CONFERENCE ON THE FUTURE

OF THE

SMITHSONIAN INSTITUTION

FEBRUARY 11, 1927

CITY OF WASHINGTON
1927

THE SMITHSONIAN INSTITUTION AT WASHINGTON

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PURPOSE OF THE CONFERENCE

"To advise with reference to the future policy and field of service of the Smithsonian Institution."

ESTABLISHMENT OF THE SMITHSONIAN INSTITUTION

CREATED BY ACT OF CONGRESS AUGUST 10, 1846

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* Deceased.

SMITHSONIAN INSTITUTION—ESTABLISHED 1846
GIFT OF AN ENGLISHMAN TO AMERICA

SOME ACHIEVEMENTS DURING 80 YEARS

I. Began Work from which Sprang 9 Government Bureaus.
   1. Initiated systematic meteorological studies lasting 25 years; developed into WEATHER BUREAU.
   2. Gave world first principles of fish conservation; organized and directed U. S. FISH COMMISSION.
   3. Built up NATIONAL MUSEUM collections to leadership. It now contains over 10,000,000 specimens in all fields.
   4. Led way in preserving records of Indian life. Built up BUREAU OF AMERICAN ETHNOLOGY.
   5. Inspired and organized NATIONAL ZOOLOGICAL PARK to promote interest in American animals.
   6. Created ASTROPHYSICAL OBSERVATORY, preeminent authority on Sun's heat.
   7. Created BUREAU OF INTERNATIONAL EXCHANGES; foremost in making world science a unit.
   8. Organized United States Bureau of INTERNATIONAL CATALOGUE OF SCIENTIFIC LITERATURE.
   9. Organized NATIONAL GALLERY OF ART.

   (Smithsonian still administers for government last seven of above Bureaus.)

II. Foremost in Diffusion of Scientific Knowledge.
   1. Gave American scientists premier agency for free publication and world wide distribution.
   2. Built up ten standard technical series; circulates these throughout world, FREE.
   3. Created America's leading scientific library.
   4. Collaborated in 42 expositions here and abroad.
   5. Gave over million specimens to schools and museums.
   6. Answers by mail over 8000 questions yearly.
   7. Cooperated through publications, specimens, instruments, men, and advice, with scientific agencies throughout world.
   8. Fostered scientific development of schools.

III. Led Way in Scientific Survey of North America.
   Made major contributions to U. S. Geological Survey.

IV. Took Part in 1500 Expeditions Covering Globe.

V. Served as Link between America and World Science.

VI. Gave American Science a High and Generous Ideal.

SMITHSONIAN SUPPORTS ALL BRANCHES OF SCIENCE

I. Meteorology.
   1. Introduced accurate instruments, daily weather maps, use of telegraph and national system of observers.
   2. Prepared first tables rainfalls and temperatures.
   3. Established basic principles of storm movements.
   4. Discovered influence of Sun's variation on weather.

II. Astronomy and Mathematics.
   1. Circulated by wire news of astronomical discoveries.
   2. Subsidized Gauss' celestial mechanics in English.
   3. First measured heat in spectra of stars.
   4. Published indispensable mathematical tables and formulae.

III. Physics and Chemistry.
   1. Langley made aviation a science and built first flying machines to fly under own power.
   2. Extended Sun spectrum 10-fold by heat measurements.
   3. Subsidized classic work on velocity of light, on interferometry, and on ultra-violet rays.
   4. Invented 8 standard instruments to measure radiation.
   5. Subsidized determination by Morley of atomic weights of oxygen and hydrogen.

IV. Geology, Mineralogy, Paleontology.
   1. Established science of paleogeography.
   2. Led way in study of earliest known life.
   3. Foremost in study of meteorites and rockweathering.
   4. Made basic contributions to micro-paleontology.

V. Biology.
   1. Published comprehensive monographs on American fishes, birds, whales, crustaceans and many other groups.
   2. Recognized as authority for identification of plants and animals.
   3. Gathered one of finest insect collections in world; forms basis of economic entomology.
   4. Published 25 volumes on American plants.
   5. Made exhaustive study of trees and shrubs of Mexico.
   6. Built up largest bird collection in America.

VI. Anthropology.
   1. Made basic contributions to study of primitive man, and of origin and antiquity of man in America.
   2. Foremost scientific collection relating to physical man.
   3. Conducts extensive studies of American Indian.
   4. Initiated preservation of Indian ruins for posterity.
   5. Compiled and published Handbook of American Indians.

JAMES SMITHSON

THE SMITHSONIAN INSTITUTION—PARENT OF AMERICAN SCIENCE

By WILLIAM HOWARD TAFT,
Chancellor of the Institution

GENTLEMEN: You have been invited here today to discuss the future of an institution which was given to this country by a native and resident of another; an institution which enjoys the protection of the United States Government and is yet a private organization; an institution which inspired the orderly development of American science and which, as long ago as 1850, made youthful America an international patron of thought and knowledge.

James Smithson was an Englishman. He was the natural son of the Duke of Northumberland and a direct descendant through his mother of Henry VII, King of England. Embittered by the bar sinister on his name, this gentleman of the 18th century was yet great spirited enough to devote his life to the service of men. A chemist and mineralogist of repute, he was admitted to the Royal Society at the early age of twenty-two. "*Every man,*" he said, "*is a valuable member of society who, by his observations, researches and experiments, procures knowledge for men.*" Acting on this principle, he devoted his attention with equal thoroughness to the small and the great, the practical and the cultural. His chemical papers are numerous and fine. He discussed the origin of the earth, and he improved oil lamps. Yet for all his labors, fame mocked him. The years brought him only bad health and painful infirmities. Broken in body and mind, he sat down in 1826, at the age of sixty-one, to make his

will, and because in that act he held true to the ideals which had inspired his life, he gained for himself the immortality which seemed to have escaped him.

James Smithson had never been in the United States. He lived in a day when Englishmen prophesied the collapse of this government; in a day, also, when great philanthropic foundations were rare. Yet he bequeathed, subject to the life interest of his nephew, his entire estate of half a million dollars *"to the United States of America, to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men."*

Smithson died in 1829, but the estate did not revert to the United States until the death of the nephew in 1835. From the moment in 1835 that President Andrew Jackson reported Smithson's bequest to Congress, it engaged the attention and inspired a sense of responsibility in the leading men, whether in public or private life, in this country. Such men as John Quincy Adams, then serving in the House of Representatives, and Jefferson Davis, in the Senate, appreciated the importance of the gift and its great possibilities for good if properly administered. They overcame the objections of John C. Calhoun, and others, and induced Congress to accept the bequest.

In July 1836, Richard Rush of Pennsylvania, who had been Attorney General, Secretary of the Treasury, minister to France and minister to England, was named to go to England to put in a formal claim for the bequest.

The English government appreciating the nobility of Smithson's legacy, pushed a friendly suit through Chancery in the then unprecedentedly short period of two years. Consequently, in 1838, Rush was able to bring back to the United States $508,000 in gold sovereigns, a sum which later small additions brought to a total of $550,000.

Congress and the country were now faced with the difficult problem of defining knowledge and determining how best to increase and diffuse it. Five successive Congresses spent much time in indecisive debate of these matters. Three Presidents urged the duty of decision on them. Learned men proffered advice—voluntary and solicited. The press and the pulpit discussed the matter. But not until August 10, 1846, did the 29th Congress give form to the long waiting Smithsonian Institution. The long debate impressed the men of Congress and the public strongly with the country's obligation to make the Institution worthy of the beneficence of the donor's gift and purpose. This alone was worth the delay.

