



AN ACCOUNT

OF THE

SMITHSONIAN INSTITUTION,

PRESENTED TO THE

AMERICAN ASSOCIATION

FOR THE ADVANCEMENT OF EDUCATION,

AT ITS ANNUAL MEETING, HELD IN PITTSBURGH, PA.,  
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BY

PROFESSOR JOSEPH HENRY, LL.D.

SECRETARY OF THE SMITHSONIAN INSTITUTION,  
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# SMITHSONIAN INSTITUTION.

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LADIES AND GENTLEMEN :—I have been requested to give you an account of the Smithsonian Institution. This is a subject near my heart, to which I have devoted almost all my thoughts and all my time for the last six years of my life. But I fear that the extreme and oppressive state of the weather will not permit me to do full justice to it. I propose answering in this Lecture the following questions :—

1. Who was James Smithson ? and what was his character and pursuits ?
2. What was his bequest ? and what were its objects ?
3. What plan has been adopted for carrying out the intention of the testator ? and what fruit has this plan produced ?

(1.) Smithson claimed to be of noble descent ; and in his will declares himself the son of Hugh, first Duke of Northumberland, and of Elizabeth, niece of Charles the Proud, Duke of Somerset. He was educated at Oxford, and paid particular attention to the study of the physical sciences ; was reputed to be the best chemist in the University, and was one of the first to adopt the method of minute analysis. As an example of his expertness in this line, it is mentioned that on one occasion he caught a tear as it was trickling down the face of a lady, lost half, examined the remainder, and discovered in it several salts. He made about thirty scientific communications to different societies, principally on chemistry, mine-

ralogy, and geology. His scientific reputation was founded on these branches, though, from his writings, he appears to have studied and reflected upon almost every department of knowledge. He was of a sensitive, retiring disposition—passed most of his life on the Continent—was never married—appeared ambitious of making a name for himself, either by his own researches or by founding an institution for the promotion of science. He declares in writing, that though the best blood of England flows in his veins, this avails him not, for his name would live in the memory of men when the titles of the Northumberlands and the Percies are extinct or forgotten. He was cosmopolitan in his views, and declares that the man of science is of no country—the world is his country, and all men his countrymen. He purposed at one time to leave his money to the Royal Society of London for the promotion of science, but on account of a misunderstanding with the council of the Society, he changed his mind, and left it to his nephew; and, in case of the death of this relative, to the United States of America, to found the Institution which now bears his name.

(2.) In answer to the second question, I would state that the whole amount of money received from the bequest was \$515,169; and beside this, \$25,000 was left in England, as the principal of an annuity given to the mother of the nephew of Smithson. This sum will also come to the Institution at the death of this person.

The Government of the United States accepted the bequest, or, in other words, accepted the office of trustee, and Mr. Rush, of Pennsylvania, a gentleman who is still an active and efficient member of the Board of Regents, and one of the most ardent supporters of the Institution, was charged with the duty of prosecuting the claim. He remained in attendance on the English Courts until the money was awarded to him. He brought it over in sovereigns—deposited it in the Mint of the United States, where it was re-coined into American eagles—thus becoming a part of the currency of the country. This money was afterwards lent to some of the new States, and a portion of it was lost; but it did not belong to the United States—it was the property of the Smithsonian Institution—and the Government was bound in honor to restore it. Congress has acknowledged this by declaring that the money is

still in the Treasury of the nation, bearing interest at the rate of 6 per cent., annually producing a revenue of about thirty thousand dollars.

It may be stated in this place, that the principal remains perpetually in the Treasury of the United States, and that nothing but the interest can be expended; not only has the original bequest been preserved, but a considerable addition has been made to the principal. At the time of the passing of the act establishing the Institution in 1846, the sum of \$242,000 had accrued in interest, and this the Regents were authorized to expend on a building; but instead of appropriating this sum immediately to this purpose, they put it at interest, and deferred the completion of the building for several years, until \$150,000 should be accumulated, the income of which might defray the expense of keeping the building, and the greater portion of the income of the original bequest be devoted to the objects for which it was designed. This policy has been rigidly adhered to, and the result is, that besides the original sum, and after all that has been devoted to the building, the grounds, and all other operations, there is now on hand \$200,000 of accumulated interest. Of this sum \$50,000 are to be appropriated to finishing the building, and the remainder is to be added to the principal. The funds have therefore been carefully husbanded.

