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After One Hundred Years

Alexander Wetmore
Secretary, Smithsonian Institution

"NO IGNORANCE IS WITHOUT LOSS to man, no error without evil." Such was James Smithson's credo. He believed in this so strongly that he spent his life in painstaking scientific investigations to push back the boundaries of ignorance, and when death cut off his own efforts, he bequeathed his fortune to the United States of America "to found at Washington an establishment for the increase and diffusion of knowledge among men."

On 10 August 1846 the Smithsonian Institution came into being when James K. Polk, President of the United States, affixed his signature to the act of its foundation. For 100 years the Smithsonian has carried forward Smithson's ideal through scientific research in many fields, through world-wide exploration, through publications embodying the results of original investigation, and through other accepted methods of increasing and diffusing information.

At the middle of the last century Washington, the capital of our Nation, was a small city of some 50,000 inhabitants. Great expanses of unoccupied lands lay beyond the Appalachian Mountains, and the detailed exploration of the vast area beyond the Missouri River was under way. The American Philosophical Society met in Philadelphia, certain other societies with scientific interests had been organized, and small natural-history museums existed in a few centers such as Harvard College and Charleston. Science in any of its branches was at best an avocation in this new world, except to a few individuals, and those Americans who had opportunity or leisure for scientific studies looked almost wholly for guidance to the Old World, whence they or their immediate ancestors had come. Into such a setting came the new Smithsonian Institution, to support and encourage scientific and cultural knowledge and to give to American science a powerful and far-reaching stimulus.

Joseph Henry, first secretary of the Smithsonian, set up a wise and far-seeing plan of organization, effective in the sound basic principles on which it rested, embodying close cooperation with other agencies and individuals, and looking to the cumulative advancement of knowledge. After Henry came Spencer Fullerton Baird, biologist, as second secretary; then Samuel Pierpont Langley, astronomer and pioneer in aeronautical research; Charles Doolittle Walcott, geologist and paleontologist; and Charles Greeley Abbot, astrophysicist—all distinguished men of science. From its early activities, bureaus grew up around the parent Institution—first the U. S. National Museum, then the International Exchange Service, the Bureau of American Ethnology, the National Zoological Park, and the Astrophysical Observatory. As the public value of these services became evident, their support was assumed in whole or in part by the Government, although they remained as bureaus of the Smithsonian Institution.

In addition to its scientific activities the Smithsonian is charged in its act of foundation with responsibility for national art treasures. The art feature has culminated recently in the National Gallery of Art, given to the Nation by Andrew W. Mellon and augmented richly by other philanthropists. The

Throughout the last century the relationship between the Smithsonian Institution **and the American Association for the Advancement of Science has been a close one. From time to time members of the Institution staff have been officers of the Association and its affiliated societies, and its members have been active on Association committees.**

For the last 40 years the official mailing address of the Association has been the Smithsonian Institution Building, Washington, D. C., where the Institution has managed to provide office space although space for its own manifold activities is at a premium.

In presenting this special issue of *Science*, under the guest-editorship of Paul H. Oehser, Assistant Chief, Editorial Division, Smithsonian Institution, commemorating the Centennial of the Smithsonian Institution, the AAAS, in only a small way, recognizes an accumulating debt.

Gallery is established as a bureau of the Smithsonian Institution, but is directed by a separate Board of Trustees. The earlier art interests of the Institution are included in the National Collection of Fine Arts and the Freer Gallery of Art. The latter, presented and endowed by Charles L. Freer, is devoted chiefly to the Oriental field, and through its highly valuable archeological materials will figure more and more importantly in strictly scientific studies.

From one building, a small staff, and a single publication, the Institution has grown in a century until it now occupies five buildings on the Mall and numerous structures at the National Zoological Park, while it issues 14 series of publications, each devoted to a particular sphere.

The main influence of the Institution has centered in its scientific staff, its series of publications, and its collections. The first comprise the heart of the organization, which continues through the younger members who come, as older ones drop out, to carry forward the living Institution in its policies for the advancement of science. The publications of the Institution constitute one record of its accomplishment in the fields of scientific culture. The collections are the base for much research and investigation and in addition are a scientific and cultural archive that the Institution guards on behalf of our Nation.

The various phases of the Institution's scientific work are passed in factual review in papers that follow, the whole comprising an outline of the major activities as they have developed and operated during its first 100 years. From this foundation the Smithsonian Institution looks forward in 1946 toward the second century of its work.

Astrophysical Contributions of the Smithsonian Institution

C. G. Abbot

Research Associate, Smithsonian Institution

ASTROPHYSICS AND THE SMITHSONIAN Institution were born about the same time. Joseph Fraunhofer, to be sure, had discovered many absorption lines in the sun's spectrum in 1814–15, but G. R. Kirchhoff and R. Bunsen's key to the interpretation of these did not come until about 1860. Photography was used to observe the shorter-wave solar spectrum by Rutherford, Mascart, Draper, and others during the first quarter century of the Smithsonian. But it was not until H. A. Rowland constructed his gratings, and photographed through the range of ultraviolet and visible about 1890, that anything like an adequate observation of the solar spectrum was made. Even Rowland perforce neglected the far-reaching region of the infrared, first mapped in detail at the Smithsonian and not available to photography until recent time. Of the numbers, distances, diameters, masses, temperatures, and detailed composition of the stars very little was known until the present century came, with its great telescopes and their exact driving mechanism, improved photography, knowledge of the structure of the atom, and far-reaching theoretical advances in physics.

As to our own habitation, the earth, it was not until many years after the establishment of the Smithsonian Institution that extensive observations of the weather were undertaken by governments. Weather studies have been a major feature in Smithsonian researches from its beginning. The Institution has also contributed its part to our present knowledge of the sun and stars.

Smithsonian promotion of astrophysics has been of two kinds. Much research has been done by members of its own staff. In addition, many choice researches by able men have been financed in part or whole, or published, with Smithsonian funds. In this brief survey it will not be possible to mention all these grants-in-aid, but their importance may be indicated by a few examples.

As we now believe, the sun's energy depends on a catalytic transformation of hydrogen into helium, whereby a certain amount of mass is lost. Our knowledge of this loss depends on the exact determination of the relative atomic weights of hydrogen and oxygen by E. W. Morley, with the aid of a superlatively fine balance supplied to him by the Institution. His research was published in 1903 in *Smithsonian Contributions to Knowledge* (Vol. 29). In the same volume is the report of A. A. Michelson's epoch-making research, "On the application of interference methods to spectroscopy," promoted by Smithsonian grants. There appears also a report by V. Schumann, "On the absorption and emission of air and its ingredients for light of wave lengths from 250 to 100 μμ." This work, supported by Smithsonian grants, opened up a new region of the spectrum, called for some time "the Schumann region." Crowning this extraordinary volume is the paper of Lord Rayleigh and Sir William Ramsay, "Argon, a new constituent of the atmosphere," for which the Institution awarded them the Hodgkins grand prize of $10,000.

The *Contributions* of 1907 (Vol. 34) contains a re-