In view of the condition of knowledge in those days many immature proposals sought to absorb the fund. The wonder is that none of them succeeded. A postgraduate university, an astronomical observatory, a normal school, a library, an institute for the promotion of agriculture, a mineralogical bureau, a system of lectureships, were suggestions advanced. The Institution, as it finally took shape, was a compromise. To its charter John Quincy Adams, Joel R. Poinsett, ex-Secretary of War, Richard Rush and Robert Dale Owen contributed the basic ideas.

Among the good points of this charter were, first, the solidity of organization which it secured to the Institution. It vested the Smithsonian with the prestige and dignity of the United States Government by making the President, Vice President, Chief Justice and members of the Cabinet the Smithsonian Establishment. It put the actual management in the hands of men whose positions guaranteed their high mindedness. I refer to the Board of Regents, which includes the Vice President, Chief Justice, three Senators, three Representatives, and six citizens chosen from the country at large. It was this

insured stable control which led Charles Lang Freer of Detroit to select the Smithsonian as the institution in this country to which he was willing to leave his rare collections of Oriental and American art and his fortune to endow them.

The second important thing the charter did was to secure the permanent investment of the principal and to permit the use of the interest only.

Thirdly, it ordered that no part of the primary fund should be expended for buildings and structures.

Fourthly, after stipulating for the inclusion of a library, a museum, a chemical laboratory, a gallery of art and lecture rooms, it left the development to a large extent in the hands of men who would be best qualified to determine what that should be.

Gentlemen, this charter was sound, but it did not make the Smithsonian Institution. The credit for that, belongs to a great man, who was its first Secretary. The first Board of Regents recognized clearly that the " future good name and success and usefulness of the Smithsonian " would depend in the main on the character and ability of the Secretary. In selecting this officer the Board sought the advice of the most distinguished men of science here and abroad. The unanimous choice of all who were consulted, including Faraday, David Brewster, Arago, Bache, Silliman, was Joseph Henry, professor of physics and natural history at Princeton. In their opinion, Joseph Henry stood " without a peer in American science." He had discovered the principle of the electric telegraph. He had anticipated the great Faraday by a year in the discovery that a magnet induces electricity, though he did not publish his results in time to get the credit. For him to undertake the organization of a new institution meant

the sacrifice, to a great extent, of his own career of research and discovery. Henry knew this, and nothing less important than the Smithsonian Institution and what it could be made to mean to American science could have induced him to make this sacrifice.

He came to the Smithsonian in December 1846 and he gave himself to the Institution unreservedly for 32 years, until he died in May, 1878. During that time he built his own ideals into the Institution. He was far beyond men of his time and many men since, in his willingness to share with others, and without claim of credit, knowledge which he and his associates had gathered. His sole aim was an extension of the boundaries of knowledge.

Only last December when the American Telephone & Telegraph Company presented a bust of Alexander Graham Bell to the Institution, we heard read a letter written by Mr. Bell to his parents in 1875 when he was working on the telephone. In that letter Bell gave credit for the continuation of his researches to a successful conclusion to the encouragement and advice given him by Henry. Alexander Graham Bell was only one of many whom the first Secretary of the Smithsonian inspired.

Joseph Henry gave to the Smithsonian a program of organization which has never been essentially modified. He deduced that plan from Smithson's phrase: "the increase and diffusion of knowledge among men." He proposed to increase knowledge by stimulating original research through suitable awards and pecuniary assistance, by publishing the results achieved by investigators in order to encourage them, and by promoting major investigations, like that of continental scope on meteorology. He proposed to achieve the diffusion of knowledge by publishing memoirs containing the results of original research

and a series of reports, giving, in language easily understood, accounts of the new discoveries in science, and of the changes made from year to year in all branches of knowledge.

Joseph Henry did not seek a great building, or a heavy administrative organization with a necessarily large overhead, nor did he feel it a justifiable expenditure of Smithson's bequest to maintain public museum collections, an art gallery and a great library, such as the charter of the Institution imposed upon the funds. He saw, long before anyone else, that in a short time the accumulations of a museum or a library would use up *for their care alone* more than the small income of the Smithsonian endowment without contributing effectively to the increase and diffusion of knowledge.

He was not against any of these things in themselves, but he did not feel that they should be supported by the Smithsonian funds. He set himself, therefore, with an ability which we cannot too highly appraise, to prevent the Institution from being swamped with the care of such material. While he avoided the expenditure of a large portion of the funds in this way he put the Institution in the way of building a better library than could possibly be bought, by exchanging Smithsonian publications for those of learned societies throughout the world. In 1866 he succeeded in having the care of this accumulating library transferred from the Smithsonian to the Library of Congress, which agreed to give it a special custody. This has been a most happy arrangement for it has permitted the Smithsonian to build up the foremost scientific library in this country, without bearing the cost of upkeep and care. It is called the Smithsonian Deposit in the Library of Congress.

While he was thus successful in part in saving the Smithsonian funds from the burden of caring for vast

masses of museum material, it was twelve years, or 1858, before he induced Congress to recognize its responsibility for the upkeep of a national museum. It took twenty-four years before the Government was persuaded to assist in any adequate way to support the great collections of the National Museum created by the Smithsonian, and for which the Smithsonian had been spending yearly more than half of its own limited income, which was in 1870 $45,000.

To illustrate how burdens that did not belong there were piled on the meager Smithsonian funds, let me cite to you the case of the International Exchanges. This service, by which the Smithsonian acted as the channel for the sending of scientific literature from this country to all institutions and learned societies abroad and receiving from abroad scientific literature for distribution among American learned societies, was inaugurated in 1847. In 1867 Congress recognized it as so efficient and desirable that it imposed upon the Smithsonian the duty of distributing and receiving governmental publications in the same way, without, however, appropriating for that purpose. From 1860 to 1876 the annual cost of the Exchanges to the Institution mounted from $2,348 to $10,199, but it was not until 1881 that Congress made an annual appropriation of $3,000 to this service.

The wonder is, gentlemen, that these burdens did not absorb the entire fund. That they did not is due solely to the constant struggle and self-sacrificing zeal of Secretary Henry and of his aid and successor Spencer F. Baird. With a few thousand dollars annually, these two men performed marvels in the encouragement of investigations in every field of science and in the publication of results. They had their fingers on the pulse of American science. Where the greatest need was, there they were to help, sparingly but effectively, and it was for that reason

that the Institution came to be in a peculiar sense the incubator of American science.

Secretary Langley and Secretary Walcott, the successors of Henry and Baird, have held to the fruitful principles built into the Institution by Henry. In their time the burden of maintaining the various Government bureaus created by the Institution and left for the sake of efficiency under its administration has been lifted from the small Smithsonian funds, although the immediate Smithsonian staff is not recompensed for their administrative services to these Government bureaus.