The bequest, in the language of the testator, was, "*to found at Washington, an establishment under the name of the Smithsonian Institution, for the increase and diffusion of knowledge among men.*"

According to this, the Government of the United States is merely a trustee. The bequest is for the benefit of mankind, and any plan which does not recognize this provision of the will, would be illiberal and unjust.

The Institution must bear and perpetuate the name of its founder; and hence its operations ought to be kept distinct from those of the Government, and all the good which results from the expenditure of the fund, should be accredited to the name of Smithson.

The object of the bequest is two-fold: first, to *increase*; and second, to *diffuse* knowledge among men. These two objects are entirely distinct, and ought not to be confounded with one

another. The first, is to enlarge the existing stock of knowledge, by the addition of new truths ; and the second, to disseminate knowledge thus enlarged among men. The distinction is generally recognized by men of science, and in Europe different classes of scientific and other societies are founded upon it.

Again : the will makes no restriction in favor of any particular kind of knowledge, and hence all branches are entitled to a share of attention. Smithson was well aware that knowledge should not be viewed as existing in isolated parts, but as a whole, each portion of which throws light on all the other, and that the tendency of all is to improve the human mind, and to give it new sources of power and enjoyment. The most prevalent idea, however, in relation to the will, is that the money was intended exclusively for the diffusion of useful or immediately practical knowledge among the inhabitants of this country—but it contains nothing from which such an inference can be drawn ; all knowledge is useful, and the higher, the more important. From the enunciation of a single scientific truth may flow a hundred inventions, and the higher the truth, the more important the deductions.

To effect the greatest good, the organization of the Institution should be such as to produce results which could not be attained by other means, and inasmuch as the bequest is for men in general, all merely local expenditures are violations of the will.

These views were not entertained at first, and great difficulties have been encountered in carrying them out. A number of literary men thought that a great library should be founded at Washington, and all the money expended on it. Others considered a museum the proper object, and another class thought the income should be devoted to the delivery of lectures throughout the country ; while still another was of opinion that popular tracts should be published and distributed among the million. But all these views were advanced without a proper examination of the will, or a due consideration of the smallness of the income. The diffusion of tracts has been a favorite idea, but it must be recollected that a single Report of the Patent Office costs the Government three times as much as the whole income of the Smithsonian fund. A single pamphlet

of ten pages could not annually be printed by the Institution, and distributed to all who would have a claim to it.

(3.) The next question is, by what plan can the several requisitions of the will be fulfilled.

This question was not fully settled by the act of Congress. It directed the formation of a Library, a Museum, a Gallery of Art, Lectures, and a building on a liberal scale to accommodate these objects. One clause, however, gave the Regents the power after the foregoing objects are provided for, to expend the remainder of the income in any way they may think fit for carrying out the design of the testator.

The objects specified in the Act of Congress evidently does not come up to the idea of the testator, as deduced from a critical examination of his will. A library, a museum, a gallery of art, though important in themselves, are local in their influence. I have from the beginning advocated this opinion on all occasions, and shall continue to advocate it whenever a suitable opportunity occurs.

The question, therefore again recurs—what plan can be adopted in conformity with the terms of the bequest?

There are two. First—a number of men may be appointed by the Institution to make researches in the different branches of science, and to send accounts of their discoveries to all parts of the world. In this way, in the strictest sense of the terms, knowledge would be increased and diffused. But this plan is not compatible with the limited income of the Institution, and would offer many practical difficulties. Discoverers, like poets, are not made, but born. It would be difficult to obtain the proper kind of men, and their maintenance would be too expensive.

