	28.0	2.8	32	2.05	10	.94
Bureau of Standards	12.0	1.20	21	1.98	16	1.5
Navy Department	3.0	.30	8	.51	3	.28
Smithsonian	16.0	1.6	19	1.2	11	1.04

TABLE V.—*Location in research foundations of men starred in American Men of Science—by percentage (2d and 6th ed.)*

	Total men starred (2d ed. 1910)	Percent of total (2d ed.)	Total men starred (6th ed. 1938)	Percent of total (6th ed.)	Starred men under 66 (6th ed.)	Percent of starred men under 66 (6th ed.)
Carnegie Institution	19.0	1.9	52	3.3	42	3.95
Rockefeller Institute	6.0	.60	27	1.7	21	2.0
American Museum of Natural History	7.5	.75	8	.45	5	.47
Field Museum	4.0	.40	2	.127	2	.19

TABLE VI.—*Location in industrial or commercial enterprises of men starred in American Men of Science*

	Total		Chemistry		Physics		Zoology		Botany		Mathematics		Geology		Psychology		Physiology		Anatomy		Pathology		Astronomy		Anthropology	
1. Total number starred men. 2. Starred men 65 and under.	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Consulting practice (private)	22	7	6	3	5		1	1	2				6	2	1						1	1				
Bell telephone laboratories	13	12	1	1	11	10					1	1														
General Electric Co	12	10	2	1	10	9																				
Dupont Co	4	3	4	3																						
Eastman Kodak Co	3	3	2	2	1	1																				
Standard Oil Development Co	3	2	3	2																						
Dow Chemical Co	2	2	2	2																						
Ethyl Gas Co	2	2	2	2																						
Gulf Companies	2	2			1	1							1	1												
U. S. Steel Corporation	2	2	2	2																						
Universal Oil Products Co	2	2	2	2																						
Bakelite Corporation	2	1	2	1																						
National Canners' Association	2	1	1																		1	1				
60 other industries having 1 starred man in each	60	38	35	22	11	8	4	2	1				4	3	4	3					1					
Totals	131	87	64	43	39	29	5	3	3		1	1	11	6	5	3					3	2				

TABLE VII.—*Location in research foundations of men starred in American Men of Science (6th ed.)*

	Total		Chemistry		Physics		Zoology		Botany		Mathematics		Geology		Psychology		Physiology		Anatomy		Pathology		Astronomy		Anthropology	
1. Total number starred men. 2. Starred men 65 and under.	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Carnegie Institution	52	42	5	3	7	6	6	5	5	4			7	4					3	2			17	16	2	2
Rockefeller Institute	27	21	6	5					2	1							2	2	1		16	13				
American Museum Natural History	8	5					6	4																	2	1
Boyce Thompson Institute	4	4							4	4																
Lowell Observatory	4	3																					4	3		
Field Museum	2	2					1	1	1	1																
Brooklyn Botanical Garden	2	1							2	1																
21 other institutions with 1 starred man in each	21	15			6	5	2	1	2	1	1				2	2					5	4	2	1	1	1
Totals	120	93	11	8	13	11	15	11	16	12	1		7	4	2	2	2	2	4	2	21	17	23	20	5	4

TABLE VIII.—*Location in universities of men starred in American Men of Science—by percentage (2d and 6th ed.)*

	Total men starred in each university having more than 3 (2d ed. 1910) (0.5 refers to part time, etc.)	Percent of total in each university having more than 3 (2d ed. 1910)	Total men starred in each university (6th ed 1938)[1]	Percent of total in each (6th ed. 1938)	Starred men under 66 in each university (6th ed. 1938)	Percent of starred men under 66 in each (6th ed. 1938)
Harvard	79.5	7.95	113	7.20	83	7.80
Columbia	56.0	5.60	77	4.90	50	4.70
Chicago	47.5	4.75	64	4.10	54	5.07
Yale	38.0	3.80	64	4.10	41	3.85
California	18.5	1.85	63	4.00	47	4.40
Johns Hopkins	33.5	3.35	55	3.50	36	3.40
Cornell	35.0	3.50	45	2.90	26	2.40
Princeton	16.5	1.65	41	2.60	34	3.20
Michigan	23.5	2.35	41	2.60	28	2.60
Stanford	21.0	2.10	39	2.50	28	2.60
Illinois	17.0	1.70	37	2.35	25	2.35
Minnesota	10.0	1.00	34	2.20	29	2.70
Pennsylvania	18.0	1.80	33	2.10	25	2.35
Wisconsin	30.0	3.00	33	2.10	22	2.05
Massachusetts Institute of Technology	25.0	2.50	29	1.85	22	2.05
California Institute of Technology			27		25	2.35
Washington (St. Louis)	5.0	.50	21	1.30	14	1.30
Ohio State	9.0	.90	19	1.20	12	1.14
Brown	7.0	.70	16	.95	10	.94
Iowa			15		11	1.04
Northwestern	7.0	.70	14	.90	9	.85
Rochester			12		11	1.04
North Carolina	6.0	.60	12	.77	7	.66
Virginia	7.0	.70	11	.70	10	.94
New York University	8.5	.85	10	.64	7	.66
Cincinnati	4.0	.40	10	.64	6	.56
Texas	3.0	.30	8	.51	6	.56
Western Reserve	8.0	.80	8	.51	4	.37
Missouri	11.0	1.10	7	.45	5	.47
Indiana	7.0	.70	7	.45	2	.19
Institute of Advanced Study			6		6	.56

TABLE VIII.—*Location in universities of men starred in American Men of Science—by percentage (2d and 6th ed.)*—Con.

	Total men starred in each university having more than 3 (2d ed. 1910) (0.5 refers to part time, etc.)	Percent of total in each university having more than 3 (2d ed. 1910)	Total men starred in each university (6th ed. 1938)[1]	Percent of total in each (6th ed. 1938)	Starred men under 66 in each university (6th ed. 1938)	Percent of starred men under 66 in each (6th ed. 1938)
Pittsburgh	3.0	.30	6	.38	5	.47
Wesleyan	4.0	.40	6	.38	5	.47
Dartmouth	5.5	.55	6	.38	4	.37
Kansas	5.0	.50	6	.38	4	.37
George Washington	3.0	.30	5	.32	4	.37
Rice Institute			5		4	.37
Swarthmore			5	.25	4	.37
Iowa State College	5.0	.50	4	.25	4	.37
St. Louis University			4	.25	4	.37
Amherst			4	.25	3	.28
Duke			4	.25	3	.28
Rutgers			4	.25	3	.28
Bryn Mawr	8.0	.80	4	.25	2	.19
Tulane	3.0	.30	4	.25	2	.19
Purdue			4	.25	1	.09
Mount Holyoke			3	.19	3	.28
Nebraska	6.0	.60	3	.19	3	.28
Pennsylvania State			3	.19	3	.28
Connecticut State College	3.0	.30	3	.19	2	.19
Temple			3	.19	2	.19
Colorado			3	.19	1	.09
Smith	4.0	.40	3	.19	1	.09
Vassar	4.0	.40	3	.19		
Clark	8.0	.80	2	.13	1	.09
Syracuse	5.0	.50	2	.13	1	.09
Worcester	3.0	.30	2	.13	1	.09
Case	4.0	.40	2	.13		
Tufts	4.0	.40	2	.13		
Colorado College	3.0	.30	1	.06	1	.09

[1] In the 6th edition, 1938, it may be observed that 15 universities, having less than 3 starred men in 1910, now have more than that number. Outstanding among these is California Institute of Technology with a total of 27 in 1938.

SECTION 7
PROBLEMS OF THE BUREAU OF THE CENSUS IN THEIR RELATION TO SOCIAL SCIENCE

Contents

SECTION 7. PROBLEMS OF THE BUREAU OF THE CENSUS IN THEIR RELATION TO SOCIAL SCIENCE

By Samuel A. Stouffer

INTRODUCTION

The purpose of this report is to illustrate concretely some of the practical problems faced by a Government agency responsible for furnishing social science data and doing social science research.

The illustrations are taken from the work of a single agency, the Bureau of the Census. Therefore, this document may be considered as a case history. Such a case history is necessary if one is to see vividly and intimately how certain problems actually arise. But such a case history lacks generality unless the single agency studied is typical. The Bureau of the Census, partly by virtue of its central importance, is not a typical agency. It has several more or less unique characteristics. Some of its problems are common to many agencies, but many of its problems arise historically out of a unique functional situation. It is not always possible to make a clean-cut separation of the common and the unique problems.

Three major subjects are discussed:

(1) Consumer needs and consumer support.
(2) Selection, training, and promotion of personnel.
(3) Analytical research on the raw data.

For purposes of orientation, the discussion of these three topics is preceded by a brief background sketch. This is particularly necessary in order to indicate how the Bureau of the Census inherited certain problems which may differ from those in other research agencies.

The record of the Bureau of the Census is one in which all Americans may take pride. The leadership of the United States in the development of objectivity in the social sciences would have been impossible without the quantity of economic, demographic, and social data provided by this Government agency. The Bureau, like various other organizations in the Government, has had its vicissitudes. It is now in process of rebuilding under the leadership of its director, Mr. William L. Austin. Even though many of its problems have their unique aspects, an examination of these problems hardly can fail to be instructive to those seeking an undertanding of the conditions under which work so fundamental to social science is carried on. Nothing in this report must be construed as representing, necessarily, the official position of the Bureau. The writer accepts full responsibility for statements of fact or opinion.

I. BACKGROUND

The role of the Federal Government in research in the social sciences differs from its role in natural science research. The difference lies in the fact that social sciences depend on the Government for the collection and tabulation of much of their basic data.

From the decennial census and other statistical compilations by the Government come many, if not most, of the raw materials used in economics, sociology, and related disciplines. While Government agencies do a large amount of research with these data, just as they do a large amount of research with natural science data, the direct and primary provision of the original statistical data is a governmental contribution to social science research transcending its relative contribution to other scientific fields.

There are about 90 different agencies in the Federal Government which collect or compile statistics.[1] Of these agencies the Bureau of the Census, though second in size of full-time staff,[2] is preeminent, because of the fundamental and general-purpose character of its work and because of the magnitude of its periodic enumerations. The Bureau's regular budget in a normal intercensal year is nearly 2 million dollars. The 1930 census cost about 40 million.

There are two main respects, apart from mere size, in which the Bureau of the Census differs from other statistical agencies:

1. The permanent staff of the Bureau, like a miniature standing army, is the nucleus of great emergency organizations recruited quinquennially to take the Census of Agriculture and decennially to take the Census of Population. At the point of its greatest expansion, the Bureau has more than 125,000 employees. Moreover, within the intercensal periods its work load fluctuates greatly, with the consequence that the average ratio of temporary to permanent employees is large compared with that in other agencies.

[1] The Committee on Government Statistics listed 92 agencies as of about January 1936. See Committee's *Report*, Social Science Research Council Bulletin 26, Appendix A.

[2] On July 1, 1938, the Bureau of the Census had 1048 full-time employees, as compared with 3,358 in the Bureau of Agricultural Economics.

2. The Bureau of the Census, as the only general-purpose statistical agency in the Federal Government, has no responsibility for administering laws, other than laws to facilitate the collection of information.

As will be indicated, certain problems, more or less unique to the Bureau, arise directly out of these two characteristics which differentiate the Bureau from other statistical agencies. In addition, there will be found in the experience of the Bureau a variety of problems which are doubtless common to most statistical agencies in the Government. We shall now trace, briefly, certain historical developments which led to the Bureau of the Census' possessing the two unique aspects just mentioned and thereby engendered special problems.

How the Irregular Work Load Developed and Its Consequences

The Census from 1790 to 1880

A census, in any country, necessitates the recruitment of a huge temporary army of supervisors, enumerators, and clerks. In the words of Francis A. Walker, Director in 1870 and 1880:

> The labor of organizing and energizing a census is such as no man can conceive who has not himself undertaken it, or, at least, stood close by and watched the machine in full operation. * * * Taking a census of the United States * * * is like fighting a battle every day of the week and every week for several months.[3]

The "peacetime" activities and personnel of the Bureau of the Census are necessarily influenced by the periodic requirement of going on a "wartime" footing.

As a permanent statistical agency, the Bureau dates only from 1902. Prior to that time, a temporary organization was recruited every 10 years and then disbanded, except, perhaps, for a clerk who kept custody of the records.

The United States was the first modern country to undertake a complete count of its population at regular intervals. The motivation was governmental, not scientific. The census was required as a consequence of the compromise in the Constitutional Convention, whereby representation in the lower House of Congress was allocated according to population. The First Census, in 1790, did little more than count persons as provided in the Constitution. Gradually, the scope was broadened. In 1840 the census was extended to include statistics on mining, agriculture, commerce, manufactures, and schools, and each decade thereafter saw the inquiry loaded with new items. Yet, paradoxically, the increasing scope of the census, unparalleled anywhere in the world, was a result of a doubt whether the Federal Government had a right to collect such statistics. The need of such statistics was recognized and it was also recognized that some of the data, such as those relating to mortality, to taxation, and to agriculture needed to be collected more frequently than once in 10 years, and that the ponderous temporary census machinery was not well suited for collecting all such data. Yet strict constructionists could see no constitutional mandate for this purpose and would consent only to smuggling in, as it were, the data under cover of an enumeration for the ostensible purpose of reapportioning Representatives in Congress.

> "That large party," wrote Francis A. Walker, "which advocates a strict and jealous construction of the constitution would certainly oppose any independent legislation by the National Congress for providing a registration of births, marriages, and deaths, or for obtaining social and industrial statistics, whether for the satisfaction of the publicist or for the guidance of the legislature. Even though the Supreme Court should decide such legislation to be within the grant of powers to the General Government, the distrust and opposition, on constitutional grounds, of so large a portion of the people, could but go far to defeat the object sought."[4]

It may indeed be wondered why consent would be forthcoming from Congress to smuggle in so much social and economic data even at the decennial period. Possibly one reason may be found in the fact that each decennial census became an occasion for political patronage. Up to 1880, the enumeration was in charge of United States marshals, whose appointments were mainly senatorial perquisites and who swore in, in turn, an army of "assistant marshals" as the actual enumerators. The Commissioner of the Census, a temporary official, had no control over appointments. In 1869 Francis A. Walker sought, with the aid of Congressman James A. Garfield, new legislation which would remove the selection of supervisors and enumerators from politics and give the power to the Director of the Census. The House passed such a bill, but it was killed in the Senate. In consequence, the census of 1870 became a considerable scandal. Walker, who directed the census, afterward wrote:

> Good, actually good appointments were not even to be expected as a general thing. The whole battle against the Garfield bill had been fought on the question of patronage. * * * (The Marshals) wanted to use these thousands of officers as a means of strengthening their hands in their respective districts, to fight the Ku Klux and the illicit distillers, to build up the Republican party and consolidate the Negro vote. And, in general, this was precisely the use to which those officers were put. Some marshals * * * found it compatible with party interests to appoint intelligent enumerators. * * * In other districts * * * the power of appointment was exercised to the inexpressible injury of the census service. Negroes who could not write or read were selected for this difficult, delicate, and responsible duty. Accompanied, perhaps, by some poor white man, with such clerical accomplishments as might be expected, these officers of the law pushed their way

[3] Francis A. Walker, *Discussions in Economics and Statistics*, edited by Davis R. Dewey (New York, Henry Holt & Co., 1899), II, 101.

[4] *Encyclopædia Britannica*, 9th edition.

into mansions where their intrusion was resented as an insult, or sought to traverse the bridle paths of extensive districts—districts three or four times as large as could properly be assigned to single officers—to find hundreds and thousands of log houses in which the poorer part of the population, white and black, found shelter.[5]

The Census After 1880

The Garfield bill which failed in 1869 was passed in 1879 and the census of 1880 was taken, again with Walker as Director, under more favorable auspices. Walker chose the supervisors himself. He wrote later:

> Supervisors were appointed from either political party, with the utmost impartiality. And, as they were themselves selected without regard to partisan services, they were officially instructed that it would be considered an offense and an abuse of trust if in their own appointment of enumerators they allowed partisan motives to appear. The enumerators of 1880, who succeeded to the work of the assistant marshals of 1870, thus freed from supposed obligations to render party services, were largely taken from among school teachers, county, or town clerks, assessors, or other persons having familiarity with figures and facility in writing.[6]

Walker's resolute effort to take the census out of the hands of the party politicians was not greeted with enthusiasm on all sides. In 1881, President-elect Garfield was seriously considering his old friend Walker for the post of Secretary of the Interior. But the appointment was impossible. James P. Munroe, in his biography of Walker,[7] quotes a letter from "the notorious Dorsey" to Garfield:

> * * * I have heard that General Walker was likely to be appointed Secretary of the Interior. I give all these stories for what they are worth. General Walker is not a Republican. He does not even know himself to what party he belongs, and never did. I went to him once to see about the appointment of two supervisors for Arkansas, and urged him to appoint some of the best Republicans in the State. * * * His reply was that he had held several public offices, but he has never allowed the question of politics to have the least influence in making appointments to subordinate positions, and he never should. So I left him, and this nonpartisan characteristic of his mind appointed two of the meanest and most disreputable Democrats in the State, one of whom had been indicted on 12 counts for Ku Kluxing Republicans. * * * I am not especially anxious to see any of the Walker breed in your administration, in high or low places. We can get along without them, and perhaps in a few generations the political millennium will come, and then they can be taken care of.

The "political millennium" has come slowly, indeed. In fact, no census since 1880 has been out of party politics. Although the removal of the enumeration from the control of the marshals was a distinct forward step, the ultimate evolution of the working of the act of 1879 was to make the appointments of supervisors a direct perquisite of Members of Congress, with the Director of the Census exercising veto power. This has continued to the present day, even with the Bureau of the Census established as a permanent agency.

While the district supervisors and the enumerators are often political appointees, progress has been made in removing the huge temporary decennial office force at Washington from political patronage. Although this had been strongly advocated for many years, Congress, as usual, exempted these employees from civil service requirements in the act providing for the 1910 census. President Theodore Roosevelt vetoed the act and his veto message is a frank revelation of the "demoralization" of scientific work through the "spoils system":

> * * * It is of the highest consequence to the country that the statistical work of the census shall be conducted with entire accuracy. This is as important from the standpoint of business and industry as from the scientific standpoint. It is, therefore, in my judgment, essential that the result should not be open to the suspicion of bias on political and personal grounds; and that it should not be open to the reasonable suspicion of being a waste of the people's money and a fraud.
>
> Section 7 of the act provides in effect that appointments to the census shall be under the spoils system, for this is the real meaning of the provision that they shall be subject only to noncompetitive examination. The proviso is added that they shall be selected without regard to political party affiliations. But there is only one way to guarantee that they shall be selected without regard to politics and on merit, and that is by choosing them after competitive examination from the lists of eligibles provided by the Civil Service Commission. The present Director of the Census in his last report states the exact fact about these noncompetitive examinations when he says:
>
> "A noncompetitive examination means that every one of the many thousands who will pass the examinations will have an equal right to appointment, and that personal and political pressure must in the end, as always before, become the determining factor with regard to the great body of these temporary employments. I cannot too earnestly urge that the Director of the Census be relieved from this unfortunate situation."
>
> To provide that the clerks and other employees shall be appointed after noncompetitive examination, and yet to provide that they shall be selected without regard to political party affiliations, means merely that the appointments shall be treated as the perquisites of the politicians of both parties, instead of as the perquisites of the politicians of one party. I do not believe in the doctrine that to the victor belongs the spoils; but I think even less of the doctrine that the spoils shall be divided without a fight by the professional politicians on both sides and this would be the result of permitting the bill in its present shape to become a law. Both of the last censuses, the Eleventh and the Twelfth, were taken under a provision of law excluding competition; that is, necessitating the appointments being made under the spoils system. Every man competent to speak with authority because of his knowledge of and familiarity with the work of those censuses has stated that

[5] Francis A. Walker, *Discussions in Economics and Statistics*, edited by Davis R. Dewey (New York, Henry Holt & Co., 1899), II, 62–63.

[6] Ibid., p. 64.

[7] *A Life of Francis A. Walker* (New York, Henry Holt & Co., 1923), p. 204.

the result was to produce extravagance and demoralization. Mr. Robert P. Porter, who took the census of 1890, states that:

"The efficiency of the decennial census would be greatly improved and its cost materially lessened if it were provided that the employees should be selected in accordance with the terms of the civil service law."

Mr. Frederick H. Wines, the Assistant Director of the Census of 1900, states as follows:

"A mathematical scale was worked out by which the number of "assignments" to each Senator and Representative was determined in advance, so many appointments to a Senator, a smaller number to a Representative, half as many to a Democrat as a Republican, and in Democratic States and congressional districts the assignments were made to the Republican State and district committees. The assignees named in the first instance the persons to be examined. They were afterward furnished each with a list of those named who had "passed" and requested to name those who they desired to have appointed. Vacancies were filled in the same manner. This system was thoroughly satisfactory to the majority of the politicians interested, though there were a few who refused to have anything to do with it. The effect upon the Bureau was, as may readily be imagined, thoroughly demoralizing."

Mr. Carroll D. Wright, who had charge of the Census Bureau after the census of 1890, estimates that $2,000,000, and more than a year's time, would have been saved if the census force had been brought into the classified service, and adds:

"I do not hesitate to say one-third of the amount expended under my own administration was absolutely wasted, and wasted principally on account of the fact that the office was not under civil service rules. * * * In October, 1893, when I took charge of the Census Office, there was an office force of 1,092. There had been a constant reduction for many months and this was kept up without cessation till the close of the census. There was never a month after October 1893 that the clerical force reached the number then in office; nevertheless, while these general reductions were being made and in the absence of any necessity for the increase of the force, 389 new appointments were made."

This of course meant the destruction of economy and efficiency for purely political considerations.

* * * It is of vital consequence that we should not once again permit the usefulness of this great decennial undertaking on behalf of the whole people to be marred by permitting it to be turned into an engine to further the self-interest of that small section of the people which make a profession of politics. The evil effects of the spoils system and of the custom of treating appointments to the public service as personal perquisites of professional politicians are peculiarly evident in the case of great public work like the taking of the census, a work which should emphatically be done for the whole people and with an eye single to their interest.[8]

The result of Roosevelt's veto message was an amended act requiring the temporary employees of the Bureau in Washington to be taken from civil service registers, based on competitive examinations. The time-honored methods of selecting field supervisors and enumerators were unchanged.[9] Suggestions for altering the situation were made from time to time, but without effect. Dr. E. Dana Durand, for example, reviewing in 1913 his experience as Director of the Census of 1910, wrote:

The most important source of inaccuracy in the population statistics * * * is the incompetence and negligence of many of the enumerators. The greatest promise of improvement appears to lie in the employment of mail carriers to collect census statistics.[10]

Dr. Durand had no official opportunity to promote this proposed reform, since he was automatically forced out of office by the incoming Wilson administration.

The Census in Relation to Party Politics

The foregoing discussion has traced the background of census taking in the United States and has shown how a close relationship between party politics and the census developed. This relationship arose out of the necessity of employing an army of supervisors and enumerators every 10 years, without, for over a century, the existence of a permanent central staff. The overloading of the decennial census and the unwillingness of Congress to establish a permanent Bureau are shown to have arisen because of doubts about the constitutional right of the Federal Government to collect statistics. The traditions of over a century which made each census an occasion for distribution of political patronage could not be expected to die at once with the establishment of a permanent bureau. There has existed in the past the danger that the Bureau of the Census would be "politically minded" first and "scientifically minded" second. This need not imply partisan political bias in the Bureau's publications. Seldom has that charge been made.[11] Rather it has implied in the past a preoccupation with political patronage which might take precedence over the consideration of scientific questions. Thus every change in party in power has automatically forced a change in Director of the Bureau. Sometimes the post has been given to men without respect to professional competence, as a reward for faithful political service. The present Director is an exception. He has had a lifelong career in the Bureau. The remarkable progress which the Bureau has made in rebuilding its organization in re-

[8] Theodore Roosevelt, *Presidential Addresses and State Papers and European Addresses*, December 8, 1908, to June 7, 1910 (New York, Review of Reviews Co., 1910), pp. 2112–16.

[9] As late as 1930 the writer personally witnessed the almost complete breakdown in administration of one supervisor's district in Chicago, due to the incompetence and corruption of the political appointees.

[10] E. Dana Durand, "The Census Methods of the Future," *Publications of the American Statistical Association, XIII New Series, No. 104*, December 1913, p. 567.

[11] Such a charge was made by members of the Democratic Party with respect to the unemployment counts in 1930 and 1931 in the Hoover administration. The writer is convinced of the honesty of those enumerations even if the accuracy may be questioned.

cent years results from his determination to hold to high scientific standards.

Intercensal Work and Isolation From the Administration of Laws

When the Bureau of the Census was established in 1902 there was some expectation that the Bureau would become the central statistical agency of the Government,[12] free from the responsibility of administering any laws other than laws to enforce the collection of its data.

Failure to Become Central Statistical Agency

The Bureau has been kept free from administrative responsibilities but, in view of the growth of other statistical agencies, it can hardly be called the central statistical agency—at least, in the sense, that it is the place to which new statistical inquiries are generally allocated. The freedom from administrative responsibilities should, in theory, be an asset from the scientific standpoint. Indeed, one basis of the respect for the Bureau's reports is its guarantee to respondents that original schedules are confidential and cannot be used by other agencies, for taxation, rate-making, policing, or other regulatory purpose. Yet, however sound in theory may be the separation of such a statistical agency from administration, there are many disadvantages.

One disadvantage is a public and, therefore, congressional apathy toward such an agency. It is not easy to arouse public opinion over the importance of statistics. The beneficiaries of statistics are not organized in pressure groups—seldom does a statistical bureau receive expressions of "consumer appreciation." The consumer relationships will be described more in detail in the next section of this report.

The intrinsically weak strategic position of the Bureau of the Census, as a purely statistical agency, for obtaining the backing of influential pressure groups is all the weaker because of the existence of strong statistical agencies closely attached to the agencies charged with the administration of laws. When vast sums are appropriated to finance new legislation, considerable amounts often must be allocated to statistical studies. Sometimes the allocation is specified in the legislation; often the statistical research is apparently not contemplated by Congress, but must be made, out of the general appropriation for a given undertaking, if the undertaking is to succeed. In neither case is the Bureau of the Census likely to be a beneficiary. The statistical work is almost invariably done in a statistical unit attached to the regulatory agency. Thus, statistical work in connection with agriculture usually goes to the Bureau of Agricultural Economics, and statistical work in connection with labor to the Bureau of Labor Statistics.

In the field of manufactures and trade the Bureau of the Census has managed to get some recognition as performing, in a specific area of governmental interest, functions comparable with those of the Bureau of Agricultural Economics, or the Bureau of Labor Statistics. Even here the Bureau runs head-on into competition with other agencies, including one within its own Department, the Bureau of Foreign and Domestic Commerce.

If, from its beginning as a permanent agency, the Bureau of the Census had been recognized as the place to which most statistical work associated with new legislation would be assigned, the Bureau would have occupied an incomparably stronger position for securing financial support. Instead, the Bureau has been passed by when the huge appropriations to support expanding functions of Government have been made. It has been forced to depend, not on the indirect revenue out of such appropriations, which are backed by strong public opinion, but upon appreciation by Members of Congress of the broad governmental and scientific value of the services and reports of the Bureau of the Census.

The Bureau's Intercensal Work from 1902 On

In order to visualize the nature of the intercensal work of the Bureau of the Census, it is necessary to trace briefly the historical background of the Bureau's great miscellany of tasks, from its establishment in 1902.

The inquiries of the Bureau of the Census touch almost every field of social and economic life. Though diverse and comprehensive in scope, the inquiries embrace only a fraction of the statistical information collected by the Government in some fields. The breadth of coverage is largely explained historically by the fact that most of the intercensal work of the

[12] "The act of February 14, 1903, establishing the Department of Commerce and Labor transferred the Census Office to that Department from the Department of the Interior (32 Stat. L. 825). It was evident that Congress contemplated the possibility of developing the Census Office into a central statistical service, for in the section of the law transferring the Office, the Secretary of Commerce and Labor was given power to rearrange the statistical work of the bureaus and offices in his Department and even to consolidate them. The opportunities for concentrating statistical work in the Census Office were greater than this provision indicated on its face, for another section of the same law authorized the President to transfer to the Department of Commerce and Labor from any of the other departments except the Department of Agriculture the whole or any part of any office, bureau, or division, engaged in statistical work." W. Stull Holt, *The Bureau of the Census*, Service Monograph of the United States Government, No. 53 (Washington, The Brookings Institution, 1929).

Bureau represents inquiries on subjects which had been covered only at the decennial census prior to the permanent establishment of the Bureau. The fact that within a given subject-matter field the Bureau is, in many cases, just one of several agencies collecting data is explained, of course, by the rapid growth of statistical agencies attached directly to the administrative arms of the Government.

An itemized chronological account of the acquisition of the Bureau's reporting functions has been prepared for the writer by Dr. Joseph A. Hill, chief of the Bureau's Division of Research. It appears as Appendix A of this report. Reference to this appendix will show that upon the establishment of the permanent Bureau, in 1902, the following subjects formerly covered in the decennial census were detached to spread the work load of the new Bureau or to permit more frequent reporting:

Mortality.
Valuation, taxation, and public indebtedness.
Religious bodies, or churches.
Social statistics of cities.
Transportation by water.
Defective, dependent, and delinquent classes.