I must make clear, gentlemen, that the Smithsonian Institution is not, and has never been considered a government bureau. It is a private Institution under the guardianship of the Government. That point was clearly made in the first report of the House Judiciary Committee in 1836, when it said: *"The sum given to the United States by Mr. Smithson's will is no wise and never can become part of their revenue. They cannot claim or take it for their own benefit. They can only take it as trustees to apply to the charitable purpose for which it was intended by the donor."*

It is because the Institution still administers for the Government seven of the public bureaus which it created that many people suppose this private research establishment to be a part of the Government. The importance of keeping the Smithsonian—in so far as it is an institution for the *"increase and diffusion of knowledge"*—a private organization, was early brought out by Joseph Henry. He said: *"That the institution is not a national establishment, in the sense in which institutions dependent on the government for support are so, must be evident when it is recollected that the money was not absolutely given to the United States, but intrusted to it for a special object, namely: the establishment of an institution for the benefit*

JOSEPH HENRY
First Secretary of the Smithsonian Institution

of men, to bear the name of the donor, and, consequently, to reflect upon his memory the honor of all the good which may be accomplished by means of the bequest. The operations of the Smithsonian Institution ought, therefore, to be mingled as little as possible with those of the government, and its funds should be applied exclusively and faithfully to the increase and diffusion of knowledge among men." That this opinion is a sound one, gentlemen, we believe the Smithsonian's achievements prove. It is obvious that the freedom from political exigencies which has permitted the Institution to play so great a part is due primarily to the private nature of its funds.

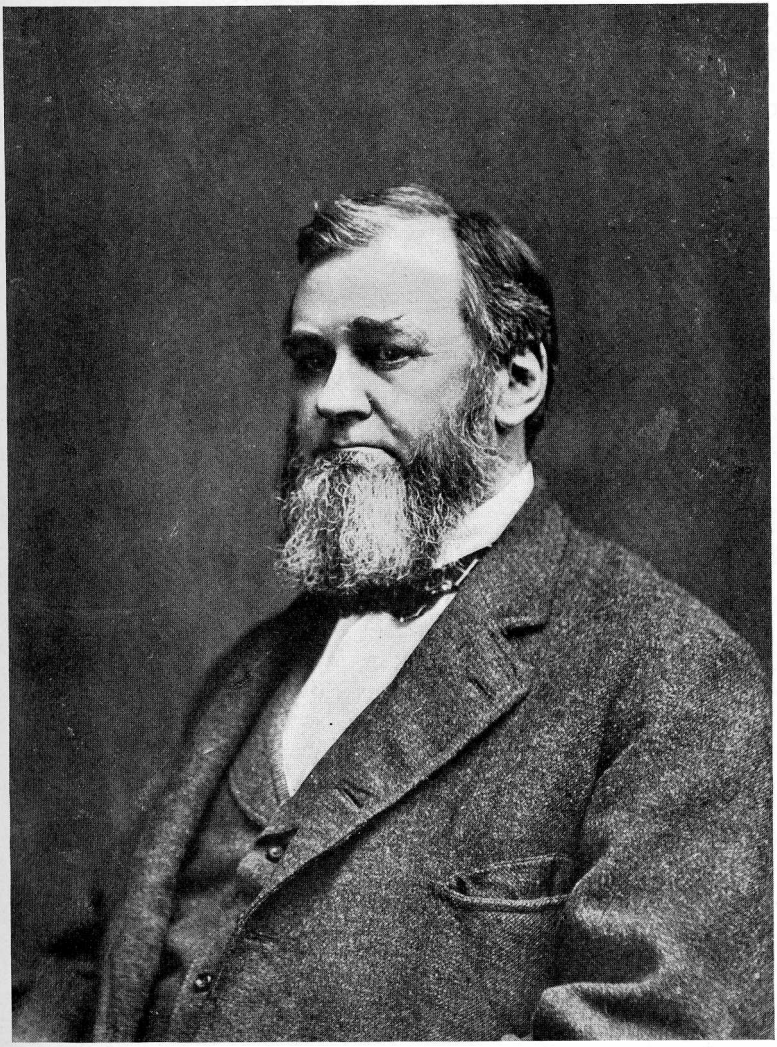
Gentlemen, there seems something fateful in the timeliness of James Smithson's bequest to the United States. It came to meet an unexampled opportunity. Here in 1846 was a vast untouched continent, enclosing, in a single geographical and political unit, a prolific plant and animal life ready under the most favorable conditions to reveal their secrets to botanists and zoologists; a continent peopled by a primitive race, illustrating the mode of life and habits of thought of prehistoric man, and offering a useful key to the lost story of man's climb upward. At the same time, in the hands of an energetic people were the mechanical tools—particularly steam transportation—capable of developing this new continent. Such a setting and such men to deal with it offered possibilities for the increase of knowledge such as perhaps the world had never seen before. The danger was that the men would remain blind to those possibilities and waste the setting for practical ends before those of its secrets which were perishable should be gleaned. It was a crucial moment in the history of knowledge. What was needed was some powerful inspiring force, actuated by the highest ideal of knowledge for its own sake, which would be conscious of the possibilities and which would

devote its energies to making the most of them. That force, the liberality of an Englishman helped to supply, and the self-sacrificing idealism of American men of science—Joseph Henry and his associates—directed. The debt of America and of science to the Smithsonian Institution is great.

Joseph Henry had the vision to understand clearly what Smithson meant his foundation to be, and the energy and character to make it that. The Smithsonian has now come to a time when without the support of the nation, it can no longer continue to be what Henry made it. And yet the need for just such an Institution as it has been is no less than the need was 80 years ago. In some respects the unique opportunities are even greater. This Institution is not the product of a moment; 80 years of the toil of great men have gone into its making. There is that about it which cannot be replaced.

The Regents have felt it their duty to reveal to a leading group of representative American citizens what it is, and does, and to advise with them what its future shall be. For that reason they have invited you here. They wish you to see the broad and comprehensive scope of the Institution, competing or interfering with nobody, cooperating with all, reaching the basic problems of mankind and of the time, with a view to furnishing the information through which alone they can be solved. They wish you to see what the future possibilities of the Institution are, and if you think them worthy of realization, to advise us as to how we may go about achieving it.

Around this hall are arranged exhibits of the researches and publications of the Smithsonian, with especial emphasis on how they should and could most profitably be extended. The scientists in charge are at hand to answer your questions. May we invite your careful attention to them?



SPENCER FULLERTON BAIRD
Second Secretary of the Smithsonian Institution

THE SMITHSONIAN INSTITUTION—ITS ACTIVITIES AND CAPACITIES

By C. G. ABBOT,
Assistant Secretary

GENTLEMEN: The exhibits which you have examined offer a bird's-eye view of the Smithsonian Institution, its past, its present, and its possibilities. To make the impression complete and vivid we must see the founder, James Smithson, son of the Duke of Northumberland, and lineal descendant through his mother from Henry VII of England. This man of aristocratic lineage devoted himself to usefulness. Expressing a ruling motive of his life, he said: *"No ignorance is probably without loss to man, no error without evil."* Such a man, denied legitimacy, but inspired to do an act which gives immortality to his tarnished name, foresees the coming greatness of our young Republic, and makes it his heir. Yet not America alone, but all mankind shares in his memorial. For he attaches to his bequest no condition excepting *"to found at Washington an establishment for the increase and diffusion of knowledge among men."*

This happened a century ago, in an age of wars, when his countrymen and our countrymen had twice in half a century shed each other's blood. Smithson's idea was highly original, for it occurred to him before men began to establish great foundations as they do today. Others caught his motive.

If there be giants in fortune and giants in industry, there are also giants in self-sacrifice for ideas. Such was Henry, the first Secretary; Baird, who killed himself untimely carrying three men's burdens and three men's knowledge; Major Powell, the one-armed hero, who dared for science

the first passage of the Grand Canyon of the Colorado strapped in his boat; Langley who dared to encounter ridicule to rescue from derision the science of flying. All these and many more, of whom some are with us, but many have passed on, loved the Smithsonian Institution and denied themselves to make it live.