The other plan, and the one adopted, is to stimulate all persons in this country capable of advancing knowledge by original research, to labor in this line—to induce them to send the results to the Institution for examination and publication—and to assist all persons engaged in original investigations as far as the means of the Institution will allow; also to institute, at the expense and under the direction of the Institution, particular researches. This plan has been found eminently practicable, and by means of it the Institution has been enabled to produce results which have made it

favorably known in every part of the civilized world. The communications are submitted to competent judges, who vouch for the value and truth of the discoveries. The publications which result from this plan are presented to all the first class libraries in the world, as well as to all colleges and well established public institutions in this country. The intention is to place the publications in such positions as will enable them to be seen by the greatest number of persons. In this way a knowledge of the discoveries are diffused among men as widely as the income will allow.

No copyright is taken for the memoirs, and the writers of popular books are at liberty to use them in the compilation of their works. The knowledge which they contain is thus in time still more generally diffused. In other countries, institutions for the promotion of the discovery of new truths, and the publication of the results, are endowed by the Government ; but there are no institutions for this purpose here, and hence men of science labor under great disadvantages. The higher the value of a work of science, the fewer do its readers become. If writers wish to make money by their labors, they must publish novels.

The Principia of Newton did not pay for itself, and yet in the present day every one shares in the benefits accruing from it.

Another part of the plan is to publish reports on scientific subjects, and to spread them as widely as the state of the funds will allow.

We have had on hand for a year or more, a large volume, consisting of a report, giving an account of the principal discoveries made during the last ten or twelve years in electricity, translated from the German, but the want of funds has prevented us from publishing it.

I shall now speak of what has actually been accomplished. The Institution—though burdened with the requisitions of Congress—has produced results such as to render it favorably known wherever science and literature are cultivated, and to connect it indissolubly with the history of the progress of knowledge in our times. It has assisted in making important contributions to astronomy, ethnology, and geography. It has established an extended system of meteorology, and has several hundred zealous observers noting the different

phases of the atmosphere, and is deducing from the reports of these, important results relative to the climate of this country. It has advanced the science of geology, by original exploration, and the publication of original papers. It has undertaken to collect all the reliable facts relative to the antiquities of this country, and has published several memoirs on the subject. It has collected and published the statistics of libraries, and introduced a system of cataloguing which will render available as a combined whole, all the libraries of the country. It has established a system of literary and scientific exchanges, both foreign and domestic, and annually transmits between the most widely separated societies and individuals, hundreds of packages.

For the purpose of illustration I will give in detail an account of some of these results and shall begin with Ethnology, a new science devoted to the natural history of man. In this connection I may mention a fact with which you are all familiar—that the remains of the works of an ancient people, called the Mound Builders, are spread over the vast regions of the Valley of the Mississippi. These remains show that a more advanced state of art existed among them than among the present race of Indians. It is of much importance in reference to the history of the human family, that every thing connected with this people should be preserved. The Smithsonian Institution early engaged in this research, and I hold in my hand (exhibiting a book) a quarto volume containing an account of over two hundred of these mounds. This investigation was commenced by two gentlemen with an idea of publishing the results of their labors, but they found that they could not present it to the world in the ordinary way. No book-seller could afford to print it, since the expense of publishing fifteen hundred copies is about five thousand dollars. It was presented to the Institution, critically examined, accepted and published. It is a book which will perpetuate the names of its authors as well as that of Smithson, through all coming time. A copy of it has been sent to every principal library of the world, and it has everywhere been received with high commendation. The success of this work has induced other laborers to enter the same field. A gentleman has devoted himself for two years to an examination of the mounds of Wisconsin. His work will contain sixty-

two plates, and cannot be published at less than from three to four thousand dollars. Another person is engaged on the mounds of Alabama, and several others are at work in different parts of the United States. The Commissioner of the Land Office, at the request of the Institution, has directed all the public surveyors to examine and delineate the mounds which may fall under their observation. The position of these, and of all other ancient works, will be placed on a Map of the United States, so that when the investigations are finished, we may trace the migrations of their builders, and thus draw deductions respecting this interesting people.

By the publication of these original works, the Smithsonian Institution assists in the increase of knowledge, and it diffuses this increase among men by sending a copy to all principal public institutions abroad, and to all colleges and well-established libraries of a certain grade in this country.