In addition to shifting numerous inquiries from the regular decennial census, the act of 1902 also provided for an additional mid-decennial Census of Manufactures (made biennial in 1919), for a quinquennial Census of Electrical Industries, for current reporting of cotton production, and for statistics of births as well as deaths. The first mid-decennial Census of Agriculture was taken in 1925. The only important new fields entered by the Bureau since 1902 are represented by the Census of Distribution (wholesale and retail trade, service establishments, etc.) and the Census of Unemployment—both authorized as part of the 1930 decennial census—and the current industrial reporting which developed mainly in the decade 1920–30. Many present inquiries, however, have a form quite different from that contemplated in the beginning. An example is the current reports on judicial criminal statistics, which were authorized by special legislation in 1931. The principal intercensal publications of the Bureau are summarized in Appendix A to this report.

Thus the Bureau of the Census took on the form of a huge statistical factory. It developed efficient methods of mass production and kept a heavy flow of work passing through its mechanical tabulation machinery. In its mechanical laboratory some of the machinery was invented and mechanical improvements were constantly added. The mechanical equipment also was at the service of other agencies in the Government for special tabulations, on much the same basis as in the Government Printing Office for printing.

Statistical Work of Other Agencies

Yet, the Bureau, with this impressive body of intercensal work, its priority as the statistical agent in almost every subject-matter field, its experienced staff, and its unrivaled mechanical equipment was not, as we have seen, to share extensively in the rapid growth of the Federal statistical services. In 1935, the Committee on Government Statistics counted the following number of separate Federal agencies, *in addition to the Bureau of the Census*, which collected or compiled statistics in selected fields, most of these agencies having begun their activity within the last 25 years:[13]

Production	18	Finance	25
Distribution	19	Population	4
Labor	19		

Out of more than 2,000 economists, statisticians, and political scientists in the professional and scientific classifications of the civil service, in Washington, at the beginning of 1938, the Bureau of the Census had only 42.

Reasons for Bureau's Failure to Become Central Statistical Agency

Why did not the Bureau acquire more of the functions of current reporting and research which instead were developed in other agencies? The answer to this question would require much more extensive study than has been possible for the preparation of this report. On the basis of present information, one can only speculate, and a number of guesses are here offered without supporting evidence:

1. The statistical data sometimes flowed into an agency in the direct course of law enforcement. *Example.*—The income tax returns coming to the Treasury.

2. When the data did not come in automatically, a regulatory agency often could use for the collection and analysis of data some of the funds appropriated to it for administration of particular legislation, even if funds were not specifically earmarked for research.

3. Such an agency might have wide popular support or benefit by the activity of pressure groups on its behalf. Thus bureaus in the Department of Agriculture were in a strategic position for securing appropriations, while a general-purpose statistical agency like the Bureau of the Census, lacking a popular dramatic appeal or an opportunity to appear indispensable to particular special interest groups, was in a weak strategic position for getting appropriations.

4. Some agencies developed large and expert field staffs, which could be deployed quickly for the collection of information, even though the primary function of the field staff was that of inspection or other regulation.

5. Most agencies probably wanted to grow and hence were reluctant to "farm out" their work to another. Even if the Bureau of the Census had been ideally equipped to supply the needed data, the normal tendency of many agencies, unless checked, doubtless would have been to augment their own

[13] *Report*, Appendix A.

staff and prestige by developing their own sources of data.

6. The Bureau of the Census, experienced as it was in making ponderous surveys with universal coverage, which required months of planning, had no experience in making quick sampling surveys and little in the rapid collection of current data.

7. The Bureau of the Census had an inadequate number of professionally trained personnel, who would be competent to interpret the technical needs of the specialized agencies even if such agencies had sought to transfer the collection and tabulation of data to the Bureau.

Some of these factors may very well have been both of a "cause" and an "effect" character. Thus the inadequate professional training of Bureau of the Census statisticians possibly may have encouraged the development of new statistical work in other agencies instead of "farming it out" to the Bureau. Yet, the growth of the other agencies helped place the Bureau in a weak competitive position for funds, with the result that the Bureau became handicapped in improving its personnel.

Summary

The foregoing pages have sought to trace historically certain factors which may differentiate to some extent the problems of the Bureau of the Census from those of many other statistical agencies. The discussion has been organized around two main sets of facts:

1. The permanent organization of the Bureau of the Census is a "peacetime" nucleus of a "wartime" army of over 125,000 people recruited every 10 years. Even between censuses, the ratio of temporary to permanent employees is abnormally high. When the permanent Bureau was established in 1902, it inherited a century of tradition that the decennial census was an occasion for the distribution of political favors. Each change in party control of Government has automatically forced a change in Director. Although the reports of the census are remarkably free from partisan bias, their scientific improvement under past administrations has not always been a matter of first concern to the Bureau's leadership.

2. The Bureau of the Census is isolated from responsibility for the administration of any laws, other than laws to enforce the collection of its data. This isolation has important advantages, in protecting respondents and minimizing bias, but it has placed the Bureau in a weak position for getting support. Statistics, in themselves, cannot command important support from pressure groups. On the other hand, large funds often become available for statistics in connection with special legislation involving the extension of Government authority. If the Bureau had been recognized as the central statistical organization of the Government, to which such new statistical functions were more or less automatically allocated, the Bureau would have been in a stronger position. Such recognition the Bureau did not receive. Instead, the new statistical work tended to develop in agencies closely attached to the administrative arms of the Government. These agencies grew rapidly, some of them acquiring field staffs and large numbers of professionally trained personnel. Lacking the support of pressure groups or the opportunity to share in indirect revenues made available by regulatory legislation sponsored by pressure groups, the Bureau had to rely for funds on congressional appreciation of the importance of statistics.

These factors will be pertinent to an understanding of the problems reviewed in the next three sections of this report.

II. CONSUMER NEEDS AND CONSUMER SUPPORT

In a democratic form of government, an agency is supported because it satisfies some needs, either of the general public or some special interest groups which command votes.

It was observed, in preceding pages, that the statistical agencies attached to regulatory arms of the Government are often in a more strategic position for obtaining funds than are agencies whose sole function is fact finding or research. Thus the pressure groups which push farm legislation are a powerful support to the work of the Bureau of Agricultural Economics, even though they may not be wholly aware of the value of that Bureau's work. Such an agency as the Bureau of Agricultural Economics benefits in two ways, through support of appropriations for the entire Department of which it is a part and through allocation of special funds for research as a byproduct of new regulatory legislation. There always exists, of course, the possibility that the research units attached to a regulatory organization will receive an inadequate amount and there is a frequent struggle for funds between the research unit and the administrative superiors. But the position of such a unit is often intrinsically stronger than that of general agencies like the Bureau of the Census and the Central Statistical Board which have little or no support from special-interest groups.

The products of the Bureau of the Census are like the oxygen in the air. They are consumed so widely that they are accepted as a matter of course and are so often used after analysis and interpretation by one or more intermediaries that the user does not readily recognize their source or their fundamental value as a base for most other statistics. No large group of voters is likely to go to special effort to support more or better statistics from the Bureau of the Census, though a group might exert strong pressure in behalf of special legislation which, at least as a byproduct, would result in more or better statistics from an agency concerned

exclusively with agriculture, or labor, or commerce and industry, or public health.[14]

Partly as a result of this lack of organized public support and partly as a result of the frequent appointment of directors for political rather than professional abilities, the Bureau of the Census has lacked money and qualified personnel for keeping up with the mounting needs of consumers of its products.

Who Are the Consumers?

The consumers may be divided into two broad classes—public and private. The public consumers include most of the administrative arms of the Federal Government, as well as State and municipal agencies. The private consumers comprise university research workers; business and industrial concerns; associations like farm organizations, labor unions, and trade associations; teachers and journalists; and the miscellaneous body of occasional users of statistics who may be designated as the "general public."

To both classes of consumers the importance of census data has increased incalculably in the past half century. It is true that during this period the share of the Bureau of the Census in the production of statistics has declined, relative to the total volume of statistics produced. But it is also true that the work of the Bureau was never so important as it is today and that the importance of its functions is likely to increase in the future.

The Government as Consumer

Let us look backward to the 1880's, when Francis Walker's second census was taken.

The Federal Government had little need for statistics in carrying out its relatively simple functions. The service to agriculture, for example, was in its infancy, and there was no program of crop control and subsidies, calling for accurate measures of acreage and production. Information about acreage and production was interesting even then, in order to give a "picture" of the rural economy. Today it is not only interesting; it is indispensable to the execution of legislation involving hundreds of millions of dollars. Consequently, the demands for detail and accuracy are tremendously greater today.

Again, consider the responsibilities assumed by the Government in the 1880's with respect to regulation of industry, trade, and labor conditions. Except for the tariff, the policy was mainly one of laissez-faire. Today, the Government has undreamed-of regulatory responsibilities. Accurate data on manufactures, transportation, power, trade, wages and hours of labor, and the industrial, occupational, and employment classification of the population are not merely, as in Walker's day, desired primarily to present a "picture" of the industrial economy. The data are indispensable to Government. While agencies other than the Bureau of the Census compile most of the current (annual, monthly) industrial and labor statistics, the census of manufactures, together with the censuses of population, agriculture, and distribution, provides basing points without which satisfactory current series could not be constructed.

Or, we may note that in the 1880's the idea of Social Security as a function of the Federal Government had hardly occurred. The census of population was of great local interest to fast-growing cities boastful of their progress and was of value to writers who sought to describe the development of the Republic. But, apart from its Constitutional function of determining Congressional apportionment, the census of population was probably more of a luxury than a necessity to the Federal Government itself. The census was a social service rendered by the Government. Gradually, its usefulness to Government increased, but the curve of its importance made its greatest upward leap with the passage of the Social Security Act only four years ago. Almost overnight the census of population became basic to policies involving the welfare of millions of citizens and involving the ultimate handling of billions of dollars. At once, the need of the Government for a quinquennial rather than a decennial census became imperative. At the same time, inadequacies of past censuses, which were not designed, of course, with a Social Security Act in mind, became apparent. Actuarial work in the Social Security Board depends on knowledge of the age and sex distribution of the population, by industrial, occupational, and employment status. Administrative work depends on knowledge of the regional distribution of employers, classified by number of employees, on knowledge of family composition, and on distinctions in the census between "covered" and "noncovered" industries, while Federal grants to States require elaborate analyses of census figures. Finally, proposed changes in the law will call for research on their probable cost and consequences, and this research will rest upon the base of census data.

[14] "The usual test of a business enterprise," said Dr. Willard C. Thorp, of Dun & Bradstreet, recently, "is market absorption of its product. The number of satisfied customers is indicated by its sales volume. Statistical work by Government agencies is in part for purposes of determining Government policy, but much of it must be justified also on the basis of its usefulness to outsiders. These consumers do not record themselves as they would by purchasing commodities * * * We use census data but never report their value to the Census Bureau for support in its annual budget battle * * * Demonstrations by the consumers of statistics are of tremendous importance to those responsible for planning the program and the expenditures of Government agencies. That support is essential is already indicated by the misfortune of the CSB (Central Statistical Board) in the sharp curtailment of its budget by Congress." In a Review in *Journal of American Statistical Association*, XXIII (March 1938), 270.

Because of the long time elapsing since the 1930 census and because the census was not designed with Social Security problems in view, the task of utilizing the available figures has been difficult. Heroic estimates have sometimes been made, with millions of dollars turning on the decision.

Finally, we may recall that in the 1880's there existed little interest in State or National planning. The last two decades have seen the rapid development of State planning commissions, the very life blood of whose work is information provided by the Bureau of the Census. On almost every page of some of the publications of the National Resources Committee appear descriptions and analyses based on data from the Bureau of the Census. Whether or not so-called "national planning" is carried out in a permanent Federal agency, the formulation of broad governmental policies will call for census data. "I am doing a thorough work of retrenchment," wrote Congressman James A. Garfield in support of a census appropriation just after the panic of 1873, "but I do not wish to put out the eyes of the Government in the name of economy." [15] In Garfield's time this may have been hyperbole; hardly so today.

Private Consumers

If the importance of the census to public consumers—as illustrated with respect to agriculture, industry and labor, social security and State and National planning—has increased in half a century, so has its importance to private consumers. In the 1880's research in economics, sociology, political science, and education had hardly begun. The science of statistics was still awaiting its Pearsons, Westergaards, Bortkiewiczs, Edgeworths, Mitchells, and Fishers. The social science research in Francis A. Walker's census of 1880, and in publications of the 1890 census completed under the supervision of Carroll D. Wright, probably was more significant, both in quantity and quality, than all the university research of the period put together. Today social scientists are numbered by the thousands and social research is carried on in all universities and by foundations, using Bureau of the Census data as a basis of much of the work.

In the 1880's industry had little interest in statistics. Today large organizations, like the American Telephone & Telegraph Co., General Motors, and the Metropolitan Life Insurance Co., maintain statistical departments rivalling or surpassing those in the Government. In addition to data which they collect themselves, they are large consumers of census statistics. The same, of course, is true of advertising agencies, radio broadcasting chains, and publishers. The use of census statistics by farm organizations, labor unions, and trade associations has increased greatly in the last decade. Through the schools and press the "general public" may be rapidly becoming more "statistically minded." A modern textbook in history replaces picturesque anecdotes about personalities with graphs from census data.

While the rapidly moving social forces were enormously increasing the need, within and without the Government, for census products, the Bureau of the Census has had funds and professionally trained personnel to satisfy only a fraction of these needs.

Relationship With Consumers

The relationships between the Bureau of the Census and the consumers of its products within the Government are for the most part cordial. Sometimes, especially in connection with the work in agriculture, the Bureau has obtained direct financial subsidies through the efforts of organizations better situated strategically. Frequently, representatives of other agencies have aided the Bureau indirectly in its budget battles. One must not lose sight of the fact, however, that many of these agencies regard themselves as competitors of the Bureau of the Census and their cooperation with the Bureau all too frequently is that of one competitor with another. Perhaps the most valuable aid which most of them give is not related to finances but rather to the giving of expert advisory service when requested. Of the more than 2,000 statisticians and social scientists in the professional and scientific classification in Washington, the Bureau of the Census had in its own organization as late as January 1938, only 42. Therefore, the opportunity to use expert advice often arises. The Central Statistical Board has facilitated this interchange of expert advice between agencies, though much of it is obtained informally and personally without use of official channels.

Agriculture

An outstanding recent example of cooperation is that which has grown up between the Bureau of the Census and the United States Department of Agriculture. The Bureau of the Census takes the quinquennial censuses of agriculture and has not had the funds or personnel to carry out the task in sufficient detail to satisfy the pressing needs of Government agencies administering crop control and other farm legislation.

In 1935 the Secretary of Agriculture obtained a million dollars from the emergency drought relief fund which was used by the Bureau of the Census in securing special data concerning drought areas. Based on

[15] Letter to Francis A. Walker, January 17, 1874. Quoted in James P. Munroe, *A Life of Francis A. Walker*, p. 125.

this census, a number of cooperative studies were made, largely with Department of Agriculture funds. A partial list of these projects is as follows:

With AAA.—Preparing elaborate minor civil division figures for use of the AAA, Resettlement Administration, and TVA; a rent survey; special tabulations of corn and potato acreage and production; check-up on crop failures in connection with the crop insurance program; farm labor project.

With Bureau of Agricultural Economics.—Poultry by size of flock; numbers of days worked off farms by farm operators; cows by size of herd; special mortgage tabulations.

With Demonstration Service.—Compiling special county and township statistics to help in allotment, AAA contract enforcement, and educational work.

With Social Security Board.—Tabulation of number of farm laborers in frequency groups.

With Farm Credit Administration.—Value of farm land and buildings per acre in the United States, by minor civil division.

The methods of determining the questions to be asked and the tabulations to be made on the 1940 census illustrate the cooperative procedure. Following approval, by the joint advisory committee of the Bureau of the Census and the Department of Agriculture, of a trial schedule, the field force of the Department of Agriculture has been trying the schedule out in a sample enumeration. A variety of experimental tabulations will be made and the results will be discussed at a joint meeting.[16] Meanwhile, the Department of Agriculture has a special committee entirely of its own members which has received suggestions and sifted out the more pressing demands. Over 600 different questions were originally proposed. The questions agreed upon will be further discussed by the joint advisory committee. Final authority, of course, rests with the Director of the Census.

In view of the remarkable strength of the Bureau of Agricultural Economics in professionally trained social scientists and in view of the far-flung field organization of the Department of Agriculture, with its more than 300,000 persons, including crop reporters, there have been frequent suggestions that the Bureau of the Census turn over to the Department of Agriculture all responsibility for the Census of Agriculture, except for mechanical tabulation.[17] Final responsibility for approval of schedules, and for field work, tabulating schemes, and publications now rests solely with the Director of the Census. At least three objections have been offered to such change as has been proposed: (1) It is not only economical, but also technically desirable, to have the population schedules carried in rural areas by the same enumerators as the Census of Agriculture; (2) there is a possibility that the preoccupation of the Department of Agriculture with current legislation which it must administer would preclude adequate attention to those broader social and economic questions—relating to farm population, for example—which are only indirectly related to immediate regulatory problems; (3) cooperation between the Bureau and the Department of Agriculture seems to be improving all the time.

[16] This study is considering such things as wording and number of questions, arrangement of the schedule, fatigue of enumerators and respondents, characteristic errors and means of avoiding them, time, costs, farmers' reactions to questions and enumerators' bias. Tabulation experiments will include a comparison of the efficiency of 45 and 80 column cards, the possibilities of the serial hook-up of present machines, and the advantages of using combined adding machines with unit counters.

[17] The Bureau of the Census has proposed that substantially this arrangement be made in annual sample censuses of agriculture if authorized, but has not favored it for the quinquennial censuses.

Population

Those branches of the Bureau's activities dealing with general population, and with industry and trade, have not been in as fortunate a situation for receiving subsidization as its work pertaining to agriculture.

The Division of Population, which has the responsibility for the schedules and publications of the decennial census of population has been aided in some ways by research organizations outside the Government as well as within. Particularly close working relationships exist with the Milbank Fund and the Scripps Foundation. The personal friendship and mutual respect which exists between members of the Division and the staff of these agencies, stimulates a frequent interchange of ideas and criticisms. When the Bureau's budgetary difficulties prevented completion of some important monographic studies based on the 1930 Census, these agencies came to the rescue. The Milbank Fund is completing a large study of family size, planned by Dr. Leon E. Truesdell, Chief Statistician for Population in the Bureau, and the Scripps Foundation carried out, with the aid of funds from the National Resources Committee, an extensive study of differential fertility. Other examples of cooperation between the Division and outside research persons might be cited. Because Dr. Truesdell's Division has been almost literally starved for funds (not receiving a dollar for research to investigate ways of improving the 1930 Census) research work done outside of the Bureau is all the more important to aid in the formulation of ideas for 1940. Three illustrations of such research may be cited, each relating to a major field in which there is great need for new statistics:

(1) *Mobility.*—The W. P. A. and the Michigan Emergency Relief Commission, aided by an advisory committee of population experts, are making an elaborate sample tabulation of internal mobility based on the Michigan census of 1935. This study is experimenting with a variety of cross-classifications, with a view of making the tests as useful as possible to the Bureau of the Census.

(2) *Metropolitan areas.*—The research committee on urbanism of the National Resources Committee attempted to synthesize the available data on urban communities, especially for entire metropolitan areas, and uncovered many serious statistical gaps which need to be closed. The interim report of this committee, dated July 1936, is particularly helpful in showing the importance of some of the social and economic problems for which specific new urban Census data are necessary.

(3) *Employment status, industry and occupation.*—The Committee on Social Security, operating in Washington with a grant from the Social Science Research Council, has made one of its major tasks the exploration of needs of the Social Security program for Census statistics. An elaborate study by Dr. W. S. Woytinski has been published,[18] endeavoring to reclassify the 1930 census data by employment status, industry, and occupation in a form useful to Social Security. This analysis opens up a number of new problems and makes many concrete suggestions for changes in procedure. A memorandum to the Census Advisory Committee by the former executive secretary of the Committee on Social Security, Dr. J. Frederic Dewhurst, outlines further suggestions, based in part on Dr. Woytinski's studies.

Industry and Trade

Becoming of greatly increasing importance is the basic reporting of the Bureau of the Census with respect to industry and trade. In some aspects of this great task the Bureau receives cooperation from other Government agencies in carrying on field work. Notable is the help of the Bureau of Mines, the Forest Service, and the Federal Communications Commission, which play a large part in the censuses of mines, forestry, and electrical industries, respectively. The Bureau of the Census has close working relationships with many other agencies.

Many Governmental Contacts.—Within the Government, particularly close relationships exist with the Central Statistical Board. The new assistant chief statistician of the Division of Manufactures in the Bureau had been for 2 years a member of the Board's staff devoting most of his time to a study of the problems of the Division. There are close working relationships with statisticians in the Bureau of Labor Statistics, the Bureau of Foreign and Domestic Commerce, the Federal Reserve Board, the United States Employment Service, the Bureau of Internal Revenue, the Tariff Commission, the Bureau of Mines, the Federal Trade Commission, the Federal Communications Commission, the Interstate Commerce Commission, and the bureaus of many State governments.

A concrete example of the type of cooperation which has been established is the work of an inter-agency Committee on Industrial Classification. For years it has been recognized that the antiquated industrial classification of the census of manufactures and inconsistencies from census to census in allocating particular plants to given categories prevented realistic research. The situation was made all the worse because the industrial classification of the Bureau of Labor Statistics and of other agencies also left much to be desired and were not comparable with each other or with the Census of Manufactures. A subcommittee of the Central Statistical Board, comprising representatives of six Federal agencies including the Bureau of the Census and of one State agency, is now preparing a standard industrial classification. The hope is to secure an agreement not to change the classification oftener than once in 5 years and to refer any questions in the interim to an inter-agency "supreme court." where rulings will be final.

Non-Governmental Contacts.—Outside of the Government such organizations as the National Bureau of Economic Research and the National Industrial Conference Board, as well as research men in schools of business, departments of economics in universities, and private firms like Stevenson, Jordan, and Harrison (management engineers), are active advisers of the Bureau. There is a formal advisory committee from the American Manufacturers Association.

The importance of the Bureau's work in the field of industry and trade is so great that some observers have felt that the Bureau might look in this direction for a kind of support analogous to that received by the Bureau of Agricultural Economics from agriculture, and the Bureau of Labor Statistics from labor. While the Bureau has maintained cordial relationships with trade associations and trade journals, and, through its strict rules of secrecy, has established confidence that the schedules would not be turned over to regulatory bodies like the Bureau of Internal Revenue or Federal Trade Commission, nevertheless, there are intrinsic difficulties in the way of eliciting from industry the kind of support which other agencies receive from agriculture and labor.

Handicaps to Business Support.—Unless the Bureau's service appears indispensable to the business man, he is not likely to fight for adequate appropriations, which would have to come from taxes. There are two handicaps: (1) The census of manufacture gets out the raw ore and perhaps produces some pig iron, but the consumers' goods, which the manufacturer sees in the reports of the Bureau of Foreign and Domestic Commerce, in his trade journals, or in the reports of private statistical organizations, are fashioned in agencies other than the Bureau of the Census; (2) the manufacturer's personal contact with the Bureau of the Census is largely restricted to filling out a long schedule, which he has a tendency to regard as a

[18] W. S. Woytinski, *The Labor Supply in the United States*, Washington, 1937, and *Labor in the United States: Basic Statistics for Social Security*, Washington, 1938.

nuisance, like his income tax returns and social security forms.

A realistic understanding of the problems of getting support, in a democracy, for work basic to all the social sciences, requires a somewhat more detailed consideration of such a practical situation as this.[19]

Agencies other than the Bureau of the Census have established prior claims on the privilege of issuing the type of reports which would make the manufacturer more conscious of the Bureau's importance. For example, among the most important series of index numbers in the country are indexes of industrial production (prepared by the Federal Reserve Board), indexes of commodity prices (prepared principally by the Bureau of Labor Statistics), and indexes of employment and payrolls (prepared by the Bureau of Labor Statistics). Perhaps not one manufacturer out of a hundred knows that the biennial Census of Manufactures is an indispensable basing point for the adjustment of weights and a check on coverage of these indexes. Interpretative analyses of current conditions within a given industry are the function not of the Bureau of the Census, but of the Bureau of Foreign and Domestic Commerce. Monthly figures for several hundred individual industries are collected by many different agencies. Here the Bureau of the Census saw an opportunity to render a service direct to influential consumers. It entered this field of current reporting. This was encouraged in the 1920's under Secretary Hoover. By 1925 it was collecting 28 series, by 1930, 44, and by 1937, 59.[20]

While the Bureau's current industrial reporting is doubtless motivated by a desire to render a needed and easily appreciated service, it cannot be said that large taxpayers are in wholehearted agreement that this service is a proper function of government. Indeed, a special committee of the Business and Planning Advisory Council for the Department of Commerce, comprising Walter S. Gifford, Pierre S. du Pont, and William A. Harriman, with Donald R. Belcher as executive secretary, took an opposite view:

> "In the interests of economy and efficiency," advised this committee, "the ideal system would be one under which properly constituted trade associations performed the entire job of primary compilation for the two-fold purpose of assembling the comprehensive data needed by the membership of the industry and of preparing the limited statistical information which should be made public. * * * The efforts of the Department of Commerce in bringing about more extensive reporting of industrial statistics should be centered primarily upon the encouragement and promotion of the statistical activities of the trade associations themselves."[21]

Expression of much the same attitude can be found elsewhere, from business sources.[22] In some cases, trade associations desire to keep important data as a trade secret. Moreover, biases can enter into privately collected statistics or carelessness permit gross inaccuracies. Standards improved rapidly under the National Recovery Administration, but afterwards deteriorated in many instances. It is said that the majority of trade associations which first began collecting statistics under the National Recovery Administration have discontinued the work entirely. The opinion of several of the country's ablest economists, with whom the writer discussed this problem, is in agreement with the position of the Committee on Government Statistics of the Social Science Research Council and the American Statistical Association, which advised:

> Generally speaking, Government agencies cannot rely with assurance on the maintenance of standards in the private collection of statistics. Important facts now compiled by government agencies should not be relinquished unless private compilers can demonstrate clearly their ability and willingness to maintain criteria of excellence at least equivalent to those established for government reporting. * * * When privately collected data satisfy reasonable criteria of accuracy and dependability, government agencies should not hesitate to make use of such sources, thus husbanding their limited resources for work along lines less adequately covered. Where trade associations refuse or are unable to establish adequate standards, or fail to maintain them, the appropriate government agency should continue or resume direct collections of data

[19] The hope was entertained in some quarters that the Bureau of Foreign and Domestic Commerce would develop to such a point that the service it might give to business would be comparable to that given by the Bureau of Agricultural Economics. At the beginning of the present administration, the Bureau of Foreign and Domestic Commerce was drastically curtailed, and all of the positions except lower clerical grades were removed, by executive order, from the classified Civil Service. It is hoped by the Bureau that all positions in Grade 5 and above will be restored to Civil Service under Executive Order No. 7916 of June 24, 1938, effective February 1, 1939. This Bureau has field offices and a field staff, but it has not yet developed a scientific atmosphere comparable to that of the Bureau of Agricultural Economics. In face of the handicap due to the insecurity of tenure of the higher appointments in the Bureau of Foreign and Domestic Commerce, the outlook is not encouraging. Theoretically, a strong argument could be made for building around the Research Division of the Bureau of Foreign and Domestic Commerce and the Manufactures and Distribution Divisions of the Bureau of the Census a new Bureau of Industrial Research, which might be to industry what the Bureau of Agricultural Economics is to agriculture and the Bureau of Labor Statistics is to labor. Practically, such an arrangement would be no improvement, unless such an organization could have a scientific atmosphere such as has dominated the Bureau of Agricultural Economics from its beginning and such as has been developed in the Bureau of Labor Statistics under Commissioner Isador Lubin.

[20] Three of these inquiries—on men's, youths' and boys' clothing, boots and shoes other than rubber, and flour and other grain-mill products—involved monthly reports from over a thousand separate concerns each, and many others required reports from 500 or more. The coverage in some cases was so large that delays in release of the reports occasionally occurred.

[21] *Reporting of Industrial Statistics*, Report of the Committee on Statistical Reporting and Uniform Accounting for Industry to the Business and Advisory Council for the Department of Commerce, September 17, 1934, pp. 5–6.

[22] See, for example, S. M. DeBral, "A Proposal for an Integrated Program for the Reporting of Business Statistics to Government Agencies," *Journal of the American Statistical Association*, XXXI (March 1936), 53–57.

which are of general public interest, even though such action involves a duplication of effort.[23]

It is clear that however valuable the Bureau's current industrial reporting might be to economists, or to a Government agency, which, for example, wanted unbiased data for use in arbitrating a labor dispute, this work is not necessarily an unmixed blessing to the Bureau from the standpoint of winning general support from industry.