THE SMITHSONIAN NOT A GOVERNMENT BUREAU

Some of you, doubtless, have been accustomed to think of the Smithsonian as a Government bureau. It is easy to point out the contrary. Founded by the private fortune of a foreigner as his memorial; given by him to the United States in trust for "the increase and diffusion of knowledge among men," and thus not merely North American but worldwide in scope; accepted by the United States as a public trust; secured in a perfectly unique standing by the eminence of the governing body appointed by Congress; it is obvious that in the origin of the Smithsonian Institution something far broader in its nature than a United States Government bureau was in contemplation. This is the more manifest in the extraordinary care taken in its organization, for Ex-President John Quincy Adams, three successive presidents, and six Congresses gave much thought to the form which Smithson's memorial should take. Resolving that their Secretary must be a man of international scientific standing, the Regents called Joseph Henry, the foremost exponent of physical science in America, who was the peer of Faraday in discovery, to devote the best thirty years of his life to forming the Smithsonian Institution.

By the wisdom of Secretary Henry, seconded by the indefatigable self-sacrificing zeal of Assistant Secretary Baird, there soon grew up at the Smithsonian Institution activities of great public value. The first six among these are the National Museum; the Weather Service; the sys-

tem of International Exchanges of Scientific Literature; the Scientific Library, now a growing unit known as the Smithsonian Deposit in the Library of Congress; the United States Fish Commission; and the Bureau of American Ethnology. Four other valuable enterprises arose later from Smithsonian initiative, namely: The National Zoological Park; the Astrophysical Observatory; the International Catalogue of Scientific Literature; and the National Gallery of Art, the latter including as its greatest single unit the privately endowed Freer Gallery of Oriental Art.

These enterprises were initiated by the Smithsonian, and for years were financed from the income of the private Smithsonian Endowment. When they became indispensable to the public, they out-grew Smithsonian support, and Congress now appropriates for their maintenance because the public needs them. Instead of removing these public bureaus to be under some department of the Government, Congress, recognizing the great efficiency, rigid economy, and appropriateness of the Institution's management of them, has seen fit to leave most, but not all, of them under Smithsonian administration.

If the Smithsonian did not exist, the National Museum, the Zoological Park, the International Exchanges, the scientific department of the Congressional Library, the Bureau of American Ethnology, would all have to go on because the public demands them. The Congressional appropriation for them, amounting to approximately a million dollars a year, is not a largess to the Smithsonian Institution but a necessary public expenditure irrespective of it.

Both the Government and the Institution gain by the present connection. The Smithsonian gives much of its energy to the administration of the bureaus, and has in consequence lamentably lost reputation as a private foundation while it has lent extraordinary prestige to these gov-

ernment activities. The public collections themselves contain vast quantities of material which are the absolute property of the Smithsonian. In return, the trained experts who care for the collections aid the Institution in the acquirement and diffusion of knowledge. The publications of the National Museum, Bureau of American Ethnology, and the Smithsonian Report are done at public expense. The franking privilege is highly valuable to the Institution. So it is give and take, with mutual advantage.

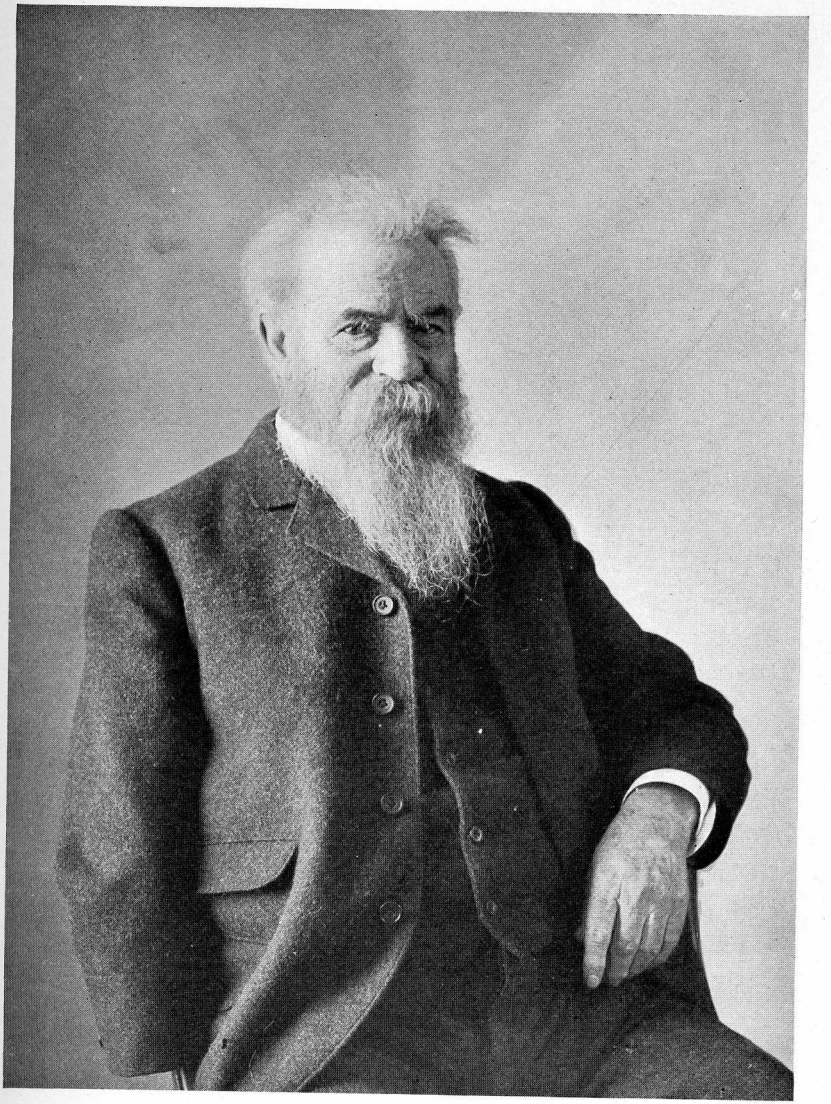
Thus the Smithsonian Institution, while not itself a Government bureau, by direction of Congress administers for the Government specific appropriations amounting to approximately a million dollars annually. It is this great public service by this private trust that causes many people to suppose that the Institution is publicly supported.

RANGE OF SMITHSONIAN ACTIVITIES

The administration of these seven Government bureaus is but incidental. The Smithsonian field is far broader, embracing all science and all the world. As there is nowhere in the world its like, I must tell you what the Smithsonian Institution does.

1. It carries on original scientific investigations with its own staff. At some time in its history it has pursued researches in every branch of the physical and natural sciences. Secretary Walcott's work in Cambrian geology and paleontology furnishes an outstanding example. He has added a new volume to our knowledge of the earliest forms of life. Smithsonian researches involve expeditions over the face of the earth from Pole to Pole. In the past year alone, aided by gifts and sacrifices of individuals, the Institution has directed or participated in 40 such expeditions.

2. The Institution subsidizes other researches by men not directly connected with the Institution, and these not



MAJOR J. W POWELL
Founder of the Bureau of American Ethnology

Americans alone, but Englishmen, Frenchmen, Norwegians, Germans, and scientists of many other nationalities. To give you classical examples of such support of outsiders by the Smithsonian, let me cite the pioneer work of Schumann, the German scientist, on the extreme ultraviolet rays, by which these rays were first made known to science, and Morley's determination of the atomic weights of oxygen and hydrogen, which is basic for the atomic weights of all chemical elements.