As another example I will mention in detail what the Institution has done for Astronomy, with which it has also permanently connected its name.

A few years ago a new planet, now known by the name of Neptune, was discovered in a remarkable manner. Its place was indicated by mathematical deductions from irregularities observed in the motion of the planet Uranus; and when the glass of the observer was pointed to the heavens in the proper direction, the planet was found in the precise place which had been predicted. The news of the discovery and the manner in which it was effected, produced a lively sensation throughout the world. The predictions which led to the actual discovery were made simultaneously, but independently, by two mathematicians—Leverrier in France, and Adams in England. They not only pointed out the direction in which the planet was to be found, but from *a priori* considerations, gave the dimensions, form and position of the orbit which it described around the sun. The direction indicated, as I stated before, was the true one, but the form and dimensions of the orbit were widely different from those subsequently found to belong to the real orbit of the planet.

Mr. Sears C. Walker, of the National Observatory, was particularly interested in this discovery, and immediately commenced a series

of investigations in reference to it. After the motions of the planet had been accurately observed for about four months, during which time it had passed through less than the 600th part of its whole circuit round the sun, he calculated an orbit from these observations of its actual motion, which enabled him to trace its path among the stars of the celestial vault, through its whole revolution, and to carry its position backward until it fell within a cluster of small stars, which had been accurately mapped by Leland about the close of the last century. After minute and critical investigation, he was led to believe that one of the stars represented on the map of Leland, which had been observed by him on the night of May 10th, 1795, was the planet Neptune. The weather at the time this interesting conclusion was arrived at was stormy, the heavens had been clouded for weeks, when he placed in the hands of the Secretary of the Institution a sealed package containing an account of his results, and others were given to different persons. On the first clear night the telescope of the Observatory was directed to the heavens. The result was, all the stars mapped by Leland fifty years before were in place except one, and that was the one which had been fixed upon as the planet Neptune. Professor Pierce, of Harvard University, visited Washington at that time, and was sceptical on the subject. He examined the map drawn by Leland, and observed a query (?) affixed to the missing star. To remove this doubt, a request was made that the original records of Leland, deposited in the Observatory at Paris, might be examined. It was found that Leland had twice observed the star which he had recorded, and not obtaining precisely the same results each time, and not dreaming that it was a planet subject to motion, he selected one of the observations for publication, and, like a true philosopher, he placed a query after the star. Want of time, or some other cause, prevented Leland from examining it again. Had he done so, he would have discovered the new planet. Mr. Walker next calculated what the motion of the planet ought to be during the two weeks of interval of the observations of Leland, and found it exactly to agree with the two places which had been recorded by that astronomer. He now had observations, embracing not a few months of the motion of the planet, but that of an interval of fifty years.

From this data he proposed to deduce the true elliptical orbit, or one which the body would describe, were there no other planet in the system. He had left the Observatory, and could not afford the necessary time to the mere numerical calculations which would be required. The Smithsonian Institution came to his aid, and undertook to defray the expense of the investigation. It advanced about \$500 to complete the research. Professor Pierce investigated the action of the other planets on Neptune, and his results enabled Mr. Walker, by means of his elliptical orbit, to calculate an ephemeris of the actual places of the new planet, which has been received by all the astronomers of the world as the only one which exhibits with precision all the motions of this new discovered member of our solar system, and which enables the astronomer to follow it from night to night in its path among the stars.

The Astronomer Royal of England has made a series of observations, to compare the predictions of the Smithsonian ephemeris, as it is called, with the actual place of the planet as determined by observation, and has stated that the ephemeris gives the place with so much precision, that no difference could be observed with the most powerful telescope between the place of the actual and the theoretical planet. From this account it is evident the Smithsonian Institution has assisted in giving the honor to this country of completing one of the most interesting discoveries in astronomy of the present century. But, alas! this triumph has been gained at the expense of a sad bereavement. The labor of the investigation was too much for Walker, and science has to mourn his untimely loss. Peace to his memory. He was a man—take him for all in all, we shall not look upon his like again.