Need of a field staff.—An old dream of friends of the Bureau of the Census which has not materialized is the possession of a permanent field staff, with regional headquarters in important cities. If each headquarters could be in charge of a full-time man who not only understood the technical statistical problems of the Bureau of the Census, but also had the dynamic qualifications of a good sales manager, and the personality to win the respect of trade associations, chambers of commerce, and individual manufacturers through public addresses and private conferences, the problem of winning the cooperation of industry for the whole Bureau program might be on the road to solution. Moreover, such a field office could be a headquarters not only for the Census of Manufactures and Census of Business but also for the Census of Population. Instead of temporary supervisors or low-paid career clerks temporarily dispatched from the Washington office, the Bureau of the Census would have permanent representatives who would get the work done and build prestige.

The Bureau has had ample opportunity to observe the importance of a permanent field staff. An example may be cited. The Census of Mines and Quarries is the responsibility of the Bureau of the Census. Since the Bureau of Mines has field representatives throughout the mining areas, the responsibility for the collection of the data was turned over entirely to this staff at the last Census. These men understood such difficult technical problems as determing whether a given mine was a copper, or silver, or zinc mine and they knew intimately most of the establishments from whom schedules were to be secured.

Rules of secrecy.—If closer continuous contacts could be established with industry by the Bureau of the Census, it might be possible eventually to relax to a greater extent the rules of secrecy, which guarantee that no information about an individual firm will be revealed. The presentation of only fragmentary data for States and cities in the published tables of the Census of Manufactures whenever a full report would reveal facts about an individual plant is a large price to pay for cooperation. The absurd totals which appear for many States and cities exasperate almost everybody who tries to put the data to scientific use. The Committee on Government Statistics felt so strongly on this point that it recommended that complete figures on at least the total number of wage earners be published for all geographic areas and that special legislation be passed, if necessary, to modify the secrecy rule.[24] So much suspicion on the part of manufacturers is encountered, however, lest their census reports fall into the hands of the Federal Trade Commission or the Bureau of Internal Revenue, that the Bureau of the Census is leaning over backward to protect respondents. Otherwise, the Bureau fears that it could not get responses without resort to legal pressure or else that the statistics would be "doctored." Every Bureau letterhead carries in red ink the words "Your Census Reports are Confidential" and the campaign to win confidence and secure accurate replies is perhaps more active today than ever before.

Federal-State Relationships in Vital Statistics

Frequently one hears suggestions that the statistical work of the Federal Government be decentralized and a larger proportion of the task be performed by the individual States. The experience of the Bureau of the Census in connection with vital statistics—that is, statistics of births and deaths—provides an illuminating illustration of the type of problems encountered.

The State boards of health collect the vital statistics and they are also among the foremost consumers of these statistics, using them in various public health programs. The Division of Vital Statistics in the Bureau of the Census compiles national figures based on the birth and death certificates which are collected by the States and transcribed by the States for transmission to Washington. The Bureau of the Census subsidizes the States in their work.

The Federal Government, for reasons discussed in Part I of this report, lagged far behind most of the European countries in developing current national reporting of births and deaths. A strong motivation for establishing a permanent Bureau of the Census was the recognition of the need, by public health officials, actuaries, and students of population, of better national vital statistics than were obtained once in 10 years in the house-to-house canvass for the Census of Population.

Beginning as of 1900, the Bureau adopted the plan of establishing registration areas for births and deaths. States would be admitted which passed uniform legis-

[23] *Report of Committee on Government Statistics*, pp. 32–33. There are several Committee memoranda on the subject, listed in Appendix C of the Committee's report.

[24] *Report of Committee on Government Statistics*, p. 48.

lation to require the information and which satisfied the Bureau, through field tests conducted by its investigators, that registration was at least 90 percent complete. The six New England States, together with New York, New Jersey, Indiana, Michigan, and the District of Columbia, some of which had been collecting vital statistics for many years, were admitted to the death registration area at once, but it was not until 1915 that a birth registration area could be established.

The long, hard, often discouraging campaign which was fought to bring States, one by one, into the fold constitutes one of the proudest chapters in the history of the Bureau of the Census. Like Grant before Richmond, the progress was slow, but the Bureau kept stubbornly pounding away until in 1933 the two registration areas included the entire Nation. The Bureau, of course, did not make the fight single-handed. Its consumers were loyal allies. Committees of the American Public Health Association, American Statistical Association, and American Medical Association, the National Tuberculosis Association, and representatives of the leading life insurance companies were in the forefront of the battles. In some States the boards of health had to be educated to the need, before citizens of that State could approach the legislature. In others, the legislatures were apathetic, in spite of strong pressures. After the required legislation was passed, there remained the problem of bringing a State up to the minimum quota. Each State had to educate its physicians and undertakers as to their duties, as well as an army of local registrars. The Bureau aided the State registrars in preparing promotional publicity and facilitated the exchange of ideas as to the most effective ways of presenting public health data to the general public.

In order to keep up an *esprit de corps* in the States, an Association of State Registrars was formed, and the Vital Statistics section of the American Public Health Association provided an annual forum for the discussion of practical and scientific problems.

The Division of Vital Statistics had its own advisory committee, comprising representatives of the American Public Health Association. There were frequent contacts with life insurance companies, particularly the Metropolitan, with the United States Public Health Service, and with private research organizations like the Milbank Fund.

The most rapid progress in completing the registration area was in the 1920's. It was in this period that most of the Southern and many of the Western States came in. It is now known that many of the later States which were admitted were well below the minimum standard in reporting births and also, probably, infant deaths. The desire to complete the registration areas as rapidly as possible is understandable. It was not until P. K. Whelpton of the Scripps Foundation published a study in 1934 that the probable magnitude of the errors became appreciated.[25]

With the acquisition of a new Chief Statistician, Dr. Halbert Dunn, in 1935, the work of building up the reporting in the States was accelerated. He and his assistant chief went from State to State, analyzing the difficulties, listening to the experiences of the State registrars, and offering suggestions. A fund of information was collected in these contacts. In order to facilitate exchange of ideas a sprightly periodical called *The Registrar* was edited in the Bureau, with many contributions from the State Registrars.

The relationship between the Division and other agencies which use the data of the Division, such as the Children's Bureau and the Social Security Board, as well as life insurance and other private research organizations, is cordial. There is a free interchange of ideas.

In consulting with advisers, the Bureau is frank about its problems. They are not all solved. The birth reporting in some States still may be less than 90 percent complete. There are still many troubles in the way of allocating births and deaths to place of residence. Post census estimates of populations are so uncertain as to introduce large errors into rates. The ideal base population to which to relate deaths from automobile accidents has not yet been found. Causes of death are still badly reported—especially those from noninfectious diseases. There is still too long a time elapsing between the birth or death and the published tables. There are tricks in tabulation and ways of using micro-photography which need further development.

It took 33 years to establish, through Federal-State cooperation, registration areas which nominally included the entire country. It may take 10 more years before a reasonably complete reporting system is established. The experience of the Division of Vital Statistics indicates the difficulties in the way of State-Federal cooperation. The success was due to some general initial recognition of the need for vital statistics, to aggressive leadership from Washington, to the willingness of national committees of social scientists and public health research men to take time to promote an educational campaign, and to the willigness of local people in each of the 48 States to take time to steer bills through their legislatures. The man-hours of self-sacrificing energy which went into the promotional work are enough to make one pause before

[25] P. K. Whelpton, "The Completeness of Birth Registration in the United States," *Journal of the American Statistical Association*, volume XXX, June 1934. Further research has confirmed Whelpton's general conclusions, though not all of the details.

urging similar campaigns. And it is only by maintaining ceaseless vigilance in Washington that all of the State boards of health—even though they, themselves, may be the most important public consumers of the statistics—can be kept operating at an efficient level in their reporting.

Advisory Committees to the Director of the Census

This section will conclude with a brief review of the work of the formal advisory committees to the Director of the Census, other than the special advisory committees concerned with the work of particular divisions. The first permanent advisory committee to the Director was established by continuing in existence the Committee, comprising representatives of the American Economic Association and the American Statistical Association, which cooperated with the Director at the time of the 1920 census. This was the formal outgrowth of a long history of advisory service.

Historical Background.—For over a century scientific and learned societies have exerted an influence on the Census.[26] As far back as 1800, the Connecticut Academy of Arts and Sciences, through its president, Timothy Dwight, and the American Philosophical Society, through its president, Thomas Jefferson, memorialized Congress to include more data in the Census. One of the earliest acts of the American Statistical Association was to call the attention of Congress to errors in the returns of education and deaths in the 1840 census. A committee of the American Statistical Association, headed by Lemuel Shattuck, one of the founders of the society, drafted the plan adopted in 1850 to change the unit of enumeration from the household to the individual. Francis Walker, director of the Census in 1880 and 1890, was for several years president of the American Statistical Association, and consulted freely with his colleagues. Prior to the 1900 census, a committee appointed by the American Economic Association reviewed past enumerations and made detailed recommendations which were published in a volume of 500 pages.[27] The secretary of this committee, Dr. Walter F. Willcox, later had an important part in the 1900 census.

The director of the 1920 census, like some of his predecessors, was a political appointee, without either scientific training or census experience, and the joint committee of the American Economic Association and the American Statistical Association actually took considerable responsibility for technical problems, working closely with Dr. J. A. Hill and Dr. Hill's assistant at the time, Dr. Henry Schultz. The committee introduced the idea of publishing separate census monographs and aided in selecting and securing experts from outside the Bureau to prepare some of them. The record shows that the committee made 118 formal recommendations to the Director up to 1922.

Present Status.—The services of the advisory committee have been called on frequently since. The committee now is selected solely from the membership of the American Statistical Association. There has been some criticism of the committee's later activity, to the effect that for a time it exercised insufficient initiative, merely approving or disapproving proposals by the Bureau. The importance of such "rubber stamp" functions should not, of course, be minimized, since a formal expression by the advisory committee gives the Director of the Census needed support when he goes before the Secretary of Commerce, the Civil Service Commission, the Bureau of the Budget, and Congress. But criticisms of lack of initiative on the part of the committee probably overlook the important effect of informal conversations which never get on the formal record. In fact, the committee's major influence may be of such a character.

Without doubt, in most situations, the effectiveness of any advisory committee's work depends much on the attitude of an agency's administrative head. He can occupy the committee's time with minor details, some of which may involve technical internal administrative problems with which the committee is hardly competent to pass judgment, and thus prevent discussion of major issues which might elicit suggestions for disturbing changes in policy. On the other hand, he can encourage the committee to take the initiative. The relationships between the present advisory committee and the Director of the Census are cordial, according to all information which the writer has received. The Committee has not hesitated to take the initiative. For example, the committee on its own responsibility arranged a joint conference with the American Statistical Association's Committee on Labor Statistics, at which problems of the relationships of the Census to Social Security were reviewed.

Miscellaneous

The foregoing account of some of the types of relationships of the Bureau of the Census with its consumers is illustrative and impressionistic rather than complete. It omits reference to several important Divisions of the Bureau—for example, the Division of Financial Statistics of Cities, which compiles basic data on municipal revenues and expenditures—and has not discussed the variety of more or less mechanical service jobs done by the Bureau for other agencies.

[26] See *Final Report of Joint Census Advisory Committee*, December 30, 1922, for a detailed review of this record.

[27] Walter F. Willcox, editor, *The Federal Census: Critical Essays by Members of the American Economic Association*, New York, 1899.

The Bureau's pool of tabulating equipment enables it to perform a function with respect to mechanical tabulations similar to that of the Government Printing Office with respect to printing. Just as there is a growing tendency to circumvent the Government Printing Office, with its delays and its alleged heavy charges, by using lithoprinting on an agency's own equipment, so there is also a tendency for agencies to avoid having to go to the Bureau of the Census for its tabulations. Each agency seeks to control its own tabulating equipment, when possible. This tendency is also analogous with the tendency to develop special libraries within an agency, independent of the Library of Congress.

Summary

The vast increase in the consumption, public and private, of census data in the past half century was described. The new functions of government with respect to agriculture; industry and trade and labor; social security; and State and national planning have created undreamed of demands for the products of the Bureau of the Census. Similarly, the consumers in university research and business, among the public have multiplied many fold. While rapidly moving social forces were creating new needs for census products, the Bureau of the Census has not had the funds and professionally trained personnel to satisfy these needs to the best advantage.

The key to an understanding of the Bureau's financial difficulties probably will be found in its lack of close identification with a pressure group commanding votes. Its services are almost universal and those statistical agencies serving special groups are more likely to be the beneficiaries of special appropriations. Although other Federal agencies are in one sense competitors of the Bureau, there are examples of cooperation in cases where the agencies are heavy consumers of Census data. The outstanding example cited was the financial aid and technical assistance given by the Department of Agriculture. Assistance of private research organizations to the Division of Population also was cited. In the field of industry and trade, there may exist an opportunity for the Bureau of the Census to perform a function analogous to that performed by the Bureau of Agricultural Economics for agriculture or the Bureau of Labor Statistics for labor. Yet the analogy would be difficult to support, since the Bureau of the Census is primarily a producer of raw data and the "finished goods" are passed on to the business man by other agencies such as the Bureau of Foreign and Domestic Commerce. The Bureau of the Census is further handicapped by the lack of a permanent field staff.

The sketch of the Division of Vital Statistics provided an example of consumer cooperation in establishing State-Federal relationships in statistical work. It took 33 years to complete registration areas for births and deaths, and an enormous contribution of time on the part of officials in the Bureaus, State health officers, and committees representing such organizations as the American Public Health Association, American Medical Association, and American Statistical Association, as well as Life Insurance Companies. Forty-eight State legislatures had to be induced to enact uniform statutes and an intensive promotional program was necessary, in order to educate physicians, undertakers, and local health officers to their new responsibilities.

In describing the work of the formal advisory committee to the Director of the Census it was indicated that informal advice which does not necessarily appear in its annual reports, is perhaps one of its most important functions. The Committee is free to take the initiative, and the present body is doing so. In the more or less perfunctory approval of some questions which it does not initiate, the committee also may be performing a function useful to science, in providing support for the Director when he goes to the Secretary of Commerce, the Civil Service Commission, the Bureau of the Budget, and Congress.

III. SELECTION, TRAINING, AND PROMOTION OF PERSONNEL

Problems of getting and keeping adequate personnel in the Government agencies carrying on social science research differ somewhat from agency to agency. While there are some problems common to all agencies, the difficulties are perhaps more acute in old established organizations like the Bureau of the Census than in new agencies.

The roster of men who at one time or another have worked in the Bureau of the Census includes many of the foremost names in American social science. At the beginning of the century the Bureau's staff included such men as Dr. Wesley C. Mitchell, Dr. Allyn A. Young, Dr. Walter F. Willcox, Dr. Thomas D. Adams, and Dr. Joseph A. Hill. Of these men, only Dr. Hill made a career in the Bureau. At each decennial census many able men with professional training in statistics and economics or sociology were brought into the Bureau, but most of them left for other Government agencies or university posts. Bureau of the Census training is an invaluable experience. There is no reason why the Bureau should not serve as a practical training school for statisticians who will

assume posts of leadership elsewhere. But the work of the Bureau is of such fundamental importance to social science generally that the Nation cannot afford too great an exodus, especially if the process of selection should leave behind the less qualified individuals, protected in seniority by Civil Service.

In spite of the auspicious beginning in 1902 and in spite of several very able subsequent additions of professionally trained men who remained permanently, the Bureau of the Census did not keep pace, up to 1933, with the needs for professional leadership in its more important positions.

By January 1, 1933, there were in the classified civil service in Washington more than 2,000 statisticians and social scientists. Of these, the Bureau of the Census had only six, and of these six only one was under 45 years of age. Some of the most important technical posts in the Bureau were in the control of men with little education beyond high school. In the entire Division of Manufactures, which compiles the most important economic data in the Nation, there was nobody who had had a graduate course in economics. While many newer statistical agencies were thriving under the leadership of men with advanced university degrees in statistics and economics, the Bureau of the Census, in some of its divisions, was running on the momentum of an earlier day.

The explanation of this condition, in the opinion of the writer, is two-fold. On the one hand, some of the directors of the Bureau were appointed without respect to scientific qualifications. They had little or no interest in maintaining or improving scientific standards. This type of appointment was a direct outgrowth of the century of American tradition, traced in part I of this Section, of close association between census taking and politics. On the other hand, when an occasional director had the will to improve the quality of the personnel, he met almost insuperable obstacles through lack of funds. The Bureau of the Census was not acquiring new functions. The new functions were being allocated to other statistical agencies. The only new appointments could be replacements, and under civil service regulations, opportunities for making replacements were few.

Under the leadership of the present director, William L. Austin, who understood the basic problems of the Bureau as the result of a lifetime in its service, the rehabilitation which has taken place, at a time when the Bureau's budget is the lowest in many years, has been remarkable. The number of men in the Bureau with a professional and scientific classification has grown from 6 to 42. The key positions of chief statisticians in the divisions are being given to men with a modern university training in statistics and the social sciences. In view of the thousands of university trained people now in the Government service, the increase from 6 to 42 professional and scientific people in the Bureau of the Census may seem small to an outsider. It is only when one has such a perspective of the Bureau's background as is presented in part I of this Section that one can appreciate how great is this accomplishment.[28]

It will be helpful to consider separately in some detail the personnel problems related to various types of positions.

The Higher Positions

The problems encountered by the present administration of the Bureau in the effort to place more of the key positions in the hands of men with professional training in statistics and the social sciences will illustrate certain difficulties which would be common to any Government agency. However earnest the desire to make improvements, these improvements can only be made gradually unless an agency is expanding. There are two main difficulties, as follows:

1. The principle of protecting civil service tenure must be respected.
2. When a vacancy in a high position occurs, it is difficult to find the right man to fill it, because—
   (*a*) The combination of administrative ability and professional eminence is rare.
   (*b*) The salary scale is low.

These factors could and, perhaps do, constitute problems for most Government statistical agencies. Let us review them briefly.

Difficulties Encountered

The principle of protecting civil service tenure must be respected. In practice, it is undesirable and difficult, and indeed all but impossible, for any agency to demote a conscientious division chief whose principal fault is his lack of professional competence for the post he holds. Almost the only practicable course is to create a new position in the organization which will use his experience without loss to him of civil service status. This puts a strain on an agency's budget, produces an illogical and unbalanced organiza-

[28] The director has had unusually able assistance. Dr. Stuart A. Rice, of the University of Pennsylvania, a former president of the American Statistical Association, was appointed assistant director in 1933, resigning in 1936 to become chairman of the Central Statistical Board. Dr. Rice's successor is Dr. Vergil D. Reed, an economist with census training and a background of successful business experience. Another acquisition was that of Mr. Oliver C. Short as executive assistant to the director. Mr. Short had made a notable record as director for 15 years of the Maryland State Employment and Registration System, and had been in charge, under the Governor, of the administration of the State merit system law, which is widely accepted as a model statute. The experience of Dr. Joseph A. Hill, which spans nearly 40 years of Bureau history, has been particularly useful, as have the general services to the director of Dr. Calvert L. Dedrick, formerly of the faculty of the University of Wisconsin, who entered the Bureau in 1935.

tion chart, and, if indulged in too frequently, might engender a loss of morale to the whole organization not compensated for by the specific gain in a particular division.

When a vacancy in a high position occurs, it is not easy to find the best man to fill it. There are two main reasons:

(*a*) The combination of administrative ability and professional eminence is rare. The academic person, viewing a Government agency from the outside, is likely to forget that a principal function of the organization may be, in some respects, that of a factory. Many a man who is recognized among his colleagues as an outstanding economist or sociologist would be a complete misfit as an executive in a manufacturing plant. As has been pointed out, the Bureau in the past has placed in most of its key positions the type of man who might run a factory, irrespective of his professional qualifications. Under the present director the Bureau has been looking for the combination. Great caution in selection has been exercised, since under the civil service system an error of judgment in the selection can not be easily corrected.

(*b*) Even if a man can be found, possessing the ideal combination of administrative ability and professional eminence, it may be difficult to induce him to accept, because of the low salary scale. While the salary scale for division chiefs, $5,600 to $6,400, compares favorably with that of the average university, it is probably low compared with what a man possessing the requisite combination of administrative ability and professional knowledge could get outside the Government. Consider the responsibilities, for example, of the chief of one of the divisions in the Bureau, namely, Vital Statistics. He must be a combination of promoter, scientific man, and administrator. Since he must obtain the cooperation of medical men and State health officers to promote more complete and accurate reporting, he not only must have an engaging personality, but also must be able to command respect and confidence. This makes it almost essential that he have the M. D. degree. But to provide tabulations of the maximum utility, he must also understand the technical problems of the students of public health and population, who are analyzing vital statistics, in and out of the Government, for administering health programs or for making additions to knowledge in several scientific fields. This requires the kind of understanding on the part of a chief which only actual research experience of his own, at least the equivalent of that of a student receiving the Ph. D. degree, can give. Finally, he must be able to superintend a factory receiving and processing four million schedules a year. Since he must delegate much of his work, he must know how to select the right subordinates and how to appraise their work and their judgment. For all this responsibility, the Bureau of the Census pays $6,000 a year. It happens that the man selected by the present Director of the Census for this task, has the required combination as probably nobody else in the United States. But he came to the Bureau at a large financial sacrifice to himself, actuated by the desire to perform a public service in a field which was central to his interests. The field of vital statistics is not an isolated example. If one considers the responsibilities in other fields covered by the Bureau of the Census—that related to manufactures, to mention only one other—the difficulty of finding men with the requisite combination of abilities who will make the financial sacrifice to serve the Government is evident. When one thinks of salary scales in industry, it is not hard to realize what a problem it is to induce a man to assume, at $5,600 entering salary, a position which calls for a leader who can command the respect of university and governmental economists, of business executives, and of chambers of commerce and trade associations, and at the same time superintend the operations of a statistical factory. With respect to manufactures, under the immediate leadership of the assistant director, Dr. Vergil D. Reed, and the new chief and assistant chief of the Division of Manufactures, remarkable progress has been made in the past 2 years.

The fear is sometimes expressed that the unavailability of men with the requisite combination of administrative ability and professional training may necessitate a modification of the effort to seek this combination of qualifications for division chiefs. Two suggestions have been offered:

Proposed Remedies

Appointing Division Chiefs Primarily on the Basis of Administrative Ability and Subordinating the Professionally Trained Man, Who Would Then Be Free From Administrative Responsibilities.—There are disadvantages in such an arrangement which would make its success doubtful in most cases. For example: If the professionally trained man is kept subordinate to a nonprofessionally trained chief, his low salary limit and lack of opportunity for advancement will not provide an attractive future. Even if the Bureau could induce able economists to enter on this basis, it could not retain them. Moreover, opportunities for conflict and mutual misunderstanding between two types of mind would be ever present. The chief might resist suggestions for change on the ground that the suggestions were "academic" or "highbrow" or "contrary to census policy" and in many cases he might be quite justified. The assistant chief, unless he had a

sense for administrative difficulties, might be a constant annoyance with impractical ideas and, if the ideas were not accepted, become quite discontented. In rare cases, where both men had unusual tact, generosity, and awareness of mutual limitations, effective team work might be possible. On the other hand, if the professionally trained man were made chief and most of the administrative responsibilities were delegated to an assistant chief without professional training who is an expert factory superintendent, the problem of salary for the former might be solved, but the problem of conflict suggested above would remain and the arrangement might be disastrous, if the chief lacked sound administrative judgment. The responsibility for decisions must rest in the chief, subject to review by the director. In rare cases, team work might be possible, but the inherent dangers are obvious.

Making Each Subject-Matter Division a Strictly Factory Unit With No Professionally Trained Man in High Authority in the Division, and Concentrating Professionally Trained Men in an Expanded Central Division of Research.—This arrangement would contemplate much less autonomy in the divisions than now exists, and would limit the responsibility of the division chiefs to the administration of routines. The work of analysis, and the technical research to determine ways of improving the data, would be the responsibility of the Division of Research. This suggestion, insofar as it would contemplate a strong "general staff" of professionally trained men responsible immediately to the director, has much to commend it. In the writer's judgment, one of the most important forward steps the Bureau has taken has been to develop a central research division. But, the writer also believes, the Bureau is correct in rejecting any suggestion of stripping the subject-matter divisions of professionally trained men. The objections are several:

(*a*) There is no way, at present, by which adequate salaries could be paid to a sufficient number of experts attached to a single division like a Division of Research. Under existing personnel policies any effort to place, in a single division, more than three or four people at salaries higher than, say, $3,800 a year is not likely to succeed. In view of the variety and scope of the Bureau's fields of work—involving such diverse problems as population, mortality, criminology, agriculture, manufactures, trade, and taxation, to mention only a few—it is obvious that an effective "pool" of technical specialists could not be had under such salary limitations. Possibly, some other arrangement might be made—such as setting up several research divisions under an assistant director or detaching experts nominally assigned to the present subject-matter divisions—but these possibilities are problematical. In any case, unless the experts could look forward to receiving, eventually, salaries at least as high as a division chief, the almost inevitable result would be an eventual loss to the Bureau of the best experts and the retention of the poorest.

(*b*) If research minds are more or less isolated from the actual operation of subject-matter divisions, there is a danger that their ideas would become impractical or, even if practical, would get lost in a cumbersome process of transmission. Under such an arrangement, the ideas would have to be transmitted to an already overburdened director or assistant director, who would have to approve or disapprove, and then issue orders to the operating division chiefs concerned.

(*c*) The danger would arise that under a future administration of the Bureau, less appreciative of scientific work than the present administration, the research minds would be sidetracked entirely. We must not forget the tradition, discussed in part I, that the administration of the Bureau is changed with each change of party in power. It would be possible for a future director, if he were not scientifically minded, to take the easy course of letting the "factory" run on its momentum and to avoid the nuisance of deciding whether or not to implement new technical ideas from a "brain trust." The research division could be ignored or abolished. Such a development is quite within the range of possibility. The best insurance policy, perhaps, for protecting future scientific work in the Bureau would be to have professionally trained men, who are also good administrators, in charge of each of the divisions of the Bureau.

The Junior Professional Staff and Opportunities for Promotion

From one professional and scientific man under 45 years of age in 1933 the number in the Bureau of the Census has grown to 18 in 1938.

In the discussion of the chief positions it was pointed out that new appointments depended on vacancies which may be slow to develop if an agency is to keep faith with the civil service and that the salary scale was too low to attract the rare combination of professional training and administrative ability required. With respect to junior positions, it is likewise true that new appointments depend on vacancies which may be slow to develop in an agency not continually acquiring new functions. But the salary scale, especially at the entrance level, is ample—indeed, more than ample—to attract competent young Ph.D.'s in the social sciences in competition with the academic or business world.

The major problem is to provide an environment in which the scientifically minded individual has an incentive for work and to provide opportunity for recognition and promotion. This is a problem which the Bureau of the Census shares, to a large extent, with most of the other statistical agencies of the Government. Only in part is it within the Bureau's own control.

The Bureau cannot alter a situation which makes promotion difficult, especially for a person who has attained a salary of about $3,200. If there is no vacancy at a higher position, the common procedure in some agencies is to rewrite the job specifications for the work now being done by an individual whom the agency wishes to promote. There are distinct limitations, however, on the number of positions of a given grade which one division can have, and the Civil Service Commission is on the alert for attempts to increase salaries by indirection.

While the problem of increasing the opportunities for promotion of the young men who have entered the Bureau in the present administration is largely outside of the Bureau's control, there are at least two ways, somewhat more within the Bureau's control, by which a career can be made more attractive. These are:

1. Further development of a critical, scientific atmosphere within the Bureau.
2. Encouragement of analytical publications, public and private, for which the actual author receives recognition.

The first will depend largely on the leadership at the top. If the progress which has begun under the present director could continue for a decade or two, a critical, scientific atmosphere might conceivably so permeate the organization that it might survive subsequent political vicissitudes. Unfortunately, the scientific flame is still so delicate that there is no certainty of its survival. If the next Director of the Census should be chosen because of his party loyalty, without respect to professional qualifications, and if he is indifferent to or ignorant of scientific work, as some former directors have been, it would not take long to undo the progress which has been made. The higher appointments under the civil service might go, as they have tended to go in the past, to faithful clerks who are rewarded for a lifetime of service in the Bureau. The professionally trained men in junior positions would seek opportunities elsewhere. This eventuality can be forestalled, in part, by establishment of new civil-service job specifications for the key positions, requiring several years of graduate university training in the social sciences. However, an agency cannot write such new specifications until a vacancy occurs, unless the present occupant of the position qualifies thereunder. It would be several years before most of the key positions in the Bureau of the Census could be so described.

The opportunities in the Bureau to encourage analytical publications are discussed in part IV of this Section. Like most Government agencies, the Bureau has not always given prominence to the names of the actual authors of its analytical reports, although a student familiar with government practice in this respect can usually trace the authorship if he goes down carefully through the hierarchy of acknowledgments in a letter of transmittal or a foreword. Recent publications indicate a liberalization of this policy. Moreover, in some of the divisions, notably Vital Statistics, every encouragement is given to junior personnel to write for scientific journals, using Bureau data, over their own signatures. This is most desirable, if the ambitious young Government social scientist is to secure recognition comparable with that of his colleagues engaged in university research.