3. The Smithsonian publishes new knowledge gained by its own and outside workers in the form of large memoirs and smaller original papers, which, with unique liberality, and to secure the widest possible use, it distributes free to 1500 libraries and learned bodies in every country of the world. Among these it publishes also tables and formulae useful to the engineer, and to all workers in the physical sciences. In addition, the Institution seeks to spread knowledge of scientific advances among intelligent general readers by reprinting in the Smithsonian Annual Report informing articles. The demand for these Reports is extraordinary, and they are praised by the most discerning of critics. Outstanding illustrations of Smithsonian memoirs are its monograph on Oceanic Ichthyology by Goode and Bean; the Langley memoir on Mechanical Flight. We have now in press a collection of internationally prepared meteorological records which will be fundamental to every practical and theoretical research in that science for many years to come. These are published with funds given by Mr. John A. Roebling.

4. The Smithsonian evolved the International Exchange Service and is now the official channel for the exchange of scientific intelligence between the United States and the world.

5. For over half a century the Institution has been building up in the Library of Congress the foremost scientific library in this country, now reaching nearly 700,000 volumes.

6. It fosters the scientific development of schools, museums and institutions in all countries by its free distribution of scientific literature, by the loan of research men, by the gift of over a million specimens, by the distribution of instruments, and by its advice. It is safe to say that there has not been a single text-book in any branch of science published in the last 50 years which has not showed the result of Smithsonian research.

7. The Institution cooperates with every department of our Government. Its botanists supply basic information for the economic botanists of the Department of Agriculture, its ichthyologists for the Fish Commission, its geologists for the Geological Survey, its ethnologists for the Bureau of Indian Affairs, its physicists for the Army and the Navy. In the late war it was the Smithsonian scientists whose optical knowledge lay at the basis of the revolutionary improvements in searchlights, which did good service on the American front before the armistice.

8. The Smithsonian answers by mail an average of 8000 questions a year on scientific subjects. These answers go to many inquirers who can neither spell nor punctuate, as well as to some of the most learned men in the world.

9. It gives occasional lectures and courses of lectures. For example, it recently sponsored the lecture of Dr. Johannes Schmidt of Denmark on his remarkable discoveries of the life migrations of the eel; and Dr. Hrdlicka's lecture series on prehistoric man. The Smithsonian was quick to seize upon radio broadcasting as a means to diffuse information, and has already given 123 talks by its own or invited experts.

10. It fosters research by conferring medals of honor on eminent discoverers. For example, on the Wright brothers for the first human flight in power-propelled machines heavier than air, and on Rayleigh and Ramsay for the discovery of argon.

11. It procures foreign diplomatic and learned recognition and assistance to expeditions going abroad. Credentials addressed to "Friends of the Smithsonian Institution" insure an open door even in semi-barbarous countries.

12. It fosters American scientific progress by providing headquarters for the American Association for the Advancement of Science and the American Association of Museums. Until 1924 it was the headquarters and meeting place of the National Academy of Sciences.

13. As already pointed out, the Smithsonian administers seven governmental bureaus in addition to the Freer Gallery.

14. It disburses annually funds from four sources:

I. Unrestricted—the income of its endowment—$65,000.

II. Sums disbursed in trust for special objects:

a. Intrusted for miscellaneous purposes by private individuals—annual average for 5 years, $70,000.

b. The income of the Freer bequest, annual average for 5 years, $190,000.

c. Congressional appropriations for 7 public bureaus—annual average for 5 years, $850,000.

It is interesting to note in passing that for the support of bureaus which are a direct outgrowth of the early activities of the Smithsonian, including those which the Institution administers, Congress appropriated last year

$5,618,549. Contrast this with the $65,000 which the parent institution has to spend annually.

HOW THE SMITHSONIAN DEVELOPED

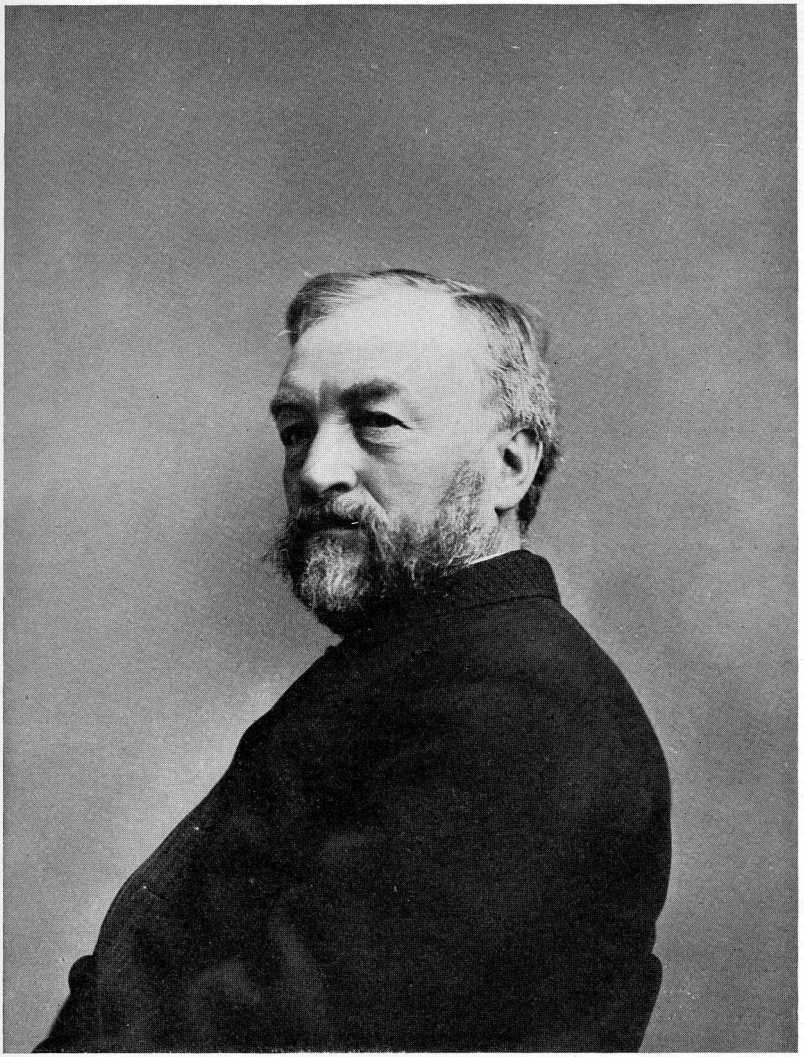
In the year 1846, Secretary Henry drew up a masterly plan of action which has never been essentially modified. That plan included a few elementary principles which have proved creative principles of the first order. They are Henry's interpretation of the purpose of the founder, James Smithson—"for the increase and diffusion of knowledge among men." We may list five of these principles.

The *first* of them directs the Institution to embrace all branches of knowledge. This insures the breadth of its scope.

The *second* directs the Institution to seek facts irrespective of their apparent economic value. Henry knew that the application of a fact would take care of itself; that the important thing was to discover the laws of aviation, for example, or the facts of plant distribution. Plenty of people would be found to build on such discoveries.