The Permanent Clerical Staff

The fact that the retirement age in the Federal service is 70 creates serious problems for an agency like the Bureau of the Census, which has so many tasks calling for mental and manual agility. The retirement problem is, of course, beyond the Bureau's control, but this organization happens to suffer in comparison with newer statistical agencies, which will eventually face the same problem unless they continually expand the size of their staffs.[29]

Of the clerks and other employees in the lower and middle classifications, say grade 7 and below, it will be seen that a majority are over 45 and one-third are over 55. The facts may be summarized as follows:

TABLE 1.—*Percentage in given age classes and above, among clerks of grade C. A. F. 7 and below*

	45 years and over	55 years and over	65 years and over
Jan. 1, 1933	59.6	33.0	6.8
Jan. 1, 1938	58.0	32.5	8.3

It should be noted that the Bureau, in making replacements to the permanent clerical staff in the past 5 years, has been able to effect a substantial increase in the number of C. A. F. employees under 30 years of age. On January 1, 1933, there were only 24 under 30 years of age. Five years later there were 65.

The effect of the disproportion of clerks in the older age groups is, of course, to reduce the efficiency in those

[29] The age problem in the statistical agencies in the Government is reviewed, in general, in *The Report of the Committee on Government Statistics* and recommendation made for revision of the retirement provisions of civil service (see pp. 54–65).

operations putting a premium on speed or adaptability. It is true that a great fund of valuable experience is conserved in the clerical staff of the Bureau, but at a cost to productivity, and it would not be surprising if necessary innovations in some of the divisions have been difficult, occasionally meeting outright resistance from section chiefs and other clerks.

Temporary Employees

The permanent force of the Bureau, as has been reported earlier, is a small headquarters staff which serves as the nucleus of temporary armies numbering over 125,000 persons at the time of the decennial census of population and agriculture and over 25,000 persons at the time of the mid-decennial census of agriculture. In addition to these great periodic expansions, there are other fluctuations of work-load necessitating the employment of temporary workers. The number of temporary employees has not fallen below 100 within the past decade. In the present administration, the Bureau has sponsored important Works Progress Administration projects employing several thousand people. Therefore, the figures showing the number of temporary employees directly on the Census pay roll necessarily underestimates the number actually responsible to the direction of the Bureau. The annual reports of the Bureau show 197 temporary employees directly on the pay roll as of June 30, 1934; 1,993 as of June 30, 1935; 806 as of June 30, 1936; 571 as of June 30, 1937; and 375 as of June 30, 1938. The turnover is such that the actual number of different individuals on the temporary pay roll over a year's period is much larger.

It has already been shown, in part I of this Section, how the greatly fluctuating work has created difficult problems for the Bureau. In the past, a disproportionate share of the Director's time which might otherwise have gone to improving the scientific quality of the Bureau's work, has been devoted to negotiations with politicians. Why it has not been possible entirely to avoid the "spoils system," at least as far as field work is concerned, was rather fully discussed in part I.

At each census, for several decades, test schedules have been used to aid in weeding out the least efficient enumerators in advance and to instruct the remainder. Brief instruction, in one form or another, has been given to the supervisors. Just before the 1930 census, the then director, Mr. W. M. Steuart, accompanied by Mr. Ellsworth, who is now chief of the Field Division, made a tour of the United States, lecturing to the politically chosen supervisors and instructing them on the new and highly responsible duties which they were to assume. A written examination for enumerators was devised to aid the supervisors in culling out the less literate candidates. This examination was ingeniously designed, but it was not always administered by the supervisors under circumstances favorable to the best selection.

One of the most important steps in the history of the census for the improvement of the field work was taken in 1934 at the initiative of the present Director of the Census, Mr. Austin, with the assistance of Dr. Rice, Mr. Ellsworth, and the chief of the Agriculture Division, Mr. Z. R. Pettet. This was the decision to appoint and train intensively 40 area supervisors, who would have immediate direction of the 227 district supervisors and 26,000 enumerators needed for the census of agriculture. About 120 candidates for the position of area supervisor were brought to Washington and given a month's intensive school of instruction, on the schedule, on field work, and on accounting. After a battery of written examinations and oral interviews the successful candidates were chosen and sent into the field. The area supervisors then conducted brief schools of instruction for the district supervisors under their direction.[30]

While district supervisors and enumerators were political appointees, it is generally believed that their efficiency was greater as a result of the training and method of selection of the area supervisors. Given a certain educational minimum, the qualities required in an enumerator are standing in the community, the kind of resourcefulness which characterizes a successful salesman, honesty, and industry, and these are difficult qualities to determine from a civil-service examination. With some exceptions, it is said, Members of Congress and local politicians have cooperated conscientiously in trying to recommend qualified persons. The writer's personal experience in the 1930 census with a situation in Chicago, where the local political cooperation was the opposite from conscientious, is said to be exceptional.

Most of the temporary employees in the Washington office are now taken from civil service rolls. This policy dates from Theodore Roosevelt's veto of the bill for the 1910 census, on the ground that "it is of vital consequence that we should not once again permit the usefulness of this great decennial undertaking on behalf of the whole people to be turned into an engine to further the self-interest of the small section of the people which makes a profession of politics."[31] The very large turn-over in temporary employees on the rolls, even in intercensal employees, still creates problems, though a conscientious effort is made to protect the quality of the service through the giving of an efficiency rating to each employee.

[30] A similar procedure was followed in training area supervisors for the 1935 census of distribution, which was taken largely with Works Progress Administration funds.

[31] Quoted in part I of this Section.

It is the judgment of the writer that defenders of the present system would have a good case in maintaining that the "spoils system" permits the selection and retention of a rather high average quality of temporary census employees. Even if they were better than employees selected by any other system, however, a strong argument could be urged against it. The argument, which has already been foreshadowed in part I, may be reduced to its simplest terms, as follows:

The historic conception of the Bureau as a patronage agency requires the dismissal of the Director with each change of party administration and often encourages the appointment of a new man whose first qualifications are those of a miniature postmaster general. Some Directors of the Census, lacking professional statistical training or census experience, have had little interest in aspects of the work other than the political. They have let many of the key civil service positions go to older clerks in the Bureau without a scientific interest, and have discouraged rather than encouraged the corporal's guard of social scientists in the Bureau who have been jealous for the Bureau's scientific prestige. Occasionally, an exception will occur, and a Director like the present incumbent, who has established a lifelong reputation as a Bureau of the Census official, will be appointed. But the traditions and the system are such that the progress which is being recorded under the present Director could quickly be brought to an end, if his successor should be a man lacking his deep affection for the Bureau and his courage in working for its improvement.

Technical Instruction Within the Bureau

The Bureau has developed, out of long experience, expeditious methods of mass instruction of editors, coders, and clerks who are recruited at the time of special censuses. Mention also has been made of the school of instruction for area supervisors for the census of agriculture and census of business. In March 1935, a formal 6-weeks' course in elementary statistics and computation was announced, any permanent or temporary employee of the Bureau to be eligible to enter. An attendance of about 35 was expected. To everybody's astonishment the enrollment was 680. The course was given, in sections and relays. Arrangements were worked out with American University to offer courses for university credit within the Bureau. Courses have been given in elementary statistics, principles of statistical research, advanced statistics, economic geography, correspondence, and accountancy. They were taught by Bureau experts. Three members of the Bureau staff, Dr. Reed, Mr. Short, and Dr. Dedrick, also teach courses at American University, and another, Mr. Fitzgerald, teaches at Columbus University. The writer knows of no instance in which a member has obtained leave of absence to teach in a university outside of Washington.

Recently the Bureau has given encouragement to graduate students who wish to acquire some practical statistical experience in the Bureau. Some of these students have themselves made valuable contributions while working in the Bureau. Two students, Shryock and Durand, in 1935, designed and carried out most of the research work out of which developed the new methods adopted by the Bureau of making post-censal estimates of population. Shryock was a Social Science Research Council predoctoral fellow. There are six graduate students at work in the Bureau at the present time.

Summary and Conclusions

This section of the report has reviewed some of the major problems faced by the Bureau of the Census in connection with personnel. The present administration of the Bureau, it was shown, has made notable progress in its program of rebuilding. The process is necessarily slow, and could be jeopardized by such a change in administration as that to which the Bureau of the Census, through long tradition, is susceptible.

As to key personnel, the Bureau is bringing in, as rapidly as possible, men with a professional graduate training in the social sciences. Difficulties in the way are (1) the infrequency with which vacancies occur and the necessity of preserving the civil service status of incumbents, and (2) the scarcity of men with the necessary combination of professional training and administrative aptitude who will accept the comparatively low salaries available. These difficulties are common to all Government statistical agencies. They are magnified in the case of the Bureau, however, because of the absence of a strong will for scientific improvement in some previous administrations.

With respect to junior professional personnel, the problem is not so much that of getting the men as of keeping a sufficient number of the better men. Entrance salaries are relatively high, but opportunities for promotion are limited beyond the lower Professional and Scientific grades. Insofar as the slow promotion system of the Government is responsible, this problem is outside of the Bureau's control. The Bureau is now trying, however, to create a more attractive scientific environment, in general, and to encourage the younger social scientists by giving more credit to the actual authors of analytical studies made within the Bureau.

The major problem with the permanent clerical staff is that of age. This is a problem largely beyond the Bureau's control, but it is perhaps more serious in

the Bureau than in younger statistical organizations, which will confront the same difficulties eventually, unless there is constant expansion. One-third of the clerical employees in the Bureau are over 55 years of age, thus greatly reducing efficiency in performance of tasks which put a premium on agility.

A source of some of the Bureau's difficulties in the past has been the size of its temporary force. Even in intercensal periods the temporary force is large and fluctuating, and at the peak of the decennial census period the temporary force exceeds 125,000. The temporary field people are frankly political employees in large part. The Washington temporary staff is largely on civil service. The most serious consequence of this situation is perhaps less the real inefficiency of these political employees than it is the danger to which the whole morale of the Bureau is exposed. The primary effect has been felt in influencing the choice of Director, who often in the past has been named as a reward for party service. The present administration of the Bureau has made substantial progress in repairing some of the harm done to the Bureau in the past. But the fact that the Bureau, by tradition, has available a large number of political jobs of a temporary character, does not make the future secure against the appointment of subsequent directors who lack the respect for scientific work which characterizes the present leadership.

Mention was made of the educational work within the Bureau, including courses taught by Bureau officials for which university credit is given. The Bureau also is hospitable to graduate students who desire to receive some practical statistical training.

As we have seen, some serious handicaps to the improvement of personnel are beyond the control of the Bureau. It is extremely important, however, for the Bureau to have a *will for improvement.* This *will* has not always been present in the administration. It is present now. Slowly, but unmistakably, this *will* is finding expression in personnel policies which are changing the atmosphere of the organization. How lasting these changes will be depends to a considerable extent on the extrication of the Bureau, politically and financially, from the insecure position whose historical background was traced in part I of this Section.

IV. ANALYTICAL RESEARCH

It doubtless would be generally agreed that the first great function of such an agency as the Bureau of the Census is to collect, tabulate, and publish basic data, which serve as raw material for further processing by research workers everywhere, in the Government and outside of the Government. The Bureau's first responsibility is to mine the statistical ore and produce the statistical pig iron.

How much farther does the Bureau's responsibility extend?

To what extent does it, or should it, conduct analytical research and fashion the statistical pig iron into consumers' goods?

These are, perhaps, debatable questions.

Three Types of Analytical Work

It may clarify the problem if one distinguishes three types of analytical work conducted by Government statistical organizations:

1. Investigations of the accuracy of the basic data, with the aim of finding ways of improving its collection and tabulation and helping to determine what new questions to ask on schedules.
2. Research on the social and economic significance of relationships derived from basic tabulations, with the general aim of making additions to knowledge.
3. Quick analysis of data with the aim of providing factual guidance to an administrator facing a particular administrative problem.

It would be quite generally agreed that the first of these three types of analysis is clearly a responsibility of such an agency as the Bureau of the Census. The Bureau is in a better position than any other agency to conduct investigations of the accuracy and validity of its own data. If for no other reason, this is true because the original schedules are usually confidential, open only to sworn employees of the Bureau, and because the Bureau has custody of vast quantities of unpublished tabulations, in the form of machine sheets and consolidation sheets. There are four times as many unpublished tables relating to the census of population, for example, as there are published tables. A still more cogent reason, however, for the Bureau to regard this type of research as a major responsibility is the fact that the Bureau itself would be the primary immediate consumer of such investigations, whose aim is to improve ways and means of collecting the Bureau's basic data and of presenting the data accurately to the public.

There also might be quite general agreement that the third type of analysis is, in general, not the function of the Bureau of the Census as Government statistical work is now organized. This form of quick analysis to inform an administrator with respect to a particular problem is one of the most important social science functions within the Government. It is the point at which facts enter into policies. Quite obviously, this function is best performed by analysts directly attached to a given administrator. It is the type of work which might be expected in such an office

as that of economic adviser to the Secretary of State. Usually, such quick interpretative analyses are not published, but are presented to administrators verbally or in the form of memoranda, often confidential. The effectiveness of the analyses depends on the analyst's grasp of the immediate administrative issues involved, on his judgment in separating the relevant from the irrelevant facts, and on his personal rapport with the administrator. We can, therefore, safely disregard this type of quick analytical research in the present report on a nonadministrative agency.

Should the Bureau Do Research of the Second Type?

If it be agreed that the first type of analytical work listed above, namely, investigations of the accuracy of the basic data, is clearly a function of the Bureau of the Census, and that the third type, namely, quick interpretative analysis of a particular administrative problem, is generally not the function of the Bureau, the ground is cleared for a consideration of the second and possibly most debatable activity, namely:

Research on the social and economic significance of relationships derived from basic tabulations, with the general aim of making additions to knowledge.

There is, perhaps, no sharp line of distinction between research described under this category and the mere collection and presentation of basic data in tabular form. Selection of categories for cross tabulation in the ordinary basic census table is presumably a recognition of the social or economic significance of the relationships. But there are various levels or degrees of refinement of the new data. There is a distinction, in emphasis at least, between a census monograph such as that by Edmund E. Day and Woodlief Thomas on *The Growth of Manufactures* and the original cross tabulations in a regular census volume. In such a monograph an effort is made to bring together from various general-purpose tabulations selected data which, summarized, describe a particular sequence of events or aid in verifying an explicit hypothesis. The main end is that of telling the historical story or formulating and verifying hypotheses, and the statistics are used as means to that end.

Practice Heretofore Followed

The Bureau of the Census has produced a remarkable body of research of this character. Indeed, when one goes back a half century to the regular census volumes of 1880 and 1890, before the establishment of a permanent Bureau, one is astonished at both the quality and volume of analytical research in a period when the social sciences in the universities were still branches of philosophy, with little interest in data. The introductions to the regular census volumes in 1900 and 1910 continued this distinguished tradition. The volume edited by Dr. Walter F. Willcox, *Supplementary Analysis and Derivative Tables*, containing over 1,100 pages of analysis of the 1900 population data, perhaps marks the peak of accomplishment.

There were two serious objections to a continuance of the tradition of publishing elaborate analytical introductions to the routine tabulations. The most serious objection was the delay caused in the publication of the basic data. The other objection was the cost. In view of the wastes due to the character of the field work (Carroll D. Wright estimated it at $2,000,000 in 1890),[32] the objection to scientific analysis on the ground of cost does not make an impressive argument. The first objection has generally been recognized as valid. The census of 1910 is regarded as one of the best in American history, for which particular credit is due to Dr. E. Dana Durand,[33] the first professionally trained social scientist to be appointed Director of the permanent Bureau; but criticism was offered because of delays in publication. That the delays were due in part to the time required for analytical work is doubtless true.

At any event, it was decided in 1920 to speed up the publication of the regular census volumes by reducing the introductions to a few interpretative pages and to publish detailed analyses of selected subjects in the form of separate census monographs. Thirteen such monographs appeared, the last one coming out in 1931, after the next census had been taken. Some of these were prepared by well-known scholars outside of the Government.

In 1930 the same procedure was planned, and publication of the regular census volumes was thereby speeded up. Many of the analytical introductions to the regular volumes, though brief, were able presentations. Twenty-one special monographs were issued, but many, if not most of these, did not represent analytical research in the stricter sense of the term. They were mainly vehicles for carrying basic tabulations for one reason or another not included in the regular decennial publications and they comprised a minimum of explanatory text. A number of important research studies which had been planned were discontinued for lack of funds upon the passage of the Economy Act of 1933. Some of the tabulations made for these unfinished studies have since been handed over to private research organizations, such as the Scripps Foundation and the Milbank Fund, for analysis and publication. In the opinion of competent critics with whom the writer has spoken, the monographic type of actual ana-

[32] See quotation from Wright in President Theodore Roosevelt's veto message, in part I of this section.

[33] Now a member of the Tariff Commission.

lytical research has declined both in quantity and quality.

Question of Future Policy

With the rapid growth of social-science research in universities, business, and privately endowed research organizations generally, there is less dependence on the Bureau of the Census for analytical research which has the general aim of making additions to knowledge than was the case a generation ago. Even as late as the first decade of this century, there was hardly any university or private organization equipped to do expensive analytical work with social and economic data. We may ask: How does this change affect the Bureau's responsibility?

Two extreme points of view may be presented.

1. The Bureau of the Census should no longer do research of this type, except for brief interpretative texts accompanying its basic routine tables.
2. The Bureau should do an increasing amount of special research on social and economic problems, documenting particular historical trends and developing and testing hypotheses about social and economic relationships.

In support of the first position several kinds of arguments may be presented.

(*a*) It may be argued that research of this character should not be done by the Government if it can be done better by outside scholars and organizations. The most effective research, it is said, grows out of pressure to solve specific problems. The university research man is in closest touch with theory and is most likely to feel a pressure to put competing theories to a quantitative test. The research organizations in business may have behind them even greater pressure to solve particular problems. Moreover, the university or other outside research man might have a technical knowledge of the special field in which the problem lies, superior to the knowledge which a career man in an agency like the Bureau of the Census could have.

(*b*) It may be held that such research is a proper function of Government, yet belongs not in an organization like the Bureau of the Census but in some central planning or research organization, such as the National Resources Committee might become. The Bureau of the Census is only one of more than 90 Government agencies which collect and compile statistics. Although its coverage embraces almost every field of social and economic life, there is hardly a single field in which it is the sole reporting agency. The facts bearing on a particular historical investigation or social or economic hypothesis may need to be assembled from the basic statistics collected by several agencies. Planned and executed in a central agency concerned with broad problems of immediate or ultimate importance to the country, such research would have a good chance of influencing governmental policy. Moreover, if research men were concentrated in a central office organized mainly for analytical work and freed from the routines of superintending the mass production of data, there would be a critical interstimulation in such a staff which would insure the highest intellectual standards and the maximum of scientific *esprit de corps*.

(*c*) An agency, like the Bureau of the Census, whose fundamental task is that of providing the raw material for both research and administration, runs some risk of weakening its reputation for authoritative accuracy if it indulges too much in research requiring refinement upon refinement of the data. As research proceeds upward from the primary tabulations, and as operations—sometimes involving the theory of probability—are applied, there often enters an increasing subjectivity and personal judgment.

(d) At the present time, fact-collecting agencies like the Bureau, have not nearly enough funds to provide the requisite raw data. If substantial additional money were not forthcoming, additional research of the type here discussed might draw off funds indispensable for basic reporting.

In support of the opposite extreme position, namely that the Bureau of the Census should do an increasing amount of special research on social and economic problems, documenting particular historical trends and developing and testing hypotheses about social and economic relationships, several arguments may be offered.

(a) The Bureau is a great storehouse of unpublished data and those in charge of deciding what to tabulate and which of the tabulated material to publish should be in an ideal position to make intelligent and efficient use of these source materials in further research. It is easy to cite examples of errors committed by research people who did not know how the field and editing instructions behind a given body of data actually were interpreted.

(b) Continuing research experience and close contacts with the live problems of the day in sociology, economics, and business are desirable if division chiefs in the Bureau are to make wise recommendations and decisions about what questions to ask on the basic Census schedules, what definitions to make, what cross-classifications to tabulate, and what to publish.

(c) If it be conceded that research on the accuracy of its basic data is an obligation of the Bureau of the Census, one may point out that one of the most effective ways of detecting inaccuracies and other defects in data is to conduct some research with the aim, not directly of discovering the defects, but rather of making additions to scientific knowledge.

(d) If the Bureau of the Census is to offer a career to professionally trained men of high intellectual qualities, it must provide for some stimulating intellectual work, which will enhance their reputation as social scientists. Otherwise, the best men will not stay in the Bureau, and the basic data of the social sciences will be collected and tabulated by routineers without incentive for providing data of maximum accuracy and utility.

(e) Often, without interrupting the ordinary routines of tabulating regular census data, it is possible to provide for a particular type of cross-tabulation which would illuminate a special research problem. Thus, the Bureau of the Census, if it had its own research men watching for such opportunities, might make at practically no expense some scientific contributions whose cost would be prohibitive if carried on as an independent operation. In view of the overhead costs of a decennial census proper (nearly forty million dollars in 1930), the slight cost of subjecting some of this vast material to special research is insignificant as compared with the increased social and economic value which a few additional operations on the data would give to the whole census.

Weight of argument in favor of research within the Bureau.—In the writer's judgment, the weight of the argument is decidedly in favor of research within the

Bureau of the Census, when financially possible—not only research on the accuracy of the basic data, but also research with a more general aim of making additions to knowledge. The broad question of whether the Government has or has not an obligation to do the latter type of research seems irrelevant to the writer. Certainly, the obligation to collect and tabulate basic data is recognized. And, just as certainly, this great obligation cannot be discharged effectively unless men trained in research and alive to current research problems are making the crucial recommendations and decisions. The best way for a man to keep "alive to current research problems" is to conduct some research, and opportunities for recognition as a social scientist are necessary if a career in the Bureau is to be attractive. And the expense would be slight, considering the added value which such research might give to basic data which already has cost millions of dollars.

Moreover, the writer feels that development of more research in the Bureau of the Census and other statistical agencies collecting data need not conflict with the development of research in a central planning or research agency. The arguments in favor of research in a planning and research agency close to the center of the Government, with easy access to statistical data wherever originally collected, and with a staff of social scientists possessing high scientific *esprit de corps*, are convincing enough. But this need not preclude a liaison between such an organization and the Bureau of the Census, whereby the latter actually conducts some of the research stimulated by the former. Possibly, the most useful work of a planning and research agency would be that of exercising a freshening influence throughout the Government rather than by conducting much research of its own. The experience of the Central Statistical Board, which, of course, has been concerned rather more with the improvement of basic reporting than with the type of analytical research under discussion here, suggests that such a plan is workable, though full of difficulties. At any event, the writer believes that the effectiveness of the primary collection and tabulation job of the Bureau of the Census would be imperiled if its responsibility for research other than that on the accuracy of census data were to be eliminated.

A list of the research monographs published by the Bureau since its establishment as a permanent agency, prepared by Dr. Joseph A. Hill, appears as Appendix B of this Section.

We shall now review the present situation in the Bureau with respect to the first of the three types of analytical research, namely, research primarily for the purpose of uncovering inadequacies in the data and of devising ways to make improvements.

The Bureau's Investigations for the Improvement of Its Own Data

The routineer and social scientist in a Government statistical agency can be distinguished by their attitudes toward the data which they collect. The routineer is likely to be defensive and suspicious of any questionings about inaccuracy or incompleteness of the data. Confronted with internal evidence, he usually can be depended on to counter by expounding the insuperable difficulties under which he works and by blaming an inadequate budget. The social scientist is likely to be much more frank about the shortcomings of his data and to have given the problems careful study. He is on the lookout for opportunities to do research which will enable him to test his theories as to where the troubles lie and as to how they can be remedied. In some statistical agencies he may not get sufficient support from his superiors to carry out such explorations and he, too, is likely to complain of an inadequate budget. But the difference in attitude can only be appreciated by one who has seen quite intimately the two types of men in action.

The Bureau of the Census has had both types of men. The influence of the present administration, unlike that of some previous administrations, has been to encourage the latter. Most of the older social scientists in the Bureau, who were critical about their data, have found at the top new encouragement for attacking their problems. New leaders also have brought with them a critical, inquiring, experimental point of view, and sometimes have shocked routineers by upsetting past complacencies.

While the present Director is sympathetic to the needs of critical analysis, he faces a great handicap.

The handicaps to systematic investigation in the past on the validity of the basic data were: (a) Lack of interest on the part of the Bureau's administration, (b) lack of qualified personnel, and (c) lack of funds. Today, the interest is present. As we saw in part III of this Section the personnel situation is gradually improving.

The handicap of lack of funds remains. Here the Bureau, like all agencies, meets obstacles in its own Department and in the Bureau of the Budget, as well as Congress. It is naturally easier to get approval for an item which has been carried in the Budget for years than it is for a new item. Hence the Bureau is penalized for its past neglect. It spent little money, under past administrations, on research for improvement of its data. What little was spent was not usually earmarked for that purpose. With greater economies being required of the permanent Government agencies, the Bureau of the Census, like other bureaus, has had a hard struggle to keep up its necessary routine oper-

ations. It has had to cut out some of them entirely—for example, with the discontinuance of marriage and divorce statistics in 1933, the United States is now almost the only civilized country in the world without current national reporting of marriages and divorces. Needless to say, it is difficult to get brand new appropriations for an activity, like research, which would seem to a nonscientific mind as a frill or luxury.

The Geographer's Problems

The lack of funds for research is particularly detrimental to the fundamental operation of such a division as that of the Geographer. The work of the Chief Geographer, Mr. Clarence Batschelet, is basic to accuracy and completeness of enumeration of the Censuses of Population and Agriculture. His staff must determine the legal boundaries of all minor civil divisions in the United States, must lay out the more than 120,000 separate enumeration districts, must obtain a complete list of the 30,000 institutions for which separate enumeration is necessary and must prepare a separate map for each individual enumerator. The boundaries of minor civil divisions are changing constantly—more than 17,000 changes took place between 1920 and 1930. These changes must be discovered and properly recorded on maps.

Unfortunately, the appropriations for maps have been inadequate. The Bureau does not make original maps, of course, but it has lacked enough money to buy the new maps which are continually being issued by public and private authorities. For many areas it is still using maps 20 or 30 years old, hopelessly out of date in view of the rapidity of population changes. There has been astonishing progress in map-making within the last decade. The United States Geological Survey has now covered nearly half of the United States. The map program of the Bureau of Public Roads has progressed rapidly, with 1,025 counties completed as of February 1938, on a scale of an inch to the mile, with 525 counties under way, and with 237 approved for subsequent surveys. The Agricultural Adjustment Administration has sponsored the spectacular project of making aerial maps of the entire important agricultural area of the country and 600 counties have been photographed complete. Mr. Batschelet has obtained samples of these new maps and compared them with the older maps. These studies have revealed astonishing errors and omissions in the maps which the Bureau of the Census has been using. Moreover, comparisons of planimeter readings of farm acreage from the new accurate surveys indicate wide discrepancies from farm acreages as reported by census enumerators.

New maps are necessary not only for carrying on the enumeration by the methods used in the past, but also for improving these methods by a more general development of farm identification. Methods of identifying farms by the assignment of numbers, just as houses are numbered in cities, were first tried in 35 sample counties in the census of 1935. The results of this experiment justified expectations. Perhaps the greatest value was the control and check it gave over the completeness of the enumerator's work. It would be quite possible to extend farm identification to most of the rural areas of the country in the 1940 census. But the Bureau of the Census must first acquire accurate maps and must get these maps early enough. Another important improvement which has been sought, is the more accurate definition of the boundaries of settlement in unincorporated towns and villages and city suburbs. The aerial maps are almost indispensable for this purpose. Finally, if the enumerations of urban statistics are to be accurately controlled, and the data are to be obtained in a form suitable for intercensal sampling, it is necessary to number the city blocks and obtain a count of at least the total number of inhabitants in each block. Obviously, if a Bureau's city map is 20 or 30 years old, it is almost useless for prenumbering of blocks—especially in view of the shifts in population from the declining city centers to the expanding peripheries.

After making careful cost analyses and pruning away every item which he regarded as not indispensable, the Chief Geographer asked for $300,000 for the next year in order to purchase maps and get ready for the 1940 census. The entire Bureau obtained only $50,000 for preparatory work on the census. Out of the forty or fifty million dollars which will be appropriated a year from now for the 1940 census, the geographer doubtless will get considerably more money. It will then be too late to conduct preliminary research. In spite of the unprecedented progress of map-making in the United States, the Bureau will be fortunate if the maps available for enumerators on the 1940 census are even as serviceable as those which permitted discrepancies in 1930.

Cooperative Studies in the Agriculture Division

Investigations to improve the validity of the data have had a better fate in one other division of the Census—the Division of Agriculture, which is charged with the responsibility for taking the Census of Agriculture. As was mentioned in part II of this Section, a trial schedule for the 1940 census has gone into the field, and special intensive studies are being made in a sample county (Morrow County, Ohio), with the view of developing better methods of establishing farm location and tabulating statistics by type of soil, distance from

town, density of population, character of roads, physiographic characteristics, location of markets, etc. The Chief Statistician for Agriculture, Mr. Z. R. Pettet, has been one of the vigorous promoters of this work, but it would not have been possible except for funds furnished by the Department of Agriculture. The need for improvement of the Census of Agriculture has been a matter of concern not only to farm economists[34] but also to the statisticians in the Bureau of Agricultural Economics, the A. A. A., and other agencies for which the Government's expanding farm program necessitated much more extensive use of the census than ever before. The Committee on Government Statistics, the Central Statistical Board, and a special subcommittee of the Social Science Research Council and the American Farm Economic Association have made intensive studies of the problems.[35] Since the Bureau of the Census lacked adequate funds for analytical studies of its own data, the Department of Agriculture came to the rescue, and the work in progress, under the joint auspices of the Bureau and the Department of Agriculture, is an admirable example of the type of studies needed throughout the Bureau.