His *third* principle was to do nothing that could be equally well done by any other agency. The withdrawal of the Smithsonian from the domains of the Weather Bureau and the Fish Commission illustrates the application of this principle. The Smithsonian initiated the work when its importance was not appreciated. When other agencies arose capable of carrying it on, the Smithsonian withdrew and directed its energies to untried fields.

As a *fourth* principle, Henry insisted upon a simplicity of organization and a minimum of overhead, to prevent it choking itself with mere administrative expense. He designed the Institution to be the cavalry of science, free to dart from front to front, giving just enough encouragement at one place to insure effective work, and able at will



SAMUEL PIERPONT LANGLEY
Third Secretary of the Smithsonian Institution

to dash off to another spot when the emergency arose. In publication this principle has caused the Smithsonian to give to the world facts of vital importance which would have found no other channel of publication.

Wise application of this principle has largely accounted for the tremendous effect the Smithsonian has had on American science. The Institution has achieved its results not by sinking all its eggs in one basket, but by a wise allotment of, for example, $200 for the making of botanical collections in Texas, of $1,000 for meteorological and magnetic instruments to be furnished expeditions all over the country, of $100 to a struggling learned society to complete the cost of an important technical publication—by effective aid here, there, and everywhere. Nothing better illustrates the Smithsonian's method of getting the greatest results with the least expenditure, than its relations with the 600 volunteer meteorological observers, which it had scattered throughout the country in the '50's and '60's of the last century. Besides weather data, it induced these men to make collections of birds, plants, and insects, and to furnish statistics on agriculture, and many similar services.

It may seem at first glance that the Institution has departed from this principle, but the great plant which you now see here, with the exception of the building in which we are and Mr. Freer's magnificent Gallery, belongs to the Government bureaus administered by the Institution.

Finally, we must not overlook the *fifth* and yet basic principle of cooperation which is employed in all the four which I have just mentioned, and which is the keystone of all Smithsonian activities. No serious applicant for aid or advice, whether it be a government, a university, a great scientist, or an illiterate miner, has ever been brusquely turned away from the Smithsonian Institution. Nothing in the way of information or materials, such as instruments and collections, has ever been re-

stricted solely to the use of the Institution. In the words of Secretary Henry in 1854, "*It is the policy of the Institution to furnish all the means in its possession to aid scientific research, and not to hoard up its treasures, or confine their use to those who may be immediately connected with the establishment, or who may be supported by its funds. Cooperation and not monopoly is the motto which indicates the spirit of the Smithsonian's operations.*"

Such are the sterling principles by which Joseph Henry and his successors attained so great results from so little means. It is natural that they have become a part of the Institution, built into it like the bones in a man's body. I think that if you will picture to yourselves the last 80 years with the Smithsonian left out, you will have a better conception of what fruit these principles have borne in public intelligence and in international cooperation, as well as in all the world of science. Suppose, for instance, that the Smithsonian had not initiated the plan of the international exchange service, by which all institutions or scientific workers in this country are enabled to send publications to and receive publications from institutions anywhere abroad.

THE SMITHSONIAN'S OPPORTUNITY

1. Research.
2. Diffusion of Knowledge.

But we are only concerned with the past in so far as it points to the future, and I want to show you what we conceive the Smithsonian's mission may be and ought to be in the 20th century.

RESEARCH IN NATURAL HISTORY

On the side of the natural history sciences, did it ever occur to you to inquire where fundamental facts came from? Where do agricultural experiment stations learn

of parasites which may down insect plagues? Where do oil geologists learn to distinguish the microscopic fossils which serve as guides to oil-bearing strata? Where do fish experts find out about the foods which fish require, or the migrations which they undertake? Where do dealers in hardwoods, fruits, drug, oil and cordage plants discover the whereabouts and the conditions of growth of their sources of supply? You will find these various people get such basic information from men who spend their lives on the systematic study, description, and mapping of habitats of the infinitely diverse plants and animals found in nature.

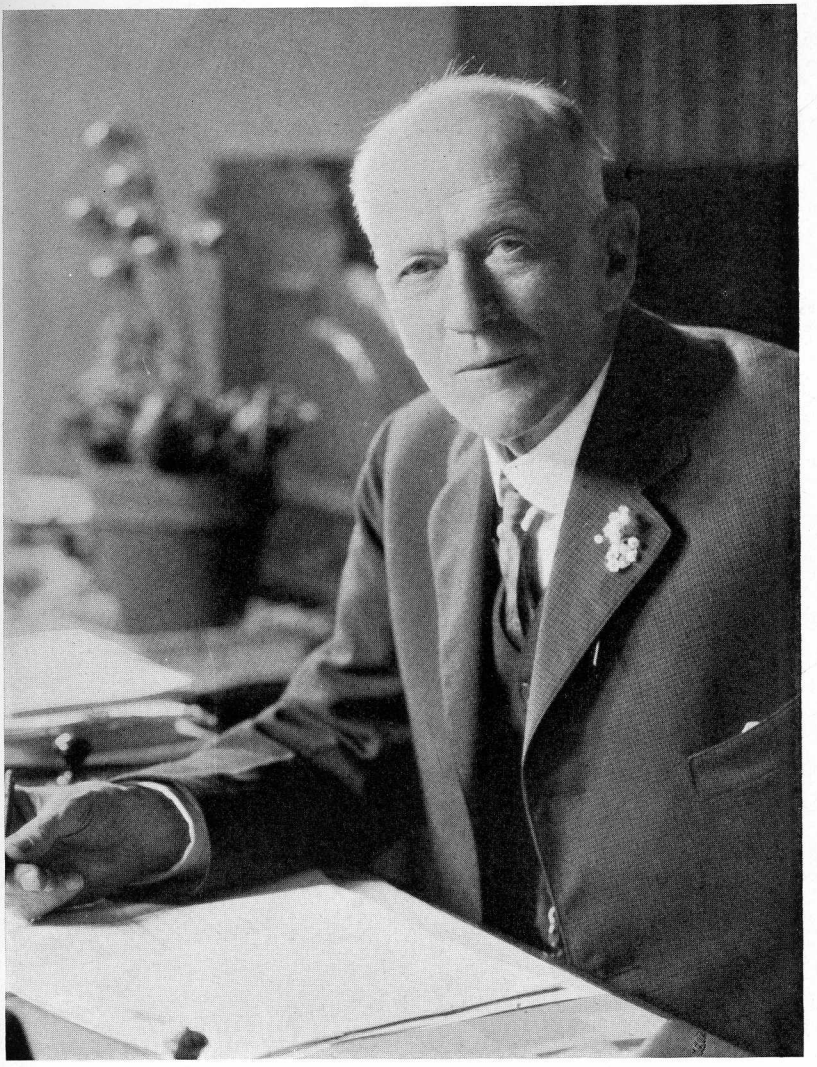
The great parent of such work in America has been the Smithsonian Institution, and with the great and constant increase of its collections the duty of pushing on this basic research becomes more and more pressing. Yet in the enormous collections of the United States National Museum, built up by and now under the direction of the Smithsonian, repose millions of specimens unexamined, unclassified, undescribed and so useless because the Smithsonian has no means to devote thereto. A single case will illustrate the importance of study of this material. For years the Institution had been gathering together samples of bottom muds from every sea in the world incidental to oceanographic studies. All this material had piled up in the Museum and would have been considered by the average man who saw it so much waste mud. But the Smithsonian Institution engaged an expert to learn all there was to know about one single family of little marine shelled animals, called foraminifera, found in the muds from the sea bottom. Some six or seven years ago, oil geologists discovered the presence in oil-bearing sands of fossil forms of these foraminifera. It became apparent that the presence of certain species of the foraminifera would serve as a guide to oil-bearing strata to a man who

knew about them. The only man in the United States who did know was this worker on the Museum collection under the Smithsonian. The oil companies turned to him for the information, which as the Encyclopaedia Britannica states, "has brought about the principal advance in the geological technique of oil finding."