Manufactures and Business

The phase of the Bureau's work which has been receiving the major attention recently from the standpoint of rebuilding is that relating to industry. In connection with the Census of Manufactures there had been hardly any research worthy of the name, to test completeness of coverage or adequacy of classifications. Confidential surveys were made in 1933–34, at the request of the Director, by the Committee on Government Statistics and the Central Statistical Board. As a result, the Division of Manufactures is undergoing a complete overhauling, under conspicuously able new leadership. There has not yet been time to conduct much systematic research on the validity of the data. Enough already was known, however, as a result of analysis made by the Central Statistical Board to indicate several points where improvement was compulsory if the data were to be made even reasonably trustworthy. Perhaps the most important concrete development has been the effort to improve industrial classification.[36] This Division, like others, is sadly handicapped by lack of funds. The regular 1933 and 1935 Censuses of Manufactures could be completed only with W. P. A. aid, and there is not enough money for the regular operations on the 1937 census—not to mention money for research.

The Census of American Business, first taken in 1930, and repeated in 1933 and 1935 with almost exclusive relief financing, is again under way on a relief basis but with a much restricted scope. Each successive census has been an experiment of a sort. This important effort to survey American business—the principal new major undertaking of the Bureau since its establishment in 1902—is still in a formative period. Unfortunately, the funds available to carry out the sheer routines have been so limited that systematic analyses of the data, to determine its strengths and weaknesses, have been practically impossible. Meanwhile, the Bureau is almost defenseless against complaints from the outside[37] that it makes arbitrary changes without research on their probable effects and that it continues to make errors because of inadequate opportunity to look more deeply into its own data. The Bureau's vital pioneering work in this field deserves much stronger financial backing than it has received.

If, like the Division of Agriculture, the Divisions of Manufactures and Distribution had financial assistance from some other Department, the opportunities for systematic self-analysis would be greater. The money available to other Government agencies serving industry and trade has not, however, compared in amount to that available for agriculture.

The Population Division and the Next Census

There is one division in which the lost opportunity for research for the improvement of the data is particularly unfortunate. This is the Division of Population—the very heart of the Bureau of the Census.

Today the Division of Population consists of a Chief Statistician and an Assistant Chief Statistician, an expert on occupations, an expert on criminal statistics, and about 30 clerks, most of whom are over 60 years of age. The Chief Statistician, Dr. Leon E. Truesdell, is one of the most distinguished scholars in the Government. He has a world-wide reputation as an expert on population. He is responsible for many of the improvements which made the 1930 census tabulations more useful to social science—for example, the introduction of value of homes and rentals, the great extension of tabulation by rural-farm and nonfarm and by 5-year age groups, and the ingeniously designed

[34] See, for example, John D. Black and R. H. Allen, "The Counting of Farms in the United States," with discussion by M. R. Benedict, *Journal of the American Statistical Association*, XXXII (September 1937), 439–70, and the criticism in two recent bulletins of the Social Science Research Council: Dwight Sanderson, *Research Memorandum on Rural Life in the Depression*, and Warren S. Thompson, *Research Memorandum on Internal Migration in the Depression*.

[35] The subcommittee last mentioned summarized its findings and recommendations in "The Census of Agriculture," Social Science Research Council *Bulletin*, No. 43 (New York, 1937).

[36] The work of an inter-departmental committee on industrial classification was described in part II of this Section.

[37] See, for example, Werner Gabler, *Retailing*, IX, January 18, 1937, p. 2.

family tabulations. He is keenly alive to the needs which the census of population will serve in the future—particularly, with respect to studies of internal migration, of the social and economic characteristics of metropolitan communities, and of a variety of major problems, of vital concern to the social security program, involving statistics on employment, industry, and occupation. Since the main work on the 1930 census ended, there have been 6 or 7 years in which this Division might have been making plans, trying experiments with sample studies, and testing the accuracy of the 1930 data. Instead, the Bureau of the Census, forced, as it has been, to retrench on expenditures, could not put a single dollar into such work. While the staff dwindled year after year, through retirement, resignation, or transfer to other divisions in the Bureau, the Division has been busy with a variety of petty but necessary routines. The staff has carried on miscellaneous activities largely unconnected with the census of population, such as getting out current reports on judicial criminal statistics, on prisoners, on the insane and the feeble-minded. There is also a varying amount of special tabulation for outside agencies and individuals. In 1934 the function of making population estimates was transferred to the Division of Population from the Geography Division.

There will be many pressures in 1940 for new items on the schedule. Some of these proposals might have been anticipated and investigated by systematic research. Amid all the local and State censuses, housing surveys, and other extensive field canvasses made with Civil Works Administration and Works Progress Administration funds, there existed an unprecedented opportunity to try out experiments, not only on the subject matter but also on interpretations of definitions and methods of collecting the data. Opportunities also were passed by to analyze the original 1930 schedules for the primary purpose of testing the accuracy of certain of the information.[38] The opportunity still exists and only recently the Bureau was offered an opportunity to cooperate in a Works Progress Administration project for this purpose. But there is no personnel in the Bureau free to provide experienced leadership.

The loss is irreparable. The Bureau's failure to get adequate appropriations for preparations for the next fiscal year means that the Division of Population will approach the 1940 census with the scantiest of preparation. With the announcement of the 1937 social science analyst examinations the Bureau has hoped to bring into the Division some able young Ph. D.'s. There is only one understudy to the Chief Statistician today. But these young men will arrive too late to help perform more than a fraction of the experimental research on which the 1940 Census of Population depends for its improvement. Nor are they likely to remain in the Bureau long after the census unless a new program is developed for intercensal investigations.

[38] The punch cards could not be used for this purpose, because they were destroyed, pursuant to custom, after the regular tabulations were completed. Even if funds for research had been available, recourse would have been necessary to the original schedules.

The Research Division

The Research Division is still so new and so insufficiently staffed that it has not had much chance to make an independent showing. Its most important work has been that of stimulating critical self-analysis in the other divisions. It had an important part in developing the new methods of making intercensal estimates; it has made some analyses of discrepancies in the age, sex, and race distributions in connection with its work of preparing life tables; it has given attention to the problems of defining unemployment and making industrial classifications; and it has broken a new path for the Bureau by experimenting with sampling techniques.

Mechanical Equipment Improved

Although the research involved is of somewhat different order, the Bureau's record in the development of better mechanical equipment for tabulating its data and, recently, of applying new photographic processes, is a notable one. The Bureau has built in its own mechanical laboratory new machinery which will greatly enlarge and speed up the facilities for tabulating the 1940 census.

General Comment

This illustrative account has not sought to cover all divisions or to render a full accounting of the research work in the Bureau directed to the improvement of data. Perhaps the most significant development which has taken place under the leadership of Mr. Austin is not so much the volume of actual research as the healthy growth of attitudes favoring it. Critics of the Bureau who claim that the Census has never admitted shortcomings of its data are, of course, grossly unfair, as reference to the introductory pages of some census reports in the past years will show. The Bureau has quite frequently admitted errors in its data—as in the frank recognition in 1930 of the underenumeration of Negroes in 1920 or as in the warning against taking the reported number of centenarians at its face value. But this frankness has been much more noticeable in some divisions than in others. And it is much more noticeable today than a few years ago. The Division of Vital Statistics, for example, no longer makes a pretense that its reporting of births or infant deaths is even 90 percent complete in all States, and is experi-

menting with methods of estimating a correction factor to be reported along with the original data. Likewise, the Division of Manufactures is seeking ways of publicly reporting the apparent degree of completeness in its coverage.

Difficulty of getting additional funds for research.—The inability of the Bureau of the Census to get more funds for research aimed at improvement of its data is a problem undoubtedly shared by many other Federal statistical agencies. The reason for the difficulty may differ with different agencies. Assuming that the will to improve exists within a statistical unit which is a division inside of a regulatory bureau, most such units still face the problem of "selling" the bureau's administrator, on the importance of such research. If he is "sold," the problem of getting money may then be easier than it is for the Bureau of the Census, because there are indirect as well as direct ways for the statistical unit attached to a regulatory agency to get funds. If he is unsympathetic, however, the difficulties of getting research funds may be even greater than it is for the Bureau of the Census. Although the Bureau of the Census is one of many agencies in the Department of Commerce, and must take its share of budgetary cuts which the Department receives, the Director of the Census has much more freedom of action than the chief of a statistical division subordinate to a regulatory bureau. However, in going before the Bureau of the Budget and Congress, the Bureau of the Census pays the penalty of past neglect of research, because such work now calls for new expenditures rather than for a continuance of past allocations whose usefulness is an accepted tradition.

Proposal to smooth out work load.—A further step toward an orderly development of research work within the Bureau would be possible if a proposed bill, drafted within the Bureau, could be enacted into law. This bill, described in detail in the *Journal of the American Statistical Association*, March 1938, pp. 230–31, seeks primarily to smooth out the work load and make systematic the schedule of operations. One of its most beneficial results would be the reduction in the ratio of temporary to permanent employees. Other important features are provisions for a regular quinquennial Census of Population; an annual sample Census of Agriculture, with complete coverage every 5 years; and, similarly, an annual sample Census of Manufactures, with complete coverage every 5 years. Statutory authority is sought to stagger various reports in such a way as to permit a larger proportion of the aggregate census appropriation to go to permanent rather than temporary employees. The indispensability of a quinquennial Census of Population—not only to such agencies as the Social Security Board, but also to any Government agency allocating funds to States or cities on a basis of population, as well as to research workers on population problems—has been proclaimed almost universally. Various reports of the National Resources Committee have been emphatic in recommending it. Similarly, the proposed annual sample surveys of Agriculture and Manufactures are necessary to Government administration and to private research as well.

Summary

It was pointed out that the first great responsibility of the Bureau of the Census is to produce the raw material for further processing by statisticians everywhere, in and out of the Government. Beyond that vital routine operation, how much analytical research should the Bureau of the Census do?

This question was considered by distinguishing three types of analytical work conducted by Government statistical organizations:

1. Investigations of the accuracy of the basic data, with the aim of finding ways of improving its collection and tabulation and helping to determine what new questions to ask on schedules.
2. Research on the social and economic significance of relationships derived from basic tabulations, with the general aim of making additions to knowledge.
3. Quick analysis of data with the aim of providing guidance to an administration facing a particular administrative problem.

The first type, it was maintained, was clearly within the province of the Bureau of the Census; the third type, generally not, being best performed by analysts directly attached to a given administrator. The question of responsibility for the second type is perhaps more open to debate.

With respect to the second type of analytical research the Bureau can point—especially between 1880 and 1910—to much good performance. When university research in the social sciences was in its infancy the Bureau produced a large volume of research of high quality. Most of this appeared as textual accompaniments of the decennial census reports. The delays in publication of the basic data, while the analysis was awaited, caused considerable criticism, and in 1920 the text accompanying the tables was reduced to a bare introduction. The analytical studies were transferred to separate monographs in selected fields. In 1930 the text in the regular volumes also was brief, but the separate monographs did not represent so much actual analytical research as they did the presentation of additional tabular material which for one reason or another had been excluded from the census.

Arguments were presented with respect to the responsibility of the Bureau of the Census for analytical work of the second type: (1) That the Bureau of the Census *should not* do such work (a) because this is not the function of a Government agency; (b) because, if it is the function of Government, it should

be performed by some central planning agency close to the Executive; (c) the subjectivity introduced by the Bureau in the process of elaborately refining data might imperil the reputation of a primary collecting agency for authoritative accuracy; and (d) unless appropriations were increased such research might draw off funds indispensable for basic reporting. (2) That the Bureau *should* do such research, because (a) it has closest knowledge of the data; (b) such research is necessary to keep the Bureau's statisticians, who make decisions about definitions, tabulations, etc., alive to uses of the data; (c) such research has as an important byproduct the discovery of inadequacies in the present basic statistics; (d) stimulating work of this character, conferring some personal prestige, is necessary if the Bureau is to retain the social scientists necessary to guard and improve the data; and (e) the expense would be slight, considering the added value which such research might give to basic data which already have cost millions of dollars. The writer favors the second argument, and believes that such research in an agency like the Bureau of the Census would be wholly compatible with research in a central planning agency as well.

Finally, actual work of the Bureau with respect to the first type of research—to find ways of improving the collection and tabulation—was reviewed with considerable illustrative detail. Obstacles to such work in a Government agency are (1) lack of encouragement by the administrative head; (2) lack of qualified personnel; and (3) lack of funds. It was indicated with respect to (1) that administrative support for such research was now present in the Bureau of the Census, though this had not always been the case, and that the situation with respect to (2) was gradually improving, as shown in part II of this Section. The main obstacle is (3), lack of funds. The Bureau is paying the penalty of past neglect of such research, because requests for funds for this purpose are now new requests rather than requests for the continuance of a long-established function. The Bureau, in getting research funds, must jump three hurdles—the Secretary of Commerce, the Bureau of the Budget, and Congress. In each case, there is a tendency to approve established past appropriations more or less automatically and to question new appropriations—especially in the face of demands for general budgetary reductions.

The Director of the Census has one less hurdle to jump than the chief of a small statistical division subordinate to a bureau which has regulatory functions, and therefore has more freedom. But if the chief of a statistical division subordinate to a regulatory bureau can "sell" his bureau head on the needs of research, the chances of getting funds are likely to be more favorable than in case of a purely statistical bureau—since there are indirect as well as direct sources of revenue, as discussed in part I of this Section. If the head of the regulatory bureau is not a supporter of research, however, a statistical division within such bureau may be in a weaker position than a purely statistical organization like the Bureau of the Census.

In spite of lack of funds, the Bureau of the Census, as was shown, has made some progress in promoting investigations which look to the improvement of its data. The most conspicuous work at the present time involves the Census of Agriculture. But this was made possible by outside funds, and some divisions, notably the Geography Division and the Division of Population, have been handicapped so seriously as to jeopardize the 1940 census. Perhaps the most important development in the Bureau with respect to this type of investigation is not so much the actual output as the healthy growth of attitudes favoring it.

GENERAL SUMMARY

This Section constitutes a case study of selected problems involved in the production of social science data in one Government agency—the Bureau of the Census.

Though the Bureau of the Census is one of about 90 Federal agencies compiling and publishing statistics, it is preeminent because of its size and the general-purpose character of its work. Some of its problems are common to all agencies in the social science field. Others of its problems are a function of the particular historical conditions out of which the Bureau of the Census grew.

Part I provided a background for the subsequent discussion. Two significant sets of facts were set forth: (1) The Bureau of the Census, first established as a permanent agency in 1902, is heir to a century of American traditions which tended at times to emphasize the political, as distinguished from the scientific, aspects of the decennial census; and (2) the Bureau has not shared widely in the vast growth of statistical services in the past generation. These services have been allocated to new statistical agencies growing up in the various subject matter fields. Thus the Bureau of the Census has been in an insecure position for getting funds—preference often being given to agencies serving solely the needs of some special-interest group. In the face of these handicaps, the contribution of the Bureau of the Census to the American leadership in making the social sciences objective is all the more remarkable.

Part II reviewed the needs of and support given by consumers of census data. The vast increase in demand, both by the Government and laymen, for data

was sketched. Although the Bureau of the Census cannot profit by pressure-group support as can some statistical organizations it has cordial relationships with its public and private consumers. In some cases—notably in the field of agricultural statistics—the Bureau has obtained not only technical help but also outright financial subsidy. These instances are exceptional. There has been some ground for hope that the Bureau might find for itself in the field of industry and trade a place analogous to that of the Bureau of Agricultural Economics in agriculture and the Bureau of Labor Statistics in labor. Such a development might be important for the obtaining of adequate financial support. Some of the difficulties of attaining such an objective were studied, particularly with respect to the competitive position of other Government agencies and with respect to the Bureau's lack of a permanent field staff. A different type of consumer relationship was exemplified by the field of vital statistics, the collection of which by State boards of health is subsidized by the Bureau of the Census. These State collecting agencies are also among the principal consumers of vital statistics. The generation of experience with vital statistics provides an illuminating example of the difficulties attending the development of a decentralized reporting system.

Part III analyzed problems of personnel. The conditions described in part I had led by 1933 to a serious situation in the Bureau, through the loss of most of its professionally trained men. There has been a statesmanlike process of rebuilding on the part of the present Director. Any agency, unless it is acquiring new functions, finds it difficult to place professionally qualified men into key positions, because vacancies are rare and it is difficult to remove a less qualified man on civil service, and because the requisite combination of administrative ability and professional preparation is not easy to secure at the salaries paid by the Government. With respect to junior professional personnel, entrance salaries are high, possibly too high, but opportunities for promotion are not attractive to the better men. Like any of the older agencies, the Bureau of the Census faces the problem of an overloading of its clerical force with elderly people. One-third of the clerical employees of the Bureau are over 55 years of age. A special problem in this organization is the large ratio of temporary to permanent employees. It is, in part, inevitable, due to the fluctuating character of census work. The implications of this situation are far-reaching, since the political nature of temporary appointments at each decennial census has frequently in the past been used to justify the selection of a Director on grounds other than professional competence.

Part IV considered questions relating to the role of an agency like the Bureau of the Census in conducting analytical research. It was recognized that the primary function of the Bureau was the production of the raw data. It was conceded that the Bureau had the obligation of conducting research to determine the validity of these data and to experiment with ways of improvement. The question of the responsibility of such a Bureau for research of an interpretative character was reviewed at length and arguments pro and con presented. It was the conclusion of the writer that more, rather than less, of the interpretative type of research should be expected from an agency with such close access to the original data. The research work of the Bureau of the Census was reviewed in some detail. It was evident that lack of funds and lack of professionally qualified personnel have greatly handicapped the organization, even in carrying out research which it regards as essential for determining the validity of some of the basic data. The Bureau is awake to the needs, but, with insufficient funds for the current routine operations, can attain only a fraction of the desired objectives.

APPENDIX A

LIST OF INQUIRIES COVERED BY THE PERMANENT CENSUS

[Prepared by Dr. Joseph A. Hill]

Decennial Inquiries listed in the Permanent Census Act of 1902:

Special classes, including insane, feeble-minded, deaf, dumb, and blind.[39]

Crime, pauperism, and benevolence, including prisoners, paupers, juvenile delinquents, and inmates of benevolent and reformatory institutions.[39]

Social statistics of cities.[40]

Public indebtedness, valuation, taxation, and expenditures.

Religious bodies.

Electric light and power, telephone, and telegraph business.

Transportation by water, express business, and street railways.

Mines, mining, quarries, and minerals, and the production and value thereof; together with the number, average daily wage, average working time, and aggregate earnings of men employed.

[39] With the proviso that the statistics be limited to institutions containing such classes.

[40] The permanent Bureau has never collected any statistics under that title or heading. Presumably it was expected to cover the same subjects as were covered under the same title in the censuses of 1880 and 1890 (see *History and Growth of the United States Census*, by Wright and Hunt, pp. 796 and 802); and the Bureau has in some years included such subjects (designated as general statistics) in the annual compilation of financial statistics of cities.

The act also authorized the Quinquennial Census of Manufactures; and the annual collection of statistics of Births and Deaths, and of Cotton Production.

Under the Amendatory Act of June 7, 1906, the first two subjects on the above list of decennial inquiries were replaced by the following:

Defective, dependent, and delinquent classes.[41]
Crime, including judicial statistics.

An attempt which was made to compile judicial statistics on a comprehensive scale proved to be a failure and the results were never published. The present annual compilation of criminal judicial statistics was inaugurated under the joint resolution of Congress passed March 4, 1931.

The amendatory act added two decennial inquiries to the original list, namely:

Savings banks, and other savings institutions, mortgage, loan and investment companies and similar institutions.
Fishing industry in cooperation with the Bureau of Fisheries.

[41] Proviso in permanent act limiting this to institutional classes was not retained in the amendatory act.

Nothing was ever done with the first of these subjects, and as regards the fishing industry only one inquiry has been made.

The amendatory act authorized also the quinquennial compilation of statistics relating to—

Street railways and electric light and power, telephone, and telegraph business.

The compilation of current industrial statistics, begun in 1929, was authorized by order of the Secretary of Commerce acting under section 8 of the act of 1903 organizing the Department of Commerce and Labor.

Two censuses of business have been taken by the permanent Bureau, one as a Civil Works Administration project covering the year 1933 and the other as a Works Progress Administration project covering the year 1935. But the present permanent census law does not provide for a census of business, although distribution, which forms an important part of the business census, is included in the scope of the decennial census as defined by the act providing for the Fifteenth and subsequent Censuses.

Chart indicating the subjects covered by the decennial census, 1790 to 1930, and by the statistical compilations of the permanent Bureau of the Census since 1902.

	The Decennial Census														
	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910	1920	1930
Population	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Manufactures			x	x		x	x	x	x	x	x	x	x	x	x
Agriculture						x	x	x	x	x	x	x	x	x	x
Mining						x	x	x	x	x	x	(5)	x	x	x
Fish and fisheries						x	x	x	x	x	x				
Mortality							x	x	x	x	x	x	(6)		
Commerce						x									
Employees and wages [1]												x			
Distribution (Retail and Wholesale, Trade, etc.)															x
Unemployment										(2)	(2)	(2)	(2)		x
Social Statistics: [3]															
Valuation of estate, real and personal							x	x	x						
Annual taxes							x	x	x						
Schools and colleges							x	x	x						
Seasons and crops							x	x							
Libraries							x	x	x						
Newspapers and periodicals							x	x	x						
Religion							x	x	x						
Pauperism							x	x	x						
Crime							x	x	x						
Wages and prices							x	x	x						
Schools and colleges						(4)				x	x				
Newspapers and periodicals [5]										x	x				
Religious bodies										x	x				
Water power										x					
Insurance										x	x				
Social statistics of cities										x	x				
Trade societies and strikes and lockouts										x					
Wages and prices										x					
Transportation										x					
Valuation, taxation, and public indebtedness [6]										x	x				
Farms and homes											x				
Real estate mortgages											x				
Defective, dependent, and delinquent classes [7]															

Permanent Census Inquiries*

Decennial:
- Religious bodies.
- Defective, dependent, and delinquent classes.
- Blind.
- Deaf-mutes.
- Public indebtedness, valuation, taxation, and expenditures.
- Transportation by water.
- Fisheries.
- Mines and quarries.

Quinquennial:
- Electrical industries.
- Agriculture.

Biennial:
- Manufactures.
- Forest products.

Annual:
- Vital statistics.
- Marriage and divorce.
- Prisoners in State and Federal prisons.
- Patients in hospitals for mental disease.
- Feebleminded and epileptics in institutions.
- Judicial criminal statistics.
- Financial statistics of cities.

Quarterly or monthly:
- Cotton production and consumption.
- Current industrial statistics.

* Includes inquiries outside the decennial census authorized by the Permanent Census Act of 1902 or by later legislation.

[1] Was included in the Twelfth Census reports but was based on a special inquiry made after the Twelfth Census was taken.
[2] The population schedule asked for the number of months or weeks unemployed during the year. Data for 1910 were never tabulated.
[3] Covered by a single schedule carrying 4 or 5 questions under each subject. Most of these subjects were continued after 1870 as separate independent inquiries.
[4] In 1840 an inquiry as to schools and colleges was included in the population schedule.
[5] Based mainly on data obtained through the census of manufactures but published as separate reports.
[6] In 1890 published under the title Wealth, Debt, and Taxation.
[7] The blind and deaf-mutes in the general population have been enumerated in connection with every population census from 1830 to 1930, inclusive. The population censuses from 1850 to 1890, inclusive, undertook to enumerate the insane and the idiotic; and an enumeration of convicts and prisoners was attempted in 1850 and 1860.
[8] Covered by a special report.
[9] Mortality was not included in the main decennial census after 1900, but was made an annual compilation under the Permanent Census Act, limited to such States and municipalities as had satisfactory systems of registration. The registration area comprised only 6 of the States in 1902 but now includes all of them.

The marriage and divorce inquiry taken in 1916 had no authorization other than an appropriation for it, as the joint resolution providing for this inquiry failed to pass Congress. It was intended to cover the entire period from 1907 to 1916, but on account of war conditions it was decided to limit the work to one year and make it the beginning of an annual compilation. The annual compilation beginning with the year 1922 was authorized by order of the Secretary under section 8 of the act of 1903 organizing the Department of Commerce and Labor. It was discontinued for reasons of economy after 1932.

Subject
Permanent Census Bureau Publications

	Years covered
Decennial:	
Religious Bodies	1906, 1916, 1926, 1936
Defective, Dependent and Delinquent Classes	1904, 1910, 1923, 1933
Prisoners and Juvenile Delinquents	1904, 1910
Prisoners	1923, 1933
Children Under Institutional Care	1923
Children Under Institutional Care and in Foster Homes	1933
Financial Statistics of State and Local Governments (Wealth, Debt, and Taxation)	1902, 1913, 1922, 1932
Decennial—Continued.	
Transportation by Water	1906, 1916, 1926
Blind	1904, 1910, 1920, 1930
Deaf-Mutes	1904, 1910, 1920, 1930
Quinquennial:	
Electrical Industries	1902, 1907, 1912, 1917, 1922, 1927, 1932
Agriculture	1925, 1930, 1935
Manufactures from 1904 to 1919, then biennial	1904, 1909, 1914, 1919
Manufactures, biennial	1921, 1923, 1925, 1927, 1929, 1931, 1933, 1935
Annual:	
Vital Statistics	1900–
Marriage and Divorce	1916, 1922–1932
Mental Patients in State Hospitals	1926–1932
Patients in Hospitals for Mental Disease	1933–
Feeble-minded and Epileptics in State Institutions	1926–1928
Mental Defectives and Epileptics in State Institutions	1929–1932
Mental Defectives and Epileptics in Institutions	1933–
Prisoners in State and Federal Prisons and Reformatories	1926–
Judicial Criminal Statistics	1932–
Financial Statistics of Cities	1902–
Financial Statistics of States	1922–1931
Fisheries	1908 only
Marriage and Divorce: Single compilation authorized by joint resolution of Congress, January 9, 1905, covering the period 1887 to 1906.	
Current Industrial Statistics, compiled monthly, quarterly, or annually	1929–

APPENDIX B

SPECIAL ANALYTICAL PUBLICATIONS OF THE BUREAU OF THE CENSUS SINCE 1900

[Prepared by Dr. Joseph A. Hill]

1900 to 1910

Following the census of 1900 a series of population studies was prepared under the supervision and editorship of Walter F. Willcox, who also wrote most of the text. These were afterwards assembled and bound in a single volume entitled "*Supplementary Analysis and Derivative Tables*," published in 1906 (1141 pp.). The subjects covered were the following:

- Area.
- Population.
- Density of population.
- Increase of population.
- Proportion of the sexes.
- Age, by Allyn A. Young.
- Race.
- Negroes.
- Interstate migration, by Joseph A. Hill.
- Illiteracy, by Joseph A. Hill.
- Families.
- Marital classes.
- Proportion of children.
- Occupations, by Wesley C. Mitchell.
- Teachers.
- Supplement:
  - A discussion of the vital statistics of the Twelfth Census, by Dr. John Shaw Billings.
  - The negro farmer, by W. E. Burghardt Du Bois.
  - Methods of estimating population.

The following monograph was published in 1909:

- A Century of Population Growth, by W. S. Rossiter (303 pp.).

1910 to 1920

	Year of publication	Pages
Negro Population in the United States, 1790–1915, by John Cummings	1918	844

1920 to 1930

Special Monograph Series

	Year of publication	Pages
I. Increase of Population in the United States, 1910–1920, by William S. Rossiter	1922	255
II. Mortgages on Homes	1923	277
III. The Integration of Industrial Operation, by Willard L. Thorp	1924	272
IV. Farm Tenancy in the United States, by E. A. Goldenweiser and Leon E. Truesdell	1924	247
V. School Attendance in 1920, by Frank A Ross	1924	285
VI. Farm Population of the United States, by Leon E. Truesdell	1926	536
VII. Immigrants and Their Children, 1920, by Niles Carpenter	1927	431
VIII. The Growth of Manufactures, 1899 to 1923, by Edmund E. Day and Woodlief Thomas	1928	205
IX. Women in Gainful Occupations, 1870 to 1920, by Joseph A. Hill	1929	416
X. Earnings of Factory Workers, 1899 to 1927, by Paul F. Brissenden	1929	424
XI. Ratio of Children to Women, 1920, by Warren S. Thompson	1931	242
The Woman Home-maker in the City, by Bertha M. Nienburg	1923	49
Farm Population of Selected Counties, by C. J. Galpin and Veda B. Larson	1924	238

1930

Age of the Foreign-born White Population, by Country of Birth, by George B. L. Arner	1933	77
Foreign-born White Families by Country of Birth of Head, by Leon E. Truesdell	1933	217

1930—Continued

	Year of publication	Pages
Negroes in the United States, 1920–32, by Charles E. Hall	1935	845
A Social-Economic Grouping of the Gainful Workers in the United States, by Alba M. Edwards	1938	264
Introduction to the Vital Statistics of the United States, 1900 to 1930, by Walter F. Willcox	1933	138
Location of Manufactures, 1899–1929, by Tracy E. Thompson	1933	67
Materials Used in Manufactures, 1929, by Tracy E. Thompson	1933	58
Farm Real-estate Values in the New England States, 1850–1930, by William I. Goodwin	1933	123
Large-scale Farming in the United States, 1929, by R. D. Jennings	1933	106
The Farm Horse, by Z. R. Pettet	1933	84
Types of Farming in the United States, by Foster F. Elliott	1933	225

1930—Continued

	Year of publication	Pages
Taxes on Farm Property in the United States, by Warder B. Jenkins	1933	120
Retail Chains, by John Guernsey and Charles F. Beach	1933	270
Food Retailing (including restaurants), by John Guernsey	1934	92
Apparel Retailing (Apparel, Clothing, and Related Merchandise), by Charles F. Beach	1933	74
Drug Retailing, by Charles F. Beach	1933	51
Shoe Retailing, by John Guernsey	1933	46
Automobile Trades, by Charles F. Beach	1934	81
Analyzing the Small City and Rural Market Area, by Charles D. Bohannan	1933	126
Multiple Types of Wholesaling, by Theodore N. Beckman and Nathanael H. Engle	1933	44
Employment and Wages in the Retail Industry by Charles F. Beach	1933	45

SECTION 8
THE LIBRARY OF CONGRESS IN RELATION TO RESEARCH

CONTENTS

SECTION 8

THE LIBRARY OF CONGRESS IN RELATION TO RESEARCH

By Martin A. Roberts

INTRODUCTION

The broad definition of research adopted for the purpose of its inquiry by the National Resources Committee covers the "*collection* as well as the *interpretation* of data." The services of the Library of Congress fall into both of these categories, and will be considered below under three heads—I, the collections; II, the facilitating apparatus; and III, the interpretation.

If one were to consider the abilities of the Library of Congress and the other libraries of the District of Columbia—governmental and institutional—one must of course begin with their resources in material, now numbering in excess of 12,000,000 volumes, including as it does the collections surpassing in their fields—Department of Agriculture in the literature of agriculture, the Geological Survey in geology, and the Surgeon General's office in medicine and surgery. The Library of Congress recognizes this by abstaining from unnecessary competition in these fields. And with the exception of a percentage of the District of Columbia Public Library, practically all is material of research value.

Since there is no single overhead authority, our Federal Government holding no such control over the educational or research institutions of the United States, as many European governments do over the institutions of their respective areas, it is difficult to coordinate the research here with the university, college, and large public library research elsewhere in the United States.

I. MATERIALS FOR RESEARCH: THE COLLECTIONS

The collections of the Library of Congress are now probably the largest (numerically) possessed by any library. They have been assembled by (1) the operation of the copyright laws, which make the deposit of copies essential to copyright registration; (2) purchase; (3) gift and bequest; (4) exchange; (5) transfer from other governmental agencies, and (6) deposit pending permanent accession.

The General Classified Collections of Printed Books

These include some 3,479,000 volumes. As a whole encyclopaedic, the collections are preeminent in American history and politics, bibliography and library science, publications of learned societies, public documents (State, Federal, and foreign), files of American and foreign newspapers (including 95,000 volumes in bound form), maps and atlases; eminent in law, economics, political science, religion, technology, aeronautics, and the sciences. They are representative of substantially the whole of American book publication for the period since 1870, with somewhat less completeness for the period anterior to that date (accessions due to copyright, 33,000 pieces for 1937). They are representative also of the most important part of world book production in the Roman alphabet (purchases for 1937, 20,000 volumes; for gifts and purchases en bloc, see the heading, "Special Collections"). In everything that pertains to the work of Congress, completeness is essential and is planned. The disposition and number by classes are (1937) as follows:

Class:	
A (polygraphy)	149,200
B–BJ (philosophy)	44,600
BL–BX (religion)	165,500
C–D (history, exclusive of American)	280,300
E–F (American history)	231,500
G (geography)	57,700
H–J (Social and political sciences)	855,100
L (education)	142,700
M (music)	65,300
N (fine arts)	70,100
P (language and literature)	329,500
PZ (fiction in English)	136,200
Q (science)	258,200
R (medicine)	108,500
S (agriculture)	120,100
T (technology)	231,700
U (military science)	47,300
V (naval science)	33,700
Z (bibliography)	151,000
Incunabula, etc	4,600

The Rare Book Room

The Rare Book Room, a focus to which are drawn the most interesting or valuable items of the general collections, has a catalogue of about 70,000 items, including many first editions, rare bindings, some 25,000 early American pamphlets, over 1,500 volumes of 18th century American newspapers (one of the two foremost of such collections), and more than 4,600 15th century books.

Collections of Special Material

The general collections form a matrix in which are embedded many collections of special material secured by gift or purchase, or by the segregation of material gradually acquired. An enumeration of certain of these is intended to be exemplary rather than exhaustive.

Name of collection	Size	Subject or contents
"Accademia della Crusca" Collection.	1,800 volumes	Italian literature, 1500–1887.
Susan B. Anthony Collection.	400 volumes	Woman suffrage movement.
John Davis Batchelder Collection.	1,125 volumes	First editions of significant books and outstanding items of a particular period.
Winslow M. Bell Collection	444 items	Bermudiana (rare manuscripts, prints, etc.).
Henry Carrington Bolton Collection.	1,631 volumes	History and bibliography of chemistry.
Bertram Dobell Collection	1,611 volumes	Privately printed books.
Peter Force Collection	60,000 volumes	Americana; incunabula, etc.
French plays	2,823 titles	French drama, 1789–1930.
Henry Harrisse Collection	220 volumes	American history and exploration.
Martin Hattala Collection	1,500 volumes	Slavic philology.
Justice Oliver Wendell Holmes Collection.	13,000 volumes	His private library, including law.
Harry Houdini Collection		Magic, spiritism, occultism, and psychical research—books and rare periodicals.
Henrik Jurgen Huitfeld-Kass Collection.	5,000 volumes	Scandinavian biography, genealogy, local, and theatrical history.
Jefferson Collection	2,000 volumes	From the library of Thomas Jefferson.
Mrs. Clarence W. Jones Collection.		Works by and about Henry James.
Edward William Karow Collection.	300 volumes	Works relating to Napoleon Bonaparte.
Lincoln Collection	3,000 titles	By and about Abraham Lincoln.
Lloyd H. Chandler Collection.	567 items	Works of Rudyard Kipling.
Longe Collection	2,000 titles	Early English plays.
Karl Niessen Collection	752 volumes	Theatrical history, especially German.
Portuguese Collection	1,899 volumes	Portuguese literature.
Frederick Starr Collection	2,706 volumes	Anthropology, ethnology, especially of the Ainus.
Raymond Toinet Collection	2,518 volumes	French literature, especially of the 17th century.
Vollbehr Collection of Incunabula.	3,000 titles	Incunabula, including the St. Blasius St. Paul copy of the Gutenberg Bible
Vollbehr Collection of Printers' Marks.	11,005 pieces	Printers' and publishers' marks.
Albrecht Weber Collection	4,020 titles	Indic philology—Important Sanskrit collection.
Washington Collection	ca. 2,500 volumes	Books by and about George Washington.
Winter Palace Collection	1,733 volumes	From the Winter Palace Library of Tsar Nicholas II.

Other Special Collections

Certain other special collections are, from their nature, or from the conditions of their acceptance by the Library, kept distinct from the general classified collections, though containing material which otherwise might be largely fused with them. Among these are:

Name of collection	Year	Subject or contents
John Boyd Thacher Collection.	1927	929 volumes—Incunabula. 3,404 items—Books and autographs relating to the French Revolution. 1,365 items—Collection of autographs.
James Meredith Toner Collection.	1882-1895	29,920 volumes. 21,661 pamphlets and indexes—Medicine and surgery, especially early American. Manuscripts—American history and topography. Photographs—American biography, especially medical and surgical. Prints—George Washington. Maps—City of Washington.

The Division of Manuscripts

Manuscript materials from various collections acquired since 1800 (when the Library was created by act of Congress), notably those from the Thomas Jefferson Library and the Peter Force and Toner collections, formed a nucleus; and a movement was immediately set on foot to assemble important personal collections and early manuscript materials from the Government departments. When the transfer of such material was authorized by law (February 25, 1903), there came from the Department of State such collections as the George Washington papers (336 folio volumes), the James Madison papers (75 folio volumes), and an addition to the Thomas Jefferson papers (137 volumes quarto). Other departments contributed valuable documents and papers; and from this beginning the Manuscript Division rapidly developed. Not only were its resources greatly increased from year to year, but a public service was brought into existence which has been of the greatest value to biographers, historians, and others who must use the materials of history.

The collection, easily the largest of like material in the country, now embraces the papers of nearly all the Presidents; of many Cabinet members, especially Secretaries of State; of notable Senators like Calhoun, Clay, and Webster; of Congressmen who have occupied strategic positions; and of business men, literary people, scientists, and social reformers, including such philanthropists as Andrew Carnegie.

During the last 15 years, important gifts of funds as well as materials have come to the Division of Manuscripts. In April 1927 Mr. William Evarts Benjamin, of New York, endowed a Chair of American History, the first incumbent of which was the late Dr. J. Franklin Jameson, while Mr. James B. Wilbur, of Vermont, gave a considerable fund, the income of which is used to purchase materials for the study of American history. In 1927, also, Mr. John D. Rockefeller, Jr., gave $450,000 to be expended within 5 years in the copying of materials in archives and libraries abroad relating to the same subject. Under project "A" this fund was administered with such success that it may safely be said that the Division of Manuscripts now has photographic reproductions of all the colonial and diplomatic series of papers of first importance to be found in western European countries and in Canada and Mexico.

A feature of the work of project "A" was the first successful employment on a large scale of the film camera in the place of the photostat and hand copying. The result was extensive runs of film negatives on 35 mm. positive safety film covering all the papers of archival series over a long period of years. Cheapness was combined with photographic accuracy; space is

conserved; and prints (both contact and enlarged) from the master negatives are available to any one by purchase or through interlibrary loan. Even scholars abroad take advantage of these facilities.

A project of the Modern Language Association for the acquisition of facsimiles of literary texts is another development of reproduction. To date 423 such texts have been reproduced. They are deposited in the Library of Congress and administered by the Division. The administration includes the loan of them to a scholar at a distance. Being facsimiles they are available for loan though the originals might not be.

The annual reports of the Division enumerate gifts of material, e. g., the Alexander H. Stephens papers, purchased and given to the Library last year by Mr. Bernard M. Baruch. The gift of Secretary Hamilton Fish's papers by his grandson, Congressman Hamilton Fish, has come to the Division this year. An outstanding gift of former years is the Edward S. Harkness Collection of documentary material bearing upon the Spanish conquests of Mexico and Peru which raises the curtain on the business, economic, and social affairs of the time. This collection has been specially calendared.

The collections have become so extensive that it has been impossible to provide detailed calendars and indexes for all. However, the arrangement of the stack of the Division is along the simplest lines, as is also that of the several collections (the chronological order within series); and it is easy with the aid of *The Handbook of Manuscripts in the Library of Congress* (1918), Dr. C. W. Garrison's *List . . . to July 1931* (reprinted from the Annual Report of the American Historical Association for 1930), the annual reports of the Division in the Librarian's annual reports, of the calendars which have been published, and of the manuscript lists and indexes in the Division to arrive at what is wanted. Many inquiries are answered by mail and even by telephone—in cases where the amount of search involved is not great.

The Division of Maps

In the year 1802, when its first catalogue was printed, the Library of Congress possessed six atlases and seven maps. In July 1937 the collection had come to encompass 1,376,801 maps and related drawings, 11,684 atlases, and 4,509 geographical books and pamphlets which were in the custody of the Division of Maps. The great wealth of the national library's cartographic collection lies in the field of American maps. Aside from their use in geographical and historical research and in the compilation of new maps these collections have been used extensively by attorneys in preparing for litigation in the Supreme Court of the United States in such cases as those between Michigan and Wisconsin, Delaware and New Jersey, Virginia and the District of Columbia, Wisconsin and Minnesota, New Hampshire and Vermont, Oklahoma and Texas, New Mexico and Texas, Arkansas and Tennessee, and between the States on the Great Lakes and the Sanitary District of Chicago; and also in constant use in litigation in the lower courts. The collection is also sufficiently rich in foreign maps to have been extensively used in the boundary cases involving the frontiers between Canada and Labrador, Canada and Alaska, Guatemala and Honduras, Venezuela and British Guiana, Bolivia and Paraguay, Chile and Peru, Turkey and Iraq, and Ecuador and Peru. Its foreign maps and atlases have frequently been consulted by scholarly investigators from all parts of the world.

The map treasures which the Library of Congress has received include many outstanding collections such as the Rochambeau Collection, the Faden Collection, the Howe Collection, the Harrisse Collection, the Lowery Collection, the Kohl Collection, the Fillmore Collection, the Bliss Collection, the Mellon Collection, 92 editions of Ptolemy's geography, the atlases of Ortelius (68 editions), Blaeu (27 editions in 82 volumes), Mercator (37 editions), 24 Portolan charts, 7 manuscript maps made or annotated by George Washington, 19 copies of the Atlantic Neptune (1775–1781) including 1,369 plates of charts and views, an original manuscript copy of Pierre Charles l'Enfant's plan of the City of Washington (1791), l'Enfant's "map of doted lines" (Aug. 19, 1791), a manuscript map of parts of New England and Canada made by Samuel de Champplain (1608), a manuscript map of New Amsterdam made by Johannes Vingboons (1660), and 13 manuscript maps attributed to Lewis and Clark. The collection also includes originals, facsimiles, or photostats of 19 editions of John Mitchell's "Map of the British and French Possessions in North America" (1755–1792), 24 editions of John Disturnell's "Mapa de Los Estados Unidos de Méjico" (1828–1858), 15 editions of John Melish's "Map of the United States with the Contiguous British and Spanish Possessions" (1816–1823), 27 editions of one or another of three versions of Lewis Evans's "General Map of the Middle British Colonies" (1749–1814), 14 editions of William Del Isle's "Carte du Canada" (1703–1799), 11 editions of John Filson's "Map of Kentucke" (1784–1794), 5 editions of William Darby's "Map of the State of Louisiana" (1816–1818), 8 editions of J. Calvin Smith's "Map of North America" with the insert "Map of the Gold Region California" (1849–1852), and many maps which were made by or possessed by former Presidents of the United States.

The chief objects of the Division of Maps of the Library of Congress are to render geographical service to Members of Congress, to the executive and judicial departments of the Government, to serious investigators who come to the Library, and to the public in all parts of the United States through correspondence.

Two comprehensive atlases recently compiled through use of the map collection of the Library of Congress are Paullin and Wright's "Atlas of the Historical Geography of the United States," and "The George Washington Atlas."

The Division of Music

The collections of the Division of Music number 1,168,584 pieces and volumes of music and are among the most comprehensive in the world. The material received by copyright is extended by gift and purchase to include a substantially complete representation of world production, together with a representative and increasingly important collection of rarissima—the holographs of the great musicians and the manuscript sources of early musical history. Closely related to this holograph and manuscript material are the numerous autograph letters of famous musicians, many of them still unpublished. In addition, the Division administers one of the world's largest collections of opera librettos (some 20,000) and scores (about 3,000 pieces). Important special collections include:

The Coolidge Foundation Collection (1925–).—A most valuable collection of musical manuscripts of modern composers, largely acquired by presentation from Mrs. Elizabeth Sprague Coolidge, although some of the items have resulted from commissions issued by the Foundation. Additions are constantly being made to this collection.

The Albert Schatz Collection (1909).—More than 12,000 librettos, including about 500 17th century and more than 4,000 18th century items, augmented (1911) by Schatz's correspondence, statistics, etc.

The Charles Martin Loeffler Collection (1937).—A vast quantity of Loeffler's manuscripts and correspondence bequeathed to the Library of Congress by the Eliza Fay Loeffler estate This material, together with other holographs of the composer which had been given by Mrs. Loeffler and G. Schirmer, Inc., forms a practically complete collection of Loeffler manuscripts.

The Victor Herbert Collection (1935).—Nearly all the available holographs of Victor Herbert, deposited in the Library of Congress by the composer's daughter, Mrs. Robert Bartlett; supplemented by gifts from G. Schirmer, Inc., and the National Federation of Music Clubs.

The Ernest Bloch Collection (1925–30).—A valuable addition to the Library of Congress, this consists of several large packages of holographs, criticisms, scrapbooks, etc. (at present restricted) presented to and deposited in the Library by the composer. The Bloch holographs have been augmented by gifts from Mrs. Elizabeth Sprague Coolidge and G. Schirmer, Inc.

Templeton Strong Collection (1930).—Holograph scores and letters of Edward MacDowell and Templeton Strong.

The Martorell Collection (1910).—About 1,300 full scores of opera arias of the 18th century, but including also nearly 30 complete opera scores.

Oscar G. Sonneck Collection (1929).—1,422 pieces, the private library of Oscar G. Sonneck.

Weckerlin Collection (part) (1910).—French folk songs.

Americana Collection.—A very large and important collection of music published in this country before 1860, acquired by copyright (deposits in the District Courts), purchase, gift, etc. This material offers an unexcelled source for tracing early musical activities in the United States.

The Archive of American Folk-Song has a collection of upwards of a thousand records of American (United States, Mexico, etc.) folk songs, each record containing from 2 to 12 songs, recorded from the actual renditions of folk singers by Mr. John A. Lomax and his son, Alan Lomax, under a subvention of the Carnegie Corporation of New York.

In addition, it may be remarked that the funds and apparatus placed at the disposal of the Division of Music by the Coolidge and Whittall Foundations, though aiming primarily at the production of music, yet by their very function enable the assemblage of materials for research, often of the most distinguished kind.

Coolidge Foundation (Mrs. Frederic Shurtleff Coolidge)—Its purposes—

(1) To develop a study of composition and appreciation of music.

(2) To establish and conduct periodic festival or festivals of music.

(3) To give concerts.

(4) To offer and award prizes for any original composition performed for the first time at any festival or concert given under auspices of Library of Congress.

(5) To further purposes of musicology through the Music Division of the Library of Congress.

(6) To promote the art of music.

The gifts of original scores by Mrs. Coolidge and the transference by her of the Berkshire Festival under governmental auspices was really a recognition by the Government of music as one of the fine arts entitled to its concern and encouragement.

The gift by Mrs. Coolidge of an Auditorium of Chamber Music almost unique in its nature (as from an individual to provide physical resources for the Federal Government) is significant. The choice of chamber music is significant because in this form music finds its purest and noblest expression. The promotion of new compositions will stimulate the creation of new forms of which some may be tentative and ephemeral, some will prove of permanent beauty and value. The provision for recitals will enable these to find a hearing.

The Coolidge gift and endowment are consistent with the scheme and policy of the Library as an agency of the Federal Government, which is not to duplicate local or ordinary effort, nor to supplant it

where the project is within its proper field and abilities, but to do for American scholarship and cultivation what is not likely to be done by other agencies—a policy expressed in the choice of specialized material (courting fields not covered by other libraries) and in the use of its collections, which it especially promotes, in special facilities for the resident and visiting investigator, and in the loan at a distance of "the unusual book for the unusual need."

The Gertrude Clarke Whittall Foundation.—The gift from Mrs. Whittall of a quintet of Stradivari stringed instruments and also Tourte bows for use in programs of music within the Library in which these instruments will be used, is of far reaching importance in the development of musicology and music appreciation.

The Sonneck Memorial Fund.—This fund was provided by The Beethoven Association for the aid and advancement of research in musicology and is in honor of the late Oscar G. Sonneck, its Secretary and Historian, who was, for many years, the Chief of the Division of Music in the Library of Congress.

The Division of Fine Arts.

The collections of this Division number approximately 540,851 pieces, including prints, photographs, photographic negatives, original drawings, stamp proofs, bookplates, posters, and other illustrative material. Its *fonds*, the material of real distinction (fine European and American prints, Whistleriana, Pennelliana, Japanese prints, etc.) secured almost entirely by gift, establishes the dominant character of the collection. To this is added the basic increment of material received by copyright and the representation of contemporary world production secured by purchase (accessions for 1937, 11,042 pieces). The collections are preeminent in certain fields (Whistleriana, Pennelliana), well equipped in others (Japanese prints, fine European and American prints, Persian and Armenian arts, modern bookplates, American portraits) and no less than representative in all. Among the most important of the separate collections are:

George Lothrop Bradley Collection—1,980 items.

Charles L. Freer Collection—1,000 prints—etchings and engravings.

Gardiner Greene Hubbard Collection—2,707 prints—engravings (old masters).

Frederick Macmillan Collection—159 pieces—etchings and drawings by Joseph Pennell.

Kirkor Minassian Collection—360 items—examples of oriental bookmaking and graphic arts.

Pennell Collections of Whistleriana—The most complete extant collections of Whistleriana and Pennelliana.

Ruthven Deane Collection of Bookplates—13,493 contemporary American bookplates.

The Cabinet of American Illustration is comprised of the original drawings of important American illustrators, chiefly in the period 1880–1910. It has now some 3,000 drawings, chiefly in large collections of the work of individual artists.

The Pictorial Archives of Early American Architecture include (1) a collection of 6,265 negatives of early American buildings, and (2) the records of the Historic American Building Survey carried out under the Civil Works Administration and Works Progress Administration (as of February 1st, 1938, 16,000 measured drawings, 17,480 photographic negatives of 3,860 noteworthy structures of the United States).

The collection of books in the fine arts numbers 70,100 volumes, and includes, in addition to a good working collection, much that is of especial interest and rarity (accessions for 1937, 2,042 pieces).

A Bureau of Chalcography is one of the objects intended by the bequest of Joseph and Elizabeth Robins Pennell. Like similar foundations at Rome, Madrid, and Paris, it would reproduce (from plates in its possession) notable engravings, etchings and other prints, for sale at cost. At the present time the plates of Joseph Pennell constitute a foundation upon which such a bureau may later be erected.

This division was enriched by the bequest of Joseph and Elizabeth Robins Pennell. The sole purpose of the bequest was to promote the collections and service of the Division; to perfect the matchless collection of Whistleriana already in the Library; to complete the collection of the works of Joseph Pennell. It was the conviction of Joseph Pennell that the United States Government through the Library of Congress would prove a competent agency for the promotion of the arts.

The Carnegie Corporation said:

> In considering the means by which interest in the fine arts may be developed in the United States, the trustees of the Carnegie Corporation recognize that the Division of Prints (which includes also the Department of the Fine Arts) of the Library of Congress may exercise a considerable influence in promoting an appreciation and understanding of the fine arts in this country * * *.

The Law Library of Congress

The Law Library of Congress originated as the first specialized department of the Library of Congress and since 1832 has developed and maintained a collection of source materials and treatises covering the legislation of the world. Originally intended to meet the needs of the Congress and the Supreme Court, gradually the Law Library has grown into a national repository of legal literature.

With this aim in view and as part of the Library of Congress, the Law Library is rapidly growing in

size and expanding the scope of its collections which are being built up to meet practical as well as theoretical requirements. Including the accessions for 1937 which represent an addition of 19,396 volumes, the Law Library collections number 375,466 volumes, exclusive of the collections covering the fields of public law, constitutional law, public and private international law, primitive law, and a number of special related subjects such as commercial law, criminology, medical jurisprudence, marriage and divorce, etc., classified in the general collections of the Library.

The full title of this department of the Library is the Law Library of Congress, and of its chief officer, the Law Librarian of Congress. Its headquarters and principal collections are housed in the main building of the Library of Congress, where also is concentrated the greater part of its reference service for Congress and the different governmental agencies. In addition, however, it retains responsibility for the service maintained in the Capitol Building, where a working collection of approximately 20,000 volumes is located for the purposes of emergency reference service. Originally this collection, together with the judicial conference library, served also the Supreme Court. However, since the Court moved to the new building, a collection of approximately 50,000 volumes has been transferred there from the Law Library for the exclusive use of the justices and members of the bar.

The collections of the Law Library contain more than 70 per cent of the English yearbooks, a considerable number of trials, a large collection of session laws of the American colonies, a practically complete collection of all American court reports, session laws, statutes, and codes, a set of the printed records and briefs of the United States Supreme Court.

In the field of foreign law, the collection relating to the British Empire is the most complete. However, the Law Library is rapidly developing representative collections of all foreign countries covering legislative enactments, administrative measures, codes, judicial decisions, and commentaries.

In building up its collections, beginning in 1866 with the acquisition of the James L. Petigru collection, the Law Library acquired as gifts or through purchase a number of specialized private libraries. In 1904, 336 volumes from the Von Maurer collection, relating to jurisprudence, were acquired; in 1905, the early English law collection of William V. Kellen; in 1921, 4,691 volumes from the library of Professor Paul Kruger, consisting primarily of monographs on the Roman law; in 1925, 862 volumes of Records and Briefs of the United States Supreme Court from the Melville W. Fuller collection; the library of the late Justice Oliver Wendell Holmes, about 13,000 volumes in which there are a large number of law titles.

The Law Library has a catalogue of its own collections, and closely related subjects are classified in the general library, arranged by author, title, and subject. This catalogue includes much material not regularly catalogued and, therefore, not entered in the main catalogue of the Library of Congress.

As the repository of legal literature, the Law Library covers a vast field, however, outside of the legal Americana, the collection of which is being made as complete as possible, the acquisitions in the other fields are restricted to items of intrinsic value in relation to the different requirements of legal practice and the various aspects of legal scholarship.

From the practical point of view, the Law Library maintains up-to-date collections of the laws in force in the different countries of the world. This material is usually supplemented with commentaries, monographs, and treatises covering the interpretation of whole systems or important aspects of legal regulation. In addition, it maintains reference works and a bibliographical apparatus facilitating the speedy and adequate use of the collections.

For the purposes of scholarship, the Law Library is building up collections covering the fields of primitive, ancient, medieval, and modern law in all their aspects (historical, systematic, sociological, etc). In connection with the development of legal doctrine, the Law Library is accumulating a collection on jurisprudence consisting of the works of outstanding jurists of the different periods and schools, supplemented by the contributions of world scholarship in the field.

The Division of Aeronautics

In 1930, through the munificence of Mr. Harry F. Guggenheim, there was established the Daniel Guggenheim Fund for Aeronautics in the Library of Congress. This fund enabled the purchase of a number of world-renowned collections of aeronautic literature which a happy concatenation of events made available within a short time. Among these were the collections of Gaston Tissandier (1,800 items), Hermann Hoernes (783 items), and Victor Silberer (895 items). At the same time there were deposited by the National Aeronautic Association its collection of more than 200 volumes and pamphlets, and by the Smithsonian Institution the Langley Aeronautical Library of 2,115 items. Somewhat later the Alfred Hildebrandt collection (5,000 items) was secured. All these, added to the original holdings, and augmented by current purchases, gifts, and copyright deposits, have made the collections of the Division the largest and most comprehensive of

their kind in the world. They are estimated to number 23,000 volumes and pamphlets.

The Smithsonian Division

The Smithsonian Division acts officially as the representative of the Smithsonian Institution in the Library of Congress. The collection is increased each year by publications from most of the learned societies and institutions of the world, sent in exchange for those of the Smithsonian Institution. This supplements the regular scientific collection of the Library of Congress which is increased annually by purchase, gift, and copyright. Both groups together number approximately 200.000 volumes and constitute one of the largest and most important collections of source material of this character in existence, and number among their sets of memoirs and transactions those of many of the older scientific academies and societies. In addition to institution and society publications, the collection is unique for its valuable sets of publications of international congresses, exploring expeditions, etc.

The research scholar in the theory and history of pure and applied sciences has available for his work access to material from the Smithsonian deposit, as well as one of the largest collections of foreign and domestic scientific monographs, and collected works of all of the great scientists of the past.

This Division cooperates actively with all of the United States Government scientific bureaus, the National Research Council, the Carnegie Institution of Washington, thus being able to secure the latest information in nearly every field of science.

The Periodical Division

The Periodical Division is the accessioning agency for serial publications. These include materials of two sorts. The magazines and journals, as they are bound, are classified in the general or special collections. The newspapers, however, remain as the permanent collection of the Division. They now number 95.000 volumes, and form the largest single such collection in the United States.

Besides important files of the newspapers of every State, there is a large group of foreign newspapers (23,400 volumes) and of eighteenth century American newspapers (1,572 volumes, kept in the Rare Book Room). Current accessions number 910 different American and foreign newspapers; 7,500 journals and magazines.

Other collections of newspapers separately received are:

State and War Department Collections.—American and foreign newspapers.

State Department, Bureau of Statistics and Senate Collections.—Newspapers.

Gen. John Meredith Read Collection.—47 volumes. Parisian newspapers, 1870-1871.