The study of these millions of specimens in the Smithsonian, many of which have no counterpart in the world, is something which only the Institution can properly undertake. Yet despite the wealth of material we already have, the collections are by no means complete. Many important regions of America are unrepresented, and we ought to be sending out expeditions to study the fauna and flora, the mineralogy, the ethnology, and the archeology of these regions.

The Smithsonian, to a large extent, originated the study of the prehistoric Indian life of this continent. It created the Bureau of American Ethnology and has done more than any other one agency in this branch of science. At the present moment the encroachments of the white man are obliterating forever the remains of Indian civilization in America. The Indians are being absorbed, forgetting their own languages. The next few years offer the last opportunities to learn the story of America's native tribes and it would be wasteful not to use to the utmost the Smithsonian's qualifications to make the most of these opportunities.

The same is true of the animal and plant life of the world. Because of the encroachments of the white man's agriculture and other activities, hundreds and thousands of species of animals and plants have disappeared, and more must disappear. My colleague, Dr. Wetmore, has published a curious example of such annihilation in the case of Laysan Island in the Hawaiian group. Early accounts of Laysan Island, and photographs taken 20 years



CHARLES DOOLITTLE WALCOTT
Fourth Secretary of the Smithsonian Institution

ago, depicted it as a pleasant spot covered with green vegetation. When Dr. Wetmore went there in 1923 for the Biological Survey, he found it nothing but a barren waste of sand, bird and insect life scanty, and vegetation practically obliterated. What had caused this desolation? In 1902, the foreman of the guano works brought to Laysan three or four pairs of rabbits, partly to amuse his children and partly for the fresh meat they would furnish. They increased with incredible rapidity. In a short while they had absolutely stripped the island of vegetation, and they themselves began to starve, so that when Dr. Wetmore arrived only a few remained of the vast army of destroyers.

The next 50 years will offer the last opportunities to secure many forms of nature to preserve for the information and study of future generations. It is a serious responsibility to neglect our fleeting opportunities.

RESEARCH IN THE PHYSICAL SCIENCES

In the physical sciences, the Smithsonian compilations of the constants of nature are of exceptional value for physicists and engineers, and need new support. The Physical Tables, inaugurated by the Smithsonian, have now gone through seven editions with many reprints. Owing to the great progress of recent years, a revision is urgently required. A prominent scientist said to me a month ago, "What would we do without the Smithsonian Physical Tables?" Our recent publication of mathematical formulae is an epitome of mathematics as a tool for physicists and engineers. What we now see the opportunity for doing is to establish a laboratory for useful mathematical research to develop new formulae, and to collect and publish existing formulae. We should also like to associate therewith a loan collection of difficultly accessible mathematical publications.

In accordance with the basic Smithsonian principle of furthering investigations in fields not occupied by others,

we contemplate basic researches in hydraulics and others in chemistry. James Smithson was a chemist, yet the Institution he founded has been able to do nothing for chemistry for a quarter of a century. Yet the chemistry of plant life, and even the properties of the chemical elements, excepting at a narrow range of ordinary temperature, are as yet largely unknown.

Time will not permit me to go into detail on all the fields of research in which the Smithsonian is particularly prepared and ought to enter. To illustrate what these investigations are, what results may be expected from them and the reasons which make the Smithsonian the logical agent for undertaking them, let me speak for a moment of astrophysics, my own field of investigation. I choose this not because it is any more important than the other fields of Smithsonian research, but because I can give you the essential facts at first hand.

The rays of the sun support all life, make all weather, and directly or indirectly supply all power. They have basic relations to human life and to the growth of plants. They are, in short, of first importance to mankind, and yet there is a vast deal that we do not yet know about them. At the present time we need to know four things in particular:

1. Which rays are best for human health and growth, and at what intensity? How do these intensities change by day, by year, by altitude and by latitude? Physicians come to the Smithsonian now for information on the influence of sun rays on child health. We cannot give them the answer, nor can anyone else, because the investigations have not been made.

2. What rays and in what intensity promote growth and reproduction in the great food and otherwise commercially valuable plants? Are useful modifications of these plants possible by the regulation of radiation? How

do plants use solar energy to make chemical energy, and can we improve upon their processes and accomplish photosynthesis directly?

3. Can solar rays advantageously be used directly for power?

4. Can studies of solar variation foretell good and bad weather conditions?

The Smithsonian Institution has spent 30 years in constant measurements of radiation. It was the first to accurately measure solar radiation. Its measurements and the instruments it has invented and developed, and which you have seen today, are recognized as standard for the world in the study of the sun. At the present moment we have under our charge three stations located on high mountains in the driest deserts in the world, daily measuring solar radiation. As a result of work done at these stations and annually at Mt. Wilson for many preceding years, the Smithsonian has discovered that the sun is a variable star and that there is a definite correlation between solar variation and the weather. To make sure just what this relation is and whether use can be made of it for weather forecasts, requires uninterrupted and constant data for a term of years.

The African station, given to us by the National Geographic Society, and which is indispensable in learning whether or not radiation governs weather, must be abandoned in 1929 unless the Smithsonian finds means to continue it.

Men cannot stay indefinitely at these wilderness observatories. We have four experts who must soon be brought home. Their training fits them particularly to carry on here such investigations as the effect of solar rays on plants and health, and their application for power. Yet in our present situation we shall have to discharge these experts with loss to us of their experience. The buildings, ap-

paratus and plans suitable to making radiation researches, which we have already, would almost cover the overhead for these proposed researches.

Experience as valuable, similar tools in the nature of collections, and comparable plants, fitting the Smithsonian for research in other sciences, are likewise going to waste for lack of means.

DIFFUSION OF KNOWLEDGE

The increase of knowledge is only half of the Smithsonian's purpose. The diffusion of it is of equal importance, and has been a main source of the Smithsonian's greatness. The coming of the Institution gave to American science the first great agency for free publication of technical results. At the end of the third year, that is in 1849, Secretary Henry reported on the publication program as follows: *"The real working men in the line of original research hail this part of the plan as a new era in the history of American science. The assistance which the Institution will thus render to original research will occupy the place of the governmental patronage of other countries, and will enable true genius, wherever found, to place its productions before the world free of cost, and in a manner most favorable for securing due attention and proper appreciation."* That prophecy has been fulfilled. Smithsonian publications are now standard works of reference throughout the world, and scientific men everywhere look to it to publish those indispensable monographs which cannot be undertaken by private publishing firms. At no time has there been greater need than now for such publications service. Members of our own staff have manuscripts which represent the work of years lying in drawers because the Smithsonian has no funds for publication.

It is now over 20 years since the Smithsonian has been able, without outside help, to publish one of its chief series,

The Contributions to Knowledge. Since the War, the Miscellaneous Collections have been reduced to a third of their former size. We have no funds available to publish the urgently needed new edition of the Physical Tables of which I have already spoken. For several years past our publication fund has been totally exhausted in the first half year, and valuable manuscripts delayed.

CATALOGUE OF SCIENTIFIC LITERATURE

Secretary Henry proposed, and English scientists succeeded in realizing, an international cooperative scheme for cataloging scientific literature. You may readily see how important this is, for if research men could not easily learn what has been done by others in their sciences, they would, as likely as not, waste their time altogether in the rediscovery of what is already known. This is what Russian scientists, cut off from the rest of the world by the revolution, were actually doing during the years 1917-22. This danger looms more and more serious as the number of workers and their publications grows so rapidly in late years.

The Smithsonian is the American agency for this undertaking. In the disaster of the World War the publication end of the program went to smash. The nations are still preparing the card indices of their scientific publications, but there is no agency with the means to publish them. It is estimated that a revolving fund of $100,000 would put this great project on its feet again.

LIBRARY

The Smithsonian library is a mine of scientific wealth. It contains nearly 700,000 volumes, is especially rich in foreign periodicals, and is unequalled of its kind in this country and possibly even abroad. Yet we cannot make anything like full use of it. Those parts reserved at the

Institution for constant reference by our staff have no subject catalogue; 10,000 volumes in constant use need binding; 30,000 lie uncatalogued and therefore inaccessible.

RECRUITING SCIENTIFIC MEN FOR THE FUTURE

One of the great services of the Smithsonian to American science has been its training of men. It did this largely through encouraging their researches. The influence of this Smithsonian trained personnel is felt throughout the world. The lack of funds for some years past has prevented the Institution from gathering to it the promising young men who should benefit by the scientific opportunities, such as collections and associations, offered by the Smithsonian, and should grow to be worthy to step into the shoes of those who have grown old in Smithsonian service. Neither has it been possible to set up any system of pensions such as might permit aged employees to retire, though the salaries of Smithsonian scientific men are not such as to permit them to lay up against old age. We have among us the world's acknowledged leaders of several branches of science who have never received a compensation exceeding $5,200 per annum. Had they been equally eminent in other activities, industrial, commercial, artistic, or even in sports, they would have achieved fortunes. We cannot expect to attract geniuses to such situations in the face of present outside competition.

STRATEGICAL POSITION

No one who has the interest of the increase of knowledge and its diffusion sincerely at heart can overlook the extraordinary efficiency of this Institution for these purposes.

1. *Overhead.* The unique relations subsisting between the Government and the Smithsonian, already described, have led to the combination in the United States National

Museum, the Freer Gallery, the Zoological Park, and the Bureau of American Ethnology, of collections of specimens partly the property of the United States, partly the property of the Smithsonian Institution, numbering over 10,000,000. In certain lines these collections are the richest in the whole world. Their housing and preservation, laboratory facilities for their study, and a trained staff of experts able to devote a certain amount of time to research and to the aid and direction of research workers—all these facilities, and the administrative and financial corps for them, are maintained by the Congressional appropriations. If means to pay assistants, costs of explorations, purchase of specimens, publication of monographs, etc., were offered, these means would go 100 per cent to the work, because the overhead is cared for by the Government.

2. *Experience.* The Smithsonian enters any field of research with 80 years of experience behind it, and it knows the why and the wherefore.

3. *Reputation.* The Smithsonian arrived first in the field in America. This fact, plus its world-wide service in the increase and diffusion of knowledge give it a foremost place in universal opinion. Consequently it can mobilize men and command cooperation in all corners of the earth. It has representatives in all principal countries in the world.

4. *Wide Range of Activities.* As Secretary Hoover has said, the day of garret scientists is past, if it ever existed. Problems of the present day are so interrelated that they demand the cooperation of many men. The Smithsonian has a vast plant, and works in all fields of science. It is fitted, therefore, to take up any problem.

5. *Location.* Situated in Washington, the Smithsonian can draw upon all the scientific branches of the Government, as well as the Carnegie Institution, the National Academy of Sciences, the National Research Council, and

the American Association for the Advancement of Science.

6. *Program.* The Institution knows specifically what ought to be done and what it can best do. It has undertaken a survey of the present situation in science to determine the branches which are most backward and most deserving of cultivation. Forty eminent scientists outside the Institution have advised on these points in the preparation of the present program.

7. *Organization.* It is a private institution under the guardianship and protection of the Government. So long as the United States endures, the Smithsonian will endure.

8. *Aim.* Finally, less tangible but perhaps more important than all of these other factors, is the broad and altruistic purpose of the Institution, *"the increase and diffusion of knowledge among men."* In 1896, Professor Holden, Director of the Lick Observatory, declared: *"It is not unlikely that the greatest service of the Smithsonian Institution to the country has been the constant exhibition in its general policy and in its daily relations for half a century, of a high and generous ideal. Any sketch of its services would be most inadequate which failed to emphasize this fundamental point."*

THE SMITHSONIAN ESTIMATE OF VALUES

Hitherto I have dwelt, possibly too strongly, on material considerations. In conclusion, I wish to place the subject in another attitude. After all, it is superfluous to use many words to justify the increase and diffusion of fundamental knowledge of the universe in which we live, and of the myriad forms of life which it contains. Our comforts and luxuries, which place us beyond the dreams of kings of a few generations ago, are all results of scholarly investigation. Out of a desire to know how rarified gases could conduct electricity, grew the X-ray. There, in a nut-shell, is the utilitarian argument for basic research.

But our country does not need to stress the utilitarian aspects of the increase of knowledge. It has profited beyond all other peoples in its application of facts. Having leisure and means in abundance, our people are now coming to a time when the profound satisfactions of knowledge will be sought for their own sake. It is not too much to say that we have reached a turning point in our intellectual history. Hitherto we have been concerned mainly with felling forests, building railroads, and winning a living from a new land. In these things we have attained an overwhelming success. The energetic minds of our people are turning to new concerns. The province of the mind offers itself as of the richest promise. In his recent message to Congress, the President of the United States expressed the desire that Washington should become the national and world center of science, education, art and literature. Here is the great opportunity of the Smithsonian Institution. It has worthily led the van hitherto towards that great aim. Should it not go strongly on?

The Smithsonian is not just another institution; it is not just another museum, not just another university or educational foundation. I have striven to show you the unique part which this private bequest of Smithson to the United States of America has played in inspiring the increase and diffusion of knowledge for its own sake. At first the Smithsonian was greatly preeminent in this field. Many other influential agencies happily have arisen for the same purpose, but there are certain great services which the Institution, because of its past, its position, its relation to the Government, and its great traditions, can best perform.

Cooperating loyally and closely with all those, both public and private, who promote knowledge both in America and abroad; ready to yield ground when others occupy it, and hastening to move its forces to fill the gaps of the front of science; held in highest esteem throughout

the world, the Smithsonian has a place of its own to occupy.

You are invited here by the Regents to give your advice on how best to sustain the Institution in this great mission. As you deliberate, I hope that you will be moved by still another consideration which hitherto I have omitted. It is the feeling that America cannot honorably permit the national trust, which she accepted from a foreign hand, to languish and be forgotten as the memorial of Smithson's passion " for the increase and diffusion of knowledge among men." As it is the Nation's ward, held in trust for all men, no other establishment should outrank it. Least of all should the Government itself relegate it to the position of a bureau for purely domestic concerns.

When, as many of us hope, it shall be our privilege to look down upon the affairs of this world from the vantage of a future life, I conceive that as we survey the constantly expanding benefits which shall have arisen from the Smithsonian Institution's service to mankind, it will be no small satisfaction to recall that we ourselves have aided to make that good influence strong and grand.