The Division of Documents

The collection of governmental publications—Federal, State, and foreign—in the Library of Congress is not only the most extensive in existence but is being actively augmented. In United States official publications it is equalled only by the Office of the Superintendent of Documents. Among United States items of particular importance is a considerable, though not complete, series of the separate prints of the documents of the first 14 Congresses of the United States, 1789–1817. The legislative journals and documents of the several States, Territories and insular possessions constitute a most important group of sources for research in American history and administrative institutions. Since January 1910, the current accessions of state publications have been listed regularly in the Library's publication, the *Monthly Check-List of State Publications.* For foreign governments, the parliamentary debates, journals and documents, together with the official gazettes, constitute the backbone of the collection. Such jurisdictions as Great Britain, France, Spain, Germany, Russia, etc., are all well represented. Colonial jurisdictions of the more important powers are also well represented, as well as sovereign jurisdictions such as Finland, Turkey, Czechoslovakia, Hungary, Iraq, etc. In addition to the parliamentary records and the gazettes, the Library has the various departmental publications of the different jurisdictions.

Owing to the intricacies of governments and their publication activities, the representation of such material in the public catalog is in general by no means adequate. Considerable reliance for the use of these materials has thus to be placed on such printed catalogs and indexes as exist as well as increasingly upon the assistants in the Division.

Indeed, legislative and parliamentary debates, journals and documents, which are meagerly represented in the public catalog, constitute sources of the first importance for a great variety of problems relative to the development of public administration, finance, and policy. In order to facilitate the approach to the content of Government publications, "An account of Government document bibliography in the United States and elsewhere" was issued by the Library in a revised edition in 1930. As a guide to the informational content of a little-known but important group of Government publications, "The Memorias of the Republics of Central America and of the Antilles," was issued by the Library of Congress in 1932.

Recently a guide to the Government publications of Mexico has been prepared under the supervision of the chief of the Division. There is a great need for further work of interpretative character in order to make readily accessible the content of Government publications, thus facilitating particularly studies in the social sciences including especially public administration.

The Division of Semitic Literature

The Semitic Division, consisting of over 40,000 volumes, embraces several cognate linguistic groups such as Hebrew, Arabic, and Aramaic, as well as others written in Hebrew script, viz., Yiddish, Judeo-German, and Ladino.

The primary collection is that of Hebraica, the nucleus of which was collected by the late Mr. Ephraim Deinard. The Hebraica comprises both Ancient and Modern Hebrew literatures. Ancient Hebrew may conveniently be classified as follows: (a) Bible: Mss., texts, commentaries and super-commentaries, translations; (b) Mishnah and Talmud: Texts, commentaries and super-commentaries; (c) Law: codes, decisions and responsa; (d) Midrash; (e) Homiletics; (f) Philosophy; (g) Kabbalah and Hasidism; (h) Liturgy; (i) Philology; (j) Poetry; (k) Criticism; (l) Bibliography and Genealogy; (m) Science.

The content of Modern Hebrew, beginning with the Haskalah period scarcely a century and a half ago, is as varied as that of any other advanced western literature.

Each branch contains a well-rounded representation of source material, which during the years have been abundantly made use of by scholars and writers, resulting in a number of important scholarly treatises.

Up till recent years the resources of the Division were consulted chiefly by students of the past, theologians interested in the Bible, archaeologists in Biblical archaeology, Talmudic students in Rabbinics, and so on. However, with the renascence of a purely Hebraic culture in Palestine and its widespread influence abroad, the emphasis has now shifted to present-day problems, and source material in Hebrew is also consulted by the sociologist, the economist, the agriculturist, the scientist and the pedagogue as in any other modern literature.

The chief stimulus to modern Hebrew literature during recent years has been the upbuilding of Palestine, and the revival of the Hebrew language as a living tongue, necessitating the incorporation and minting of an entirely modern Hebrew terminology.

The Division of Orientalia

The Chinese collections of the Division were founded in 1869 by a gift to the United States of the literary classics of his country by the Emperor T'ung Chih (1862–75). They have been increased by the generosity of several American ambassadors to China and of other individuals, and by the interest and enterprise of Dr. Walter T. Swingle of the Department of Agriculture. They now number 175,570 volumes, and are believed to constitute the largest library of Chinese books in the world, outside of China and Japan. They are thoroughly representative, but are particularly rich in works relating to local history, agronomy, and in the encyclopaedic collections known as *ts'ung chu.*

The Japanese collection was founded in 1900 by a gift from the Imperial Japanese Government. It now numbers 29,000 volumes, and provides an effective working collection. Subsidiary but important collections of Mongol, Manchu, Korean (including the distinguished James S. Gale collection), Tibetan, Annamite, Siamese, Turkish, and other Eastern literatures have received as yet no special administration.

Certain of the more important collections, separately acquired, for the Oriental Division are as follows:

Name of collection	Size	Subject or contents
Boxer Indemnity Collection	5,000 volumes	A set of the Chinese encyclopedia *T'u Shu Chi Ch'eng.*
Caleb Cushing Collection (part) (purchased Oct. 22, 1879).	2,547 volumes	Chinese works from his private library.
Hing Kwai Fung Collection	6,467 volumes	General Chinese literature.
Kan-ichi Asakawa	9,000 volumes	General Japanese literature.
Andrew W. Mellon Collection	38 pieces	Rare Chinese maps, atlases.
W. W. Rockhill Collection	6,000 volumes	Codes and rites of China.
Wang Shu-an Collection	22,100 volumes	The family library of Mr. Wang Shu-an of Tientsin.

The Division of Slavic Literature

The collections of this Division have gradually been developed, through exchanges, purchases, transfers, and gifts, from the original deposit of about 68,000 Russian items, which were purchased by the Library of Congress in 1907 from Mr. G. V. Yudin, of Krasnoyarsk, Siberia, including much material on the early history of Alaska.

On June 30, 1937, the Division contained 154,725 pieces. At the present stage the holdings of the Division are chiefly in Russian, but they pertain to many fields and constitute one of the largest Russian collections outside of Russia.

Among its early printed books there is a copy of *The Acts of the Apostles*, published in Moscow in 1564. This first dated Russian publication, skillfully executed by the Deacon Ivan Feodorov in the *Tsar's Printing Court*, sets the official date of the beginning of Russian printing.

The period of Emperor Peter the Great (1698–1725) is represented by a group of 40 books, published by his orders in Amsterdam and Moscow. A few of them are printed with the old "Cyrillic" characters, and

the majority with the new characters of a modified and simplified "Cyrillic" alphabet, introduced by that Emperor and remaining in the Russian language to our day.

The Russian collection is especially rich in the classes of bibliography, history, and belles-lettres. Among its source material it has complete sets of the Russian chronicles and the publications of Russian historical societies. It also has very large sets of the most important periodicals published in Russia during the last 150 years.

In the class of belles-lettres, the collection contains the works of almost all the chief Russian novelists, poets, short-story writers, dramatists, critics, and historians of literature for a period of over 100 years; among those works there are many first and early editions of the Russian classics.

The great interest of the Yudin collection proper lies in the material relating to Siberia, the Far East, and Alaska, which provides important material for the study of Russian discoveries, early settlements, administration, trade, economic condition, and the spread of Christianity in those territories.

Service for the Blind

The Service for the Blind has custody of 35,733 volumes in embossed types (Braille, Moon, etc.) and 709 containers of talking book records. It cooperates with the American Red Cross in placing many titles in hand-copied Braille. The Red Cross also conducts courses in teaching of Braille.

The project, Books for the Adult Blind, has the responsibility for selecting and having books embossed in raised type and for furnishing talking book records. Congress appropriates annually $100,000 for books in embossed types and $175,000 for talking book records. Through grants of $679,000 from President Roosevelt under Emergency Relief Acts, this project is lending about 17,300 talking book machines to the needy adult blind.

The Hispanic Room

In 1927, Mr. Archer M. Huntington of New York City established in the Library of Congress an endowment of $100,000, the income of which is applicable to the purchase of books, not more than 10 years old, relating to Spanish, Portuguese, and South American arts, crafts, literature, and history. In the following year, Mr. Huntington established a fund of $50,000 to provide a consultant in the field of Hispanic literature. There remained but one step to complete this series of gifts. Within the past year an anonymous donor made possible the equipment and maintenance of a room in which may be assembled our important holdings and later accessions in the Hispanic fields, with a view of concentrating there the studies and researches in connection with them. This room (plans for which have been prepared under direction of the Architect of the Capitol by Paul P. Cret) is now (April 1938) in process of preparation. The collections in Hispanic fields which will be brought together here will far exceed those existing in any other American library.

Collections of Philosophy and Psychology

Philosophy and psychology comprise a body of literature in the Library of Congress consisting of about 45,000 volumes. These works are grouped under the general classification of philosophy. In one respect at least, that classification might very well be revised, for the subordination of psychology to philosophy is nominal rather than real. In the grouping of books on the shelves works on psychology constitute, as a matter of fact, a group coordinate with and not subordinate to philosophy. Although the literature of laboratory and experimental psychology might, on account of its methods, very well be grouped with certain of the sciences, that separation of the relatively recent literature has been found (at least for the present) to be undesirable and impracticable. Consequently, works in phychology, including experimental and laboratory psychology, are placed on the shelves as a separate group, located conveniently near the writings with which, both in life and literature, they have been traditionally related, i. e., with works on epistemology, ethics, and aesthetics. Certain exceptions, however, to this classification have been made. Psychological writings which are ancillary to a science, that is, whose principal aim is to aid in the solution of problems in medicine, sociology, psychiatry, or in the physiology of the nervous system or in the functions of various glands, are, in the Library of Congress, classified with these several sciences. In the public catalogue, of course, all of the literature of psychology, wherever it may be housed in the Library, is conveniently brought together and properly organized under its various subject-headings. Consequently, there would be for the practical convenience of Library users little or no gain in undertaking to separate from the general mass of psychological literature that part which experimentalists might regard as scientific.

The Library's equipment for the systematic study of the history of philosophical theories, both occidental and oriental (there are more than 170,000 volumes in the Library's Chinese collection, also a considerable collection of Sanskrit works), is very extensive. The classical writers are represented in standard editions, frequently in numerous editions, and these editions are supplemented by the most approved com-

mentaries, not only in English, but in German, French, Spanish, and Italian, and often in other languages. There is a voluminous literature, well adapted to serious research, that deals with the texts and interpretation of the fragments of the early Greek philosophers, Aristotle, Plato, Albertus Magnus, Thomas Aquinas, and the other great medievalists, Roger and Francis Bacon, Descartes, Malebranche, Hume, Leibniz, Locke, Kant, Hegel, Berkeley, Gioberti, Brentano, and many others, not to mention the more recent masters. On the shelves will be found also a comprehensive literature concerned with the relations of mathematics and the several sciences to philosophy and psychology. The Library is especially rich in the literature of aesthetics and of the philosophy of the fine arts—a body of writings particularly inviting to the scholar occupied with investigations into the history of aesthetic theories. For the lay reader and for students seeking, for purposes of general culture, substantial acquaintance with the present status and history of philosophical ideas, the Library has made generous provision. The more recondite literature is here in great abundance for the technically trained student and writer.

The psychological literature, beginning with Aristotle's *De Anima* down to Wundt and the investigations that come from today's laboratory, is representative and comprehensive. It covers the various schools and types of theory and method: physiological, experimental, genetic, behavioristic, structural, functional, psychoanalytical, and the doctrine of Gestalt. It deals with human and animal psychology, and with the various relations of psychology to education, medicine, law, logic, sociology, and religion.

The collections of philosophy and psychology are constantly receiving additions both from new publications and by way of purchase of older books to fill lacunae on the shelves. All of the more important philosophical and psychological periodicals are received by the Library, especially periodicals published in the English, French, German, and Italian languages. American periodicals are omitted from the following list because, due to copyright deposit, they are all received in the Library. In addition to the periodicals and serials named below, the Library receives regularly the proceedings and reports of the more notable learned societies, philosophical and psychological associations and congresses, studies from the laboratories and departments of many universities and serial publications of national and provincial academies.

Annalen der Philosphie und philosophischen Kritik.
L'année philosophique.
L'année psychologique.
Archiv für gesamte Psychologie.
Archiv für Geschichte der Philosophie.
Archiv für Religionspsychologie.
Archiv für systematische Philosophie und Soziologie.
Archives d'anthropologie criminelle, de médecine légale et de psychologie normale et pathologique.
The Australasian journal of psychology and philosophy.
Beiträge zur Aesthetik.
Beiträge zur Geschichte der Philosophie des Mittelalters.
British journal of educational psychology.
British journal of medical psychology.
British journal of psychology.
La Critica, revista di letteratura, storia e filosofia.
La critique philosophique.
Deutsche Psychologie.
Erkenntnis.
Giornale critico della filosofia Italiana.
The Hibbert journal.
Imago, Zeitschrift für Anwendung der Psychoanalyse auf die Geisteswissenschaften.
International journal of psycho-analysis.
Internationale Zeitschrift für ärztliche Psychoanalyse.
Jahrbuch für Philosophie und phänomenologische Forschung.
Journal de psychologie normal et pathologique.
Kant-Studien.
Logos, rivista internazionale di filosofia.
Mind, a quarterly review of psychology and philosophy.
The Philosopher.
Philosophische Monatshefte der Kant-Studien, im Auftrage der Kant-Gesellschaft.
Philosophy (formerly Journal of philosophical studies).
Psyche.
Psychologische Forschung.
Psychologische Studien (Neue Folge der Philosophischen Studien).
Revue d'histoire de la philosophie.
Revue de métaphysique et de morale.
Revue de philosophie.
Revue neo-scolastique de philosophie.
Revue philosophique de la France et de l'étranger.
Rivista di filosofia neo-scolastica.
Rivista di psicologia.
Scientia.
Vierteljahrsschrift für wissenschaftliche Philosophie und Soziologie.
Zeitschrift für Aesthetik und allgemeine Kunstwissenschaft.
Zeitschrift für angewandte Psychologie.
Zeitschrift für deutsche Kulturphilosophie (continuation of Logos, internationale Zeitschrift für Philosophie der Kultur).
Zeitschrift für exakte Philosophie im Sinne des neueren philosophischen Realismus.
Zeitschrift für immanente Philosophie.
Zeitschrift für Philosophie und Pädagogik.
Zeitschrift für Philosophie und philosophische Kritik.
Zeitschrift für Psychologie und physiologie der Sinnesorgne.
Zeitschrift für Völkerpsychologie und Soziologie.

II. ORGANIZATION OF THE MATERIALS: THE APPARATUS

It is no exaggeration to say that the apparatus through which the materials are made available is of almost equal importance with the materials themselves. The media through which the worker secures his materials are therefore of two kinds: The physical equipment and service, and the bibliographical organization.

Physical Equipment

The Library now occupies the largest building in the world appropriated exclusively to library purposes (35 acres of floor space in the Main Building and Annex). Congress has dealt generously in the provision of the original structures and their maintenance. They are essentially modern buildings in the sense that they are completely fireproof structures and that illumination, ventilation, and the necessary functions of housekeeping are under full and economical control.

In the Main Building the arrangements for the accommodation of books and other bibliothecal material are flexible; order and access are everywhere assured; catalog and collections are in every case contiguous; mechanical invention (pneumatic tubes, mechanical carriers, elevators, etc.) and adequate staff facilitate quickness of service. Suitable, and in some instances (e. g., Rare Book Room, Coolidge Auditorium, Union Catalog Room) adequate quarters have been provided for nearly every special activity; 54 study rooms and 150 study tables aid lengthy research.

The Annex is designed to multiply all these facilities, to enable a more exclusive appropriation of the Main Building to service to Congress by bringing together on the main floor divisions closely connected—Law, Legislative Reference—and to purely bibliothecal activities, to secure to the several divisions a fuller scope for development and at the same time complete control and readier use of their collections, to permit the segregation of important research material, to extend to serious investigators the facilities of 172 additional study rooms and two special reading rooms.

Bibliographical Organization

The Catalog

The Public Catalog.—The importance of the catalog as a bibliographic tool depends upon (1) the scope of the collection which it comprehends, and (2) the soundness of the scheme according to which it is prepared, together with the care with which that scheme has been followed. Of the collections notice has been taken above. Of (2) it may be said that the scheme of cataloging followed is standard, with an elaboration made necessary by the unusual problems here encountered. The processes of cataloging for the public catalog have been summarized as follows:

> By the word "cataloging" we mean the preparation of printed or other duplicated entries according to standard rules whereby these entries are rendered usable for all library and bibliographic purposes. This involves the authoritative investigation of author headings by research or correspondence; transcription of title, collation, contents, etc., according to standard rules; duplicate entry under joint authors, editors, translators, subjects, title, catchword title, etc., etc., and the integration of all these entries by a network of cross references ("see" and "see also") tracers, authority cards, guide cards, etc., which converts the catalog from a mere assemblage of cards into an organic unit designed to meet all needs of all classes of searchers—in other words, a universal apparatus as distinguished from mere check lists, want lists, "location" lists, inventories, and other partial or temporary lists designed to meet only occasional or temporary needs. (*Annual Report of the Librarian, 1935*, p. 241, footnote.)

Included in the public catalog are all books in the Roman alphabet, whether in the general or special collections, and all books in non-Roman alphabets in the general collections. There are many analytical entries of importance. To secure accuracy and serviceability there have been developed in the cataloging department many processes and tools which greatly facilitate these ends. Some of these, such as the list of subject headings, the rules for cataloging serials and the publications of learned societies, etc., have been given, by publication, to the library world; others, such as the admirable reference collection, the invaluable corpus of authority cards, the proximity to the records of the Copyright Office, the use of the Union Catalog, and the procedure of direct reference to an author for information concerning himself, can hardly elsewhere be duplicated.

The resulting catalog of more than six million cards, forms perhaps the most closely organized of dictionary catalogs in the world; and in its field (that representing the special strength of the Library's collections) unrivaled. It is basic for American bibliography.

Catalogs of Special Collections.—A number of catalogs have been prepared covering special material found in the general collections. Each of the separate divisions has, besides, catalogs of the material in its custody. Certain of these catalogs have been published. A number of the most important of them are listed below in very brief form. Those which have been published are marked with a superior figure.

General collections:
- Biographical references.
- Genealogical references.
- Heraldic illustrations.
- American and English genealogies.[1] 2d ed. 1919.
- The Collections of John Boyd Thacher in the Library of Congress.[1] Incunabula. Books relating to the French Revolution. Early Americana. Autographs relating to the French Revolution. Autographs of European notables. Miscellanea and bibliographic apparatus. 3 v. 1931.

Division of Manuscripts:
- Calendars of numerous collections.
- General catalogue of the collections, by collection with inventorial notes.
- Handbook of manuscripts, 1918.[1]
- List of ms. collections . . . to July 1931.[1] 1932.
- Calendar of John Paul Jones mss.[1] 1903.
- Calendar of the correspondence of George Washington with the Continental Congress.[1] 4 v. 1915.

[1] Published.

Calendar of the correspondence of James Madison.[1] 2 v. 1894–1895.
Calendar of the correspondence of Thomas Jefferson.[1] 3 v. 1894–1903.
Calendar of the papers of Franklin Pierce.[1] 1917.
Calendar of the papers of John Jordan Crittenden.[1] 1913.
Calendar of the papers of Martin Van Buren.[1] 1910.
Calendar of Washington mss.[1] 1901.
The Harkness collection of Spanish mss. concerning Peru, 1531–1561; [a calendar] 1932.[1]
List of the Benjamin Franklin papers.[1] 1905.
List of the Vernon-Wager mss.[1] 1904.
List of the Washington mss., 1592–1775.[1] 1919.
Naval records of the American Revolution.[1] 1906.
Papers of James Monroe.[1] 1904.

Division of Maps:
Alaska and the northwest part of North America, 1588–1898; maps. 1898.[1]
Check list of large scale maps published by foreign governments.[1] 1904.
The Kohl Collection of maps relating to America.[1] 1904.
List of atlases and maps applicable to the world war.[1] 1918
List of geographical atlases.[1] 4 v. 1909–1920.
List of maps and views of Washington and District of Columbia.[1] 1900.
List of maps of America.[1] 1901.
List of works relating to cartography.[1] 1901.
The Lowery Collection . . . maps of the Spanish possessions within the present limits of the U. S., 1502–1820.[1] 1912.
Noteworthy maps. No. 1, 2, 3.[1] 1927–1930.
Catalogue of an exhibition . . . comprising some 200 Hispanic-American maps, atlases . . . 1935.[1]
Supplements on cards to the list of geographical atlases and to the list of maps of America.

Division of Music:
General catalogues of the collections, music and books on music, by author, subject, title, and medium.
Index to articles in musical periodicals, 1900–
Analytical index to songsters.
Catalogue of early books on music (before 1800).[1] 1913.
Catalogue of first editions of Edward MacDowell.[1] 1917.
Catalogue of first editions of Stephen C. Foster.[1] 1915.
Catalogue of opera librettos printed before 1800.[1] 2 v. 1914.
Dramatic music . . . Catalogue of full scores.[1] [1908.]
Orchestral music . . . Catalogue, scores.[1] 1912.
The Stradivari quintet of stringed instruments.[1] [1937.]

Division of Fine Arts:
Catalogue of book collections, by author, title, and subject.
Catalogue of Cabinet of American Illustration, by artist, giving title and place of publication of each drawing.
Catalogue of Pictorial Archives of Early American Architecture.
Catalogue of print collections, by artist: entries for titles, schools, media, and subjects in process.
Index to art periodicals, ca. 1900–1929 (superseded by the Art Index).
Index to periodical articles about artists.
Index to portraits in books (continuation of the ALA Portrait Index).
Subject catalogue of reproductions of paintings.
Catalogue of the Gardiner Greene Hubbard Collection of engravings.[1] 1905.
The Noyes Collection of Japanese prints, drawings, etc.[1] 1906.

[1] Published.

Law Library: General catalogue of the collections, by author, title, and subject. This includes much material not regularly catalogued and, therefore, not entered in the Main Catalogue.

Division of Documents:
Accession list of the documentary collections.
Memorias of the republics of Central America and of the Antilles.[1] 1932.
Monthly check-list of State publications (monthly).[1] Jan. 1910.

Division of Aeronautics:
General catalogue of the collections by author. This catalogue includes, beside entries for all uncatalogued material and for books ordered and for books not in the collection with indicia to locations.
Index to aeronautic periodicals and to articles on aeronautics in other periodicals.
Aeronautical periodicals and serials.[1] 1937.

Division of Periodicals:
Accessioning list of all periodicals coming into the Division.
Binding record. Periodical catalogue of bound files with their classification numbers and of new titles.
Catalogue of the newspaper collections, by place.
Check list of American eighteenth century newspapers.[1] 1936.
Check list of American newspapers.[1] 1901.
Check list of foreign newspapers.[1] 1929.
Information circulars regarding reprints of early newspapers.[1]

Division of Semitic Literature: General catalogue of the collections by title (complete) and author (incomplete).

Division of Orientalia: General title catalogue of the collections. (Photostat copies, made on sheets in 1931, available.)

Division of Slavic Literature:
The division has the following card catalogues:
1. Author entries, written in longhand—over 45,000 cards.
2. Author and subject entries, printed—about 10,000 cards.
3. Union catalogue of books in American libraries in Slavic alphabets—over 40,000 cards (mostly printed).

Moreover, the majority of the Division's serials and periodicals have been entered in the Union Lists of Serials, published by the H. W. Wilson Co.

Service for the Blind:
Catalogue of the collections, by author, title, subject, and type.[1]
American Braille (list of available books).[1] 1921.
Braille grade 1½ (list of available books).[1] 1930.
—— —— Supplementary list. 1933.
English Braille.[1] Grades I, II, and III (list of available books). 1921.
Moon type (list of available books).[1] 1921.
New York Point (list of available books).[1] 1921.
Revised Braille, grade 1½ (list of available books).[1] 1921.
Union catalogue of hand-copied books in Braille—Grade one, grade two, and grade one and a half.[1] 1934.

Copyright Office:
Catalogue of copyright entries, 1891– .[1]
Catalogue of dramatic compositions copyrighted in the U. S., 1870–1916.[1]
Records of copyright, 1790–1870, 1870– .

The Union Catalog.—This is an author catalog containing nearly 10,000,000 cards representing practically all book holdings of the Library of Congress together with entries from over 700 American libraries whose

[1] Published.

contributions range from a few selected entries to complete records of their collections. This catalog originated in 1901, in the consolidation of the printed catalog cards of six major libraries. Its present expansion was initiated in 1927 by a grant from Mr. John D. Rockefeller, Jr., of $50,000 a year for 5 years, after which it became a Government-supported unit of the Library. As a result, the catalog now forms an American central bureau whose principal functions are to aid scholarly research in indicating what materials exist and to simplify interlibrary book loans by locating them geographically close to the user. In addition, it is a unique source of bibliographical information, containing as it does, the cataloging experience of the major libraries of the country; specifically, it forms a tool essential in the processes of cooperative or centralized cataloging.

And the Library of Congress is ambitious to make available all of its bibliographical apparatus and every ability of its staff for research to the remotest parts of the United States and to that end is maintaining an informational service which may be drawn upon freely in correspondence. As a result, this Union Catalog will solve the difficulty of many an investigator in quest of a particular book and inform him whence it may be borrowed.

Supplementing the main author catalog are a number of important auxiliary catalogs to facilitate the identification of unusual books. Such are the Index to Special Collections in American libraries, the card catalogs of the British Museum, Vatican and other European libraries and other lists aggregating over 2,000,000 cards.

The Classification

The classification is at once the extension and the complement of the catalog; it is in effect a method of cataloging by subject accomplished by the actual arrangement of the books on the shelves. When such an arrangement can be systematically and thoroughly carried out the accruing advantages to the searcher are enormous. He can go directly to the shelves for his material—not only to the larger groups (e. g., "Philosophy and Religion", class B; "Chemistry", class QD) but to the actual topic of his consideration (e. g., "Perseverance of the Saints", BT768; "Sulphoxides", QD341.S6), without the interposition of any catalog, bibliography, or list. It is only within comparatively modern times that the concentration and diversification of material, which made such an arrangement important and desirable, also permitted its execution on any considerable scale. The scheme of classification adopted by the Library of Congress in the years following 1899 was elaborated by its own experts, for its own use, benefiting from a previous century of trial and error. Its virtues are: (1) Comprehensiveness (every phase of human activity is accounted for; there is no "miscellaneous" residue), (2) particularity (topics are logical subdivisions of general subjects; not lumped within them), (3) expansiveness (new subjects find their places by logical coordination within the existing scheme), (4) flexibility (the natural and economical arrangement of wholly different classes of material, and of material in small and large quantities is provided for), (5) practicality (the system is not based solely upon a philosophical classification of knowledge and does not force the material into arbitrary forms for the sake of logic), (6) articulation (cognate classes are at once related and differentiated by position and by necessary notes and cross references in the schedules), (7) simplicity (the notation is expressive and uncomplicated), (8) individuality (the scheme is that of the Library of Congress with its responsibility primarily to the Congress, and consequently arranges the material from that point of view), and (9) adaptability (in spite of its individuality the scheme is easily adapted to the use of other large or special libraries, American or foreign).

The classification as projected is substantially complete, but is undergoing a continuous amplification in fields in which material is concentrated. The schedules have been printed and from time to time reprinted as this amplification has proceeded, placing the results at the disposal of other libraries. The bibliothecal worth of the classification and its convenience of application have been attested by its adoption in nearly 200 other libraries, American and foreign, and by its characterization, in the words of the secretary of the British Museum Library, as the only adequate scheme for use in considerable libraries.

In addition to enabling direct recourse to material on the shelves, by subject, the classification offers two advantages. (1) The shelf-list (the inventorial catalog which records the books in the exact order in which they are classified) becomes a class-catalog or *catalogue raisonnée* of the classified collections. There is now being developed a classed catalog on cards supplemental to the shelf-list. (2) The classification, as a logical development of related subjects, uses a terminology somewhat different from that employed by the catalog, where each subject stands by itself in merely alphabetic order. The varying viewpoints taken in the two processes furnish approaches to the material supplementary to each other.

The application of the classification is to the general collections of books, the collections of the Divisions of Music, Smithsonian, Slavic, and Aeronautics; to the book collections of the Divisions of Maps and Fine

Arts. The classifications of the Law Library and of the Periodical Division have not been reduced to notation. The collections of the Division of Manuscripts are classified only by type of collection. The prints of the Division of Fine Arts are arranged by (1) school, (2) period, and (3) artist. The Chinese collections are arranged according to the method known as the Ssŭ k'u ch'u üan which divides the material into four groups according with four great divisions of knowledge. Maps are arranged topographically, with a final chronological order. Semitica are arranged alphabetically only within large major divisions.

III. THE EXPOSITION OF THE COLLECTIONS: INTERPRETATION AND SERVICE

The service interpretative of the collections may be considered as expressed (1) directly through the activities of the staff in behalf of seekers of information; (2) by publications which render such information independent of the presence of the staff; (3) by activities which are undertaken in the interest of libraries generally; (4) by other special services to libraries and to investigators; and (5) by actual projects of investigation or research undertaken under the auspices of the Library.

The Staff

The General Reference Services

The usual aids to the investigator in locating his material, in using the apparatus, and in determining questions which involve bibliographic reference are secured both as to the general and the special collections by staffs selected and trained for that purpose.

Chief Reference Librarian.—The Chief Reference Librarian coordinates the handling of reference questions, reviews the findings of the various divisions of the service, and directs the conduct of special reference problems.

Main Reading Room.—The Main Reading Room is responsible for the issue of books from the general collections and for the disposition of usual questions of reference, whether made by the inquirer in person, or by letter. (1,070,471 books were issued in the reading room during the year 1936–37; 3,267 answers were prepared to letters of inquiry.)

Rare Book Room.—The Rare Book Room is responsible for the issue of the books in its custody, including the collections of incunabula and broadsides, and of certain other collections, including the Collections of John Boyd Thacher in the Library of Congress, the Houdini and Toner Collections, and the Delta Collection. It is responsible for reference in connection with these collections and for answering bibliographical inquiries made in person or by mail regarding rare books.

Study Room Reference.—The Study Room Reference Service has responsibility for the general reference service to investigators to whom are assigned study rooms and study tables. The use of the collections by this group of workers may be measured by the issuance to them for use at their desks, from the general collections of the Main Reading Room, of 239,794 volumes during 1937. Closely allied with this service is that rendered by the consultants who are available to the more advanced investigators.

Division of Bibliography.—The Division of Bibliography has responsibility for the conduct of reference problems and the solution of bibliographic questions involving a greater expenditure of time than is possible to other branches of the service, and for the preparation of lists. During 1937 2,875 informational memoranda were prepared in answer to requests from Members of Congress, from the executive branch of the Government and from individuals in practically every State of the Union and 28 foreign countries. Seventeen mimeographed and 27 typewritten lists totaling 831 pages were prepared. The more important of these are noticed in the Bulletin of the Public Affairs Information Service.

Division of Accessions.—The Division of Accessions maintains a card catalog in which are noted all of the data regarding every book and pamphlet received from the sources indicated, which proves a valuable supplement to the other official catalogs of the Library in providing important bibliographical information. To this Division, also, due to its special concern with the subject, are referred all inquiries and inquirers regarding the prices or market values of books.

Other Divisions.—Each of the several divisions (Aeronautics, Documents, Fine Arts, Law, Manuscripts, Maps, Music, Orientalia, Periodicals, Semitic, Slavic, Smithsonian, Union Catalog) dealing in specialized material has its own reference staff. Special features in connection with the organization or service of certain of these will be described below.

Special Reference Service for Members of Congress

The service to the individual Members of Congress and to its committees has of course first claim upon the attention of its Library, and each Division of the Library is organized to attain that end. Certain special features of this organization deserve attention.

Main Reading Room.—The Congressional Unit in the Main Reading Room is charged with the general issue of books and with general reference work especially in response to telephonic requests from Members of Con-

gress or their committees. During 1937, 20,555 requests were handled. Book rooms with attendants and select reference collections form the depots for the reception and return of books in the several office buildings (Senate and House) of the Members, while a depot (the Capitol station) in the Capitol Building is connected by tunnel with the Library. Delivery of books is made via this tunnel (1,200 feet long) by a mechanical carrier (time required for passage, 3 minutes). In each book room an adequate reference collection is maintained to care for such reference questions as may be quickly answered.

Congressional Reading Room.—The Congressional Reading Room is set apart for the use of Members of Congress (Senate and House) visiting the Library in person, and is equipped with a reference collection and organization sufficient to meet all but the most specialized demands.[2]

Legislative Reference Service.—The Legislative Reference Service is the only division of the Library whose declared function is assistance exclusively to Members of Congress or their committees. It was established in 1914; its purpose, as originally designated by law, is "to gather, classify and make available, in translations, indexes, digests, compilations and bulletins, and otherwise, data for or bearing upon legislation, and to render such data serviceable to Congress and Committees and Members thereof." More recently Congress added the specific function of preparing and publishing digests of the public general bills introduced in either House, and a "digest" is accordingly issued at intervals during each session.

The activities of the service closely follow the categories mentioned in the statute:

1. Collection of material. Assistants are assigned to the study of matters likely to become the subject of legislative inquiry, in order to gain familiarity with the material and the sources of information. A clipping file of leading political, economic, and statistical journals is maintained on subjects of recurrent interest; and further data is assembled on points of special significance.

2. Classification of material. Classification and indexing are important preliminaries to the ready location of information, especially in matters of legal reference. Many special indexes are therefore prepared and maintained as part of the routine of the service. Four indexes in particular, however, of the highest importance not only to Congress but to all who require a knowledge of American law, have been authorized by statute and issued in published form. These are:

Index analysis of the Federal statutes, 1789–1931. 2 v. (1908 1911).

Index to the Federal statutes, 1908–1933. 1 v. (1933).

State law index (biennial). 1929– .

The digest of public general bills carries a subject index of pending measures; and the final cumulative issue for each session includes an author list of Members of Congress.

3. Furnishing information. Inquiries submitted to the service are numerous and diverse (4,792 in 1937). Many of them can be answered directly by recourse to the special indexes or files or special knowledge of the personnel. Many others require investigation, study, and often compendious report. Frequently the results of such research commend themselves to the inquirer as worthy of publication and they are consequently made available as separate congressional documents, or, more often, are inserted in the Congressional Record, or in hearings and reports on pending legislation. Typical instances of the first sort are the following:

Documents illustrative of the formation of the Union of the American States. 1927. 1,115 p.

Provisions of Federal law held unconstitutional by the Supreme Court of the United States. 1935. 200 p.

Taxation of incomes, corporations, and inheritances in Canada, Great Britain, France, Belgium, and Spain. 1925. 277 p.

War taxation of incomes, excess profits, and luxuries in certain foreign countries. 1918. 128 p.

Occasionally the service has been asked to undertake research with a view to publication, as is the case with the revision of the Annotated Constitution, authorized by Senate resolution and now in press.

The facilities of the Legislative Reference Service are also frequently availed of to supplement the official drafting services of Congress, especially in furnishing precedents of Federal, State, and foreign legislative practice.

The Chairs

The Chief Aid to Research is the Human Aid.—In the interpretation of our collections and in the use of the apparatus the most valuable aid is that which might be rendered by an expert familiar with them, who is also a specialist in the subject itself; for it is the knowledge of the subject matter that distinguishes such an expert from the technical staff of cataloguers, classifiers, bibliographers, and reference assistants. The knowledge necessary is therefore that gained by education, training, and experience in the particular field of research involved. It is that of the professor who has taught in it, or of the investigator who has himself done research in it. The employment of specialists would be neither for teaching nor personal research; it would be rather for the interpretation of the collections, and guidance in their use.

A corps of such specialists—representing the various major fields of research—adds to the resources of a library, and aids even the mature investigator in the use of its collections; and the Library's service is distinctive in that it couples that knowledge of the subject matter and of the problems and methods of research in it with the knowledge of the collections and

[2] For special service rendered by Law Division, see p. 239, The Law Library of Congress.

of the apparatus to be gained only by a responsible association with them.

For the usual operations of a library—for the classification and cataloguing, and the conventional reference and bibliographic service—the congressional appropriation provides the Library with a staff unsurpassed in its efficiency; and this can be further developed from within or replenished from the ranks of the profession. In addition to this, specialists are needed in certain fields, not in mere library technique but in the *subject matter:* men definitely educated in the science or cultivated in the art involved—with the equipment to teach it or to pursue research in it, but who find a larger interest in interpreting—vitalizing—the literature of it for the benefit of the student, the investigator, and the public at large; who, understanding the problem of the investigator, are able to translate his need into the language of the classification and the catalogue, and who (in other fields) having the appreciations of the connoisseur, are able to converse with him in his own "language"—and whose influence may thus be potent not only in interpreting our own collections, but in bringing to us the gift of collections already formed.

The incumbents of the "chairs" are drawn from teaching and research positions. They are familiar with our collections, expert in the use of our apparatus, skilled also in the interpretation of a need into the language of the collections and the apparatus. With this equipment they render an advisory service of value both to the general inquirer and the research investigator.

Neither a teaching faculty nor a research faculty, composed of individuals competent to do either but foregoing these to be of aid to others, their service will be the interpretation of the collections and guidance in the use of them.

Such specialists exist in the faculties of universities or upon the staffs of research organizations. They can render much more efficient aid to the investigator than can be expected from the bibliographers and reference staff alone.

Such men as these the usual governmental stipend cannot be counted upon to attract and hold. Endowments are needed whose income, added to the funds already available, will enable the Library to secure men competent for this highly specialized service.

A precedent for this was set in the endowment, in 1925, by Mrs. Frederic S. Coolidge, of the Division of Music, which included provision for an annual honorarium to the Chief of the Division in addition to his governmental salary. The explanation is the special duties and responsibilities—and inevitable personal expense—imposed upon him in the execution of her trusts; but the result is to insure expert conduct in the administration of that Division, a specialist there who will not merely be an authority in the subject matter, but widely influential in the application of it to the service of the Science, the Art, and the Profession. This was, therefore, analogous to the endowment, or the part endowment, of a Chair of Music.

Since 1925 endowments have been secured which provide for four other chairs. The complete list is now in consequence as follows:

1. Chair of Music (Division of Music). Established January, 1925, by Mrs. Frederic S. Coolidge.

The incumbent of the Chair of Music has administrative direction of the Division of Music and of its collections, including operations in the acquisition, preparation, and service of music and musical literature including manuscripts and rare items and of cognate material such as phonograph records and music rolls. He has supervision over the Archive of American Folk-Song. He is responsible for the expenditure of a number of special funds for the acquisition of unusual materials. He organizes the concerts provided by the Elizabeth Sprague Coolidge Foundation and the Gertrude Clarke Whittall Foundation, arranging programmes, engaging artists, and managing the funds involved. He is responsible for the discharge of the obligations of the Library under these and other donations, and he is its representative at musical congresses and conventions.

2. The William Evarts Benjamin Chair of American History, mentioned above, though intended for the benefit of all who come to use materials, manuscript or printed, on American history, is naturally most closely associated with the Division of Manuscripts where the most recently available sources are expected to be found. The incumbent (Professor St. George L. Sioussat, beginning June, 1938) is, of course, an expert in American history and in historical investigation, and has knowledge of the printed sources currently received as well as of the manuscript sources; and it is his particular province to serve those who come for extended research.

3. Chair of Fine Arts (Division of Fine Arts). Established April 1927, by the Carnegie Corporation of New York.

The grant which enabled the establishment of the Chair of Fine Arts was made in recognition of the fact that the Division of Fine Arts "may exercise a considerable influence in promoting an appreciation and understanding of fine arts in this country; and that the amount and quality of this influence will depend upon the qualities and abilities of the specialist in conduct of the division." The incumbent of the Chair is therefore the administrative officer of the Di-

vision; he is responsible for the custody, and maintenance of its several collections; for the informational services in connection with them, both by personal interview and by correspondence; for the discharge of the obligations of the Library under the Pennell, Hubbard, and other bequests. He cooperates with the National Park Service and the American Institute of Architects in accomplishing the Historic American Buildings Survey, and other projects toward "an appreciation and understanding of the fine arts."

4. Chair of Aeronautics (Division of Aeronautics). Established November 1929, by the Daniel Guggenheim Fund for the Promotion of Aeronautics.

The Chair of Aeronautics was made possible at the same time, and from the same source, as were the purchases of the several great collections of aeronautic literature which, with the Library's existing collection of material, were segregated in the Division of Aeronautics. The exploitation of this unique collection, its proper utilization toward the solution of the technical problems involved, its contribution toward the advancement of the industry and the national defense, required its organization and interpretation by one who should be more than bibliographically expert in the literature of aeronautics, but who should also be a specialist in the engineering and scientific problems. The incumbent of the Chair of Aeronautics has a responsibility, therefore, not only toward the historical aspects of his subject as represented in its literature, but also toward its application and development in so far as these may be forwarded by research in that literature. These responsibilities are discharged by interview, correspondence, and publication, by the preparation of bibliographies and indexes, and by the investigation and analysis of actual aeronautical problems.

5. Chair of Geography (Division of Maps). Established February 1933, by Mr. James Benjamin Wilbur.

The foundation of the Chair of Geography was intended to secure to one of the largest map collections in the United States the services of a professional geographer. The incumbent of the Chair has not only the administrative responsibility for the collection, but also has competence to make authoritative investigation of the problems upon which map data may be brought to bear. His advice in such problems as are raised by boundary disputes, the determination of geographical names, mapping and surveying projects, geographical aspects of international relations, certain aspects of census enumeration, etc., may be of determining importance. For such advice and aid his services are often required by the Legislative and by many agencies of the Executive Branches of the Government, by many public and private bodies, and numerous individuals.

The Consultants

The idea which actuated the formation of a staff of Consultants was the same as that behind the endowment of the Chairs—with this difference: Each chair, for which the compensation is a combination of Government stipend with the income of an endowment, has full administrative responsibilities in the conduct of a division of the Library, and a subordinate staff; and is necessarily subject to the requirements conventional in the government service. It seemed possible that without these responsibilities, and in a relation largely exempted from such conventional requirements, a number of men might be secured for the advisory relation alone, content to receive for it a compensation which would be scarcely more than an honorarium. They might be drawn in part from among the teachers in colleges and universities retiring under some age limit, or investigators similarly retiring from research work; they might even be younger men still desiring to pursue some research of their own which might proceed concurrently with the service to the Library.

In addition to the assistance which, as experts in their fields, the Consultants are able to render directly to students and investigators, their aid is of great importance in the purely bibliothecal activities of the Library—in the selection and purchase of books, in the development of the classification, in the determination of problems of cataloging and in interpreting the collections.

The first Consultantship, in Hispanic literature, was established in April 1928 by Mr. Archer M. Huntington, who had previously provided a fund for the purchase of books in this field. Other Consultantships have been made possible by grants from the General Education Board and the Carnegie Corporation of New York. In the absence of other funds, and to fill a susceptible need, a number of scholars have expressed a willingness to serve in the same relation, though without any formal connection with the staff. These are the Honorary Consultants.

Consultants are now available in the fields of history, political science and public administration, economics, church history, Hispanic literature, Romance literature, philosophy, poetry, bibliography, cataloging and classification, library practice, classical literature, military history, musicology, paleography, Roman law, sociology, and Chinese history and culture.

Publications

The publications of the Library fall into several groups: (1) texts, (2) bibliographical guides to special fields of study, (3) bibliothecal manuals and compendia, (4) bibliographies, catalogs and lists, and (5)

reports, memoranda, and other informational publications.

Texts

Among the manuscript collections of the Library are a number of documents basic to American history. These are needed by scholars in all parts of the country. To render their texts available in published form not only permits much wider use to be made of them, but preserves the documents themselves. At the same time publication enables the student to overleap the barrier which the manuscript condition and the (often) extremely difficult chirography of the originals present, and provides a place for the statement and solution, once and for all, of the various problems which must be considered in connection with the use of the documents.

Early in the present century, therefore, publication under competent editorial supervision of the texts of a number of such documents was determned upon. The following have so far been issued:

Journals of the Continental Congress, 1774–1789. 1904–1937. 34 v.

The Records of the Virginia Company of London. 1906–1935. 4 v.

The Harkness Collection * * * Documents from Early Peru. 1936.

In this category may also be entered the publication of the full orchestral score of the first work of chamber music performed in the Library under the auspices of the Elizabeth Sprague Coolidge Foundation (October 1928):

Canticum Fratris Solis, set [by Charles Martin Loeffler] for voice and chamber orchestra to the hymn of St. Francis of Assisi, in a modern Italian version by Gino Perera. [Elizabeth Sprague Coolidge Foundation, 1929.] Full score, 95 p.

Bibliographical Guides and Manuals

In a number of fields a guide to the literature which is not only informing as to the actual material available, but critical as well, establishing the worth of the various sources, their place in the history of the subject, and outlining the procedure which should be followed in their use, enables a student to enter a field of studies cognate to his own.

Such a field, for example, is the law of Spain as respects a student of Anglo-American law. To fill a need which could only otherwise be filled by the presence of actual experts in these subjects permanently on the staff (and then chiefly only for inquirers at the Library) the following bibliographic manuals have been published:

The Bibliography of International Law and Continental Law, by E. M. Borchard. 1913.

Guide to the Law and Legal Literature of Argentina, Brazil, and Chile, by E. M. Borchard. 1917.

Guide to the Law and Legal Literature of France, Prepared Under the Direction of E. M. Borchard . . . by G. W. Stumberg. 1931.

Guide to the Law and Legal Literature of Germany, by E. M. Borchard. 1912.

Guide to the Law and Legal Literature of Spain, Prepared Under the Direction of E. M. Borchard . . . by Thomas Palmer, Jr. 1915.

Guide to the Diplomatic History of the United States, 1775–1921, by Samuel Flagg Bemis and Grace Gardner Griffin. 1935.

Publications in Library Economy

A large number of the publications of the Library are in the field of library economy. The more important of these, such as the schemes of classification and the lists of subject headings, have been prepared for its own use, and by publication are made a contribution to the library world. Others are descriptions, for the use of those who may wish to take advantage of them, of the practice of the Library in certain operations. Other publications, though of interest and importance to librarians (such as check-lists, catalogs, informational memoranda) have a wider significance and are not included here. The following however are of special note:

Catalogue rules on cards.

Classification schedules, A–Z. 32 v. 1910–1937.

Guide to the cataloging of periodicals. 3d ed 1931.

Guide to the cataloguing of the serial publications of societies and institutions. 2d ed. 1931.

Literature subject headings. 5th ed. 1926.

Notes on the care, cataloging, calendaring and arrangement of manuscripts. 3d ed. 1934.

Notes on the cataloging, care, and classification of maps and atlases. Rev. ed. 1921.

Subject headings used in the dictionary catalogues of the Library of Congress. 3d ed. 1928. Cumulative supplement, 1935.

Tentative headings and cross-references for a subject catalog of American and English law. 1911.

Tentative list of subject headings and index rules for the State law index. 1927.

United States headings established by the Library of Congress, with additional headings of other libraries. 1936.

Catalogs, Bibliographies, and Lists

The chief printed catalogs of the various collections have been cited in part I of this Section, where they are listed under the several Divisions. In addition to these should be mentioned the catalogs of exhibits, comprising materials of particular interest or distinction, and the more or less comprehensive lists, often involving fugitive and other obscure materials (and so of permanent value) the preparation of which is one of the chief functions of the Division of Bibliography. Other lists are prepared by the several Divisions covering the special materials in their fields. Certain of these are published from time to time.

Memoranda and Reports

This is a miscellaneous group of publications, including most of the publications of the Copyright Office, memoranda on the bibliographical identification of certain rare issues of newspapers, a compilation of the popular names of Federal statutes, an account of international exchange of Government publications, informational circulars regarding the Declaration of Independence and the Constitution, reports on the "Star Spangled Banner," "Hail, Columbia," "America," "Yankee Doodle," etc.

Activities Benefiting Other Libraries: Printed Catalog Cards, and Cooperative Cataloging

Many of the fruits of its own organization and experience can be freely passed on by the Library to other members of the library world. This is chiefly true of matters in which the results are susceptible of publication. Some of these (e. g., the classification schedules, the lists of subject entries, etc.) have already been mentioned above ("Publications in Library Economy"). Two activities, however, undertaken directly for the benefit of subscribing libraries, convey to them currently the results of the cataloging and classification performed in the Library.

The Card Division

It is obvious that if a printed catalog card is produced in conformity with a generally accepted standard of cataloging, then this card may be used for its catalogs by any library owning the book which this card represents, without incurring the actual expense of the cataloging process. And since the catalog card bears at the same time a notation indicating its classification, this expense, too, may be saved by the subscriber. The desideratum of such a central cataloging bureau was the object of negotiations and experiments by the American library world from 1850 till 1901, when the establishment of the printed catalog card service of the Library settled the question in its broad outlines. The Card Division is the agency which determines how many copies of the card are to be printed, stocks it, and supplies copies of it at cost to libraries and individuals desiring it. The cards now in stock number more than 105,000,000, representing about 1,500,000 separate titles. The regular subscribers to the service number more than 6,000, and the annual sales approximate $275,000, completely paying for the service. Large as this sum is, the saving to the subscribers must be measured by the difference between the few cents which is the price of a card, and the dollars which the separate cataloging of the book would have cost.

The existence of a stock of printed cards representing very largely the items in the general classified collections of the Library makes possible several other important features of the service of the Card Division. One of these is the maintenance of depository sets of cards at various regional centers; 73 such catalogs are now established (exclusive of partial sets in United States governmental libraries) including 17 in foreign countries. Another feature is the possibility offered for the rapid assembly of titles in any particular subject by purchasing cards en bloc within any specified field.

Incidentally, this card distribution system has done much to systematize and improve the standard of cataloging in libraries throughout the United States.

Cooperative Cataloging and Classification Service

Soon after the distribution of the printed catalog cards was begun, it became apparent that a considerable proportion of the books acquired by libraries throughout the country are not represented in the collections of the Library of Congress and catalog cards for them would have to be prepared by the libraries themselves. Such cards began to be printed and distributed by the Library as early as 1909. In 1932 this service was extended to include a project for the "analytical" cataloging of monographs in scholarly serial publications, including such collections as Migne's "Patrologia" and the "Monumenta Germaniae Historica." The desire of libraries to have the decimal classification added to the printed cards resulted in a project first sponsored by the American Library Association then transferred to the Library of Congress.

The several undertakings in cataloging and classification carried on in behalf and in cooperation with other libraries were brought together in 1934 in the Cooperative Cataloging and Classification Service. The Service is charged with the revision of copy prepared by cooperating libraries and the application of the decimal classification. Over 6,000 new cards yearly result from this work and decimal classification numbers are supplied for about 34,000 books.

Other Special Services to Other Libraries and to Investigators

Interlibrary Loan

Under the system of interlibrary loans the Library lends certain books to other libraries for the use of investigators engaged in research. The loan rests on the theory of a special service to scholarship which is not within the power or the duty of the local library to render. Its purpose is to aid research calculated to

advance the boundaries of knowledge by the loan of unusual books not readily accessible elsewhere. During 1937, in response to 8,171 requests, 8,259 volumes were dispatched on interlibrary loan to 881 libraries in the United States and Canada, and to five other libraries in five other foreign countries.

Not only the collection of printed books is comprehended in the material subject to such loans, however. Music, maps, and sometimes other material is lent and even rare books whenever needed by the serious investigator. An especially appropriate subject of such loans is the collection of photographic transcripts of foreign archival material in the Division of Manuscripts and the collection of rotographs of early modern European manuscripts deposited in the Division of Manuscripts by the Modern Language Association of America for this very purpose.

The system of interlibrary loan is a reversible one, and the Library is able to secure for its constituency the benefit of loans from other libraries of locally inaccessible material. During 1937, 155 books were thus borrowed.

Loans to Governmental Libraries

Closely connected with the system of interlibrary loans is the service of the Library to all of the Executive Departments and independent bureaus. Loans of material are freely made for the purpose of aiding in the prosecution of research for the Government. Such loans are made, however, not to the individual investigator, but to his departmental or bureau library, which takes responsibility for the material. The extent of this service may be conjectured from the annual statistics: during 1937, 45,597 volumes were lent to 227 agencies in response to 13,942 requests.

Photoduplication Service

Photoduplicates (photostats, microfilm copies) of research material can be secured through the Photoduplication Service of the Library at moderate cost. In view of the increasing demand for photoduplication of research materials, the Rockefeller Foundation, in February 1938, made a grant of funds to the Library for the establishment of a microphotographic laboratory. The apparatus and methods made possible by this grant will greatly facilitate the scholar in his quest for otherwise unavailable materials.

Research Pursued in the Library

Enough has been said in the foregoing pages to indicate the amount and the character of the researches carried on in the Library as part of its operations. The primary function of the institution is to *assemble* materials for research. This function does not, upon a superficial view, seem to imply itself a necessity for research. The part which research plays in the assembly and utility of the collections would be apparent only were it withdrawn; it would then be apparent that the perfection of organization, the ancillary publications, the informative service, and to a degree the completeness of the collections themselves, rest upon basic and continuing studies among them from various points of view. The need is, not for less, but for more of these.

There may be considered here, however, under two heads, the research carried on in the Library not connected with its own orgauization and function.

1. Studies pursued by investigators utilizing our special facilities, including group investigations.

It is, of course, impossible to estimate the amount of productive research which the collections and services of the Library enable. Certain statistics within reach are not, however, without interest. During the year 1937 the use of study tables and study rooms were accorded to 1,150 investigators pursuing their studies over a greater or less extensive period of time. They came from the United States and from 21 foreign countries, and represented 136 American and 14 foreign universities. Among them were 140 investigators pursuing research for the Federal government, 171 members of faculties, 339 graduate students from other than local institutions, 74 holders of fellowships or grants in aid. They made use of a quarter of a million books. About 50 works published during the year were recognized as in whole or in part the result of research performed here.

An extremely productive form of investigation, and one to whose efficiency the facilities of the Library peculiarly lend themselves, is that of group research. Such, for example, have been a number of the projects sponsored by various agencies of the Federal government during the past few years, in order as rapidly and effectively as possible to explore uncharted fields or to produce data to guide action in a changing economy. Such, too, have been the investigations under the direction of Dr. Earl G. Swem in the compilation of the Virginia Historical Index, Miss Winifred Gregory for the Union Lists of Serials, Documents and Newspapers, and of the editors of the Dictionary of American Biography.

2. Investigation pursued under the auspices of the Library, in cooperation with individuals and learned institutions.

The Library cannot itself undertake or finance extensive projects of research beyond the limits set by its own function and operation. It can, however, very appropriately supervise such projects, provide the materials, sometimes select the personnel, and utilize the results. Such, for example, was its experience in

the preparation of the guides to the law of foreign countries previously listed. Certain other projects may be mentioned. Where these have resulted in publication the title is noted in quotation marks.

"A. L. A. catalog. 1904."
American Library Association.
"A. L. A. portrait index. 1906."
American Library Association.
Advancement of musical research. 1929–
Beethoven Association (Sonneck Memorial Fund.)
Collection of photographs of early American architecture. 1930–
Carnegie Corporation of New York.
Continuation of the A. L. A. Portrait Index. 1933–34.
Civil Works Administration.
Development of bibliographical apparatus. 1926–
Richard Rogers Bowker.
Folk-song project, 1928–
Annie C. B. Parker.
Estate of Mrs. Parker.
A. W. Mellon.
Carnegie Corporation of New York.
John Barton Payne.
Mrs. Adolph C. Miller.
American Council of Learned Societies.
Guide to Mexican public documents.
American Library Association.
"Guide to the diplomatic history of the United States, 1775–1921. 1935."
Social Science Research Council. 1931–3.
"Guide to the law and legal literature of France. 1931." 1927–29.
The Law School of Yale University.
"Guide to the law and legal literature of Spain. 1915." 1913–14.
Harvard University.
Law collections: inventory, catalog of serials, want list of colonial laws, index to briefs and records of U. S. Supreme Court and U. S. Circuit Courts of Appeals. 1934.
Civil Works Administration.
Pictorial survey of early Virginia architecture by Miss Frances B. Johnston. 1934–
Carnegie Corporation of New York.
Project C. "Census of medieval and renaissance manuscripts in the United States and Canada. 1935–." 1929–
General Education Board.
American Council of Learned Societies.
Project E. "Catalogue of Latin and vernacular alchemic manuscripts in the United States and Canada. 1937–." 1933–
American Council of Learned Societies.
Project G. Training center for Far Eastern Studies in the Library of Congress. "Some eminent Chinese of the seventeenth [eighteenth, nineteenth] century. 1936–37." 1934–38.
American Council of Learned Societies.
Rockefeller Foundation.
"A union list of periodicals, transactions and allied publications currently received in the principal libraries of the District of Columbia. 1901."
The libraries of the District of Columbia.

Library of Congress Trust Fund Board

The Library of Congress Trust Fund Board is a quasi-corporation with perpetual succession and all the usual powers of a trustee including the power to invest, reinvest, and retain investments and specifically the authority to accept, receive, hold, and administer such gifts or bequests of personal property for the benefit of or in connection with the Library, its collections, or its service, as may be approved by the Board and by the Joint Committee on the Library.

The Library of Congress Trust Fund Board administers endowments, the income from which is available for specified objects. Since 1925 the totals for direct application, the endowments, the income, and two trust funds have amounted to $4,019,279.90, for the benefit of the Library and its collections.

The "Annex" and Potentialities for More Effective Research in Various Fields

The coordination of the service for Congress and its Committees has been made the more effective by the purpose to transfer the Law Division and the Legislative Reference Service to the room now occupied by the Periodical Division on the Main Floor with headquarters in the Senate Reading Room. This will join with the Congressional Reading Room, on the west side of the building. The Periodical Division will move to the present quarters of the Copyright Office, which will be moved to the "Annex".

The preparation Divisions (Accessions, Classification, and Cataloging) will move to the "Annex" and will thus render possible a special reading room for "Political Science, Law, and Economics" in the room now occupied by the Catalog Division (main floor, southeast side) and a special reading room for "History and Genealogy" in the room now occupied by Accessions and Classification (main floor, northeast side). The pavilion room (main floor, northeast corner) will be the Room of Poetry. The room on second floor, southeast side, made vacant by the transfer of the Card Division to the "Annex" will be the Hispanic Room, where advanced research will be possible in the fields of learning in Spanish, Portuguese, and related languages.

In the "Annex" on the top floor will be two large research reading rooms, around which have been arranged 172 study rooms, for the use of those pursuing advanced research, and there is space in the "Annex" for almost innumerable study tables.

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