As a farther illustration of the operations of the Institution, I shall next allude to what it has done and is doing for Botany.

Several appropriations have been made for botanical explorations in the new territories which have been lately added to the United States, and the results of these have been examined by some of the best botanists in the country, and are now in progress of publication.

The Smithsonian Institution has also been instrumental in the preparation of an extended memoir on the Algæ of the American

Coast, by Dr. Harvey, of the University of Dublin, who has devoted himself specially to this branch of botany. He was invited to this country to deliver a course of lectures before the Lowell Institute, and proposed, if means could be found to publish the results, to make a critical examination of the sea plants of our coast. A recommendation was made by a number of our most distinguished botanists to the Smithsonian Institution, for it to defray the expense of this work. This was agreed to, and Dr. Harvey made an exploration along the whole extent of our seaboard, and with the assistance of botanists and others, procured an extensive collection of sea plants. These he took with him to Ireland, and is at present laboriously engaged in their investigation. He executes the drawings in most beautiful style with his own hands, on lithographic stones furnished by the Institution. The whole work will cost him four or five years of labor, for which he asks no other remuneration than a few copies for distribution among his friends, and the consciousness of having increased the sum of human knowledge. Without the aid afforded by the Smithsonian Institution this important work would never have been undertaken.

Copies of this, and of the other memoirs published by the Institution, will be offered for sale, at the price of a little more than the cost of printing and paper.

The Institution has established a great system of meteorological observations, extending over the whole of the North American Continent, and has already collected more facts relative to the climatology of this country than has ever before been gathered together. Observations have been made for a number of years past in several hundred places, and these are in process of reduction. A portion of the results were appended to the last Report of the Board of Regents, and the Senate of the United States ordered the whole to be published.

The great object, however, of the Smithsonian collection of meteorological observations is, to settle definitely the question as to the origin, progress, and character of the winter storms of our continent. On this subject it is well known there are various opinions. According to Mr. Redfield, our storms are great whirlwinds moving northward, and rotating from the east to the north and west.

According to Mr. Espy, they are upward and onward motions. Dr. Hare adopts the latter opinion as to their motions, but differs from Mr. Espy as to the motive power, which he refers to electricity, while the former contends that it is due to the evolution of latent heat, produced by the condensation of the vapor carried upward. The Institution proposes to discuss the subject by representing on a series of maps of the United States, the face of the sky at three different periods during the days on which a storm occurs. All portions of the country over which a cloud exists at a given time will be represented by a given color, and the portions over which the sky is clear by another color. The extent of rain and snow will also be indicated in a similar manner. In this way the progress of the change of the aspect of the sky over the whole country will be exhibited immediately to the eye. The point or points, as it may be, of the generation of the incipient storm will be observed perhaps on the first map, the second will exhibit the extension of the cloud, the third will probably indicate the beginning of rain at a given locality, and the other numbers of the series will show the extension and progress of the storm until it passes off into the ocean, or contracts and disappears on the land.

In carrying on many of the observations of the Institution, teachers could render important aid. Many facts might be recorded without instruments which would tend to advance the cause of science, and improve the habits and knowledge of the observer. Beside those which would be available in mapping the face of the sky, we may mention the following: the time of the beginning and ending of storms, of wind and rain—of the change and direction of the former; of the aurora borealis; of shooting stars; of the first appearance and disappearance of particular kinds of birds; of the flowering of plants, the ripening of fruit, the fall of the leaf; of the first and last frost.

Blank forms and directions will be furnished by the Institution to observers who might desire to engage in these investigations.

I might detain you with accounts of the cataloguing system by which it is proposed to render available all the scattered libraries of the country, and to furnish means for re-producing catalogues at a trifling expense, also with an explanation of the system of ex-

changes, and many other operations of the Institution ; but I have given enough to occupy more than the time allotted to me, and to convince you that the Institution has a wide field of usefulness before it, and that it has done, and is doing good service in the cause of the promotion of knowledge.

It is to be regretted, that since the income is so small in proportion to the demands made upon it, that the Act of Congress enjoins the establishment and support of a museum, a library, a gallery of art, and other local objects. It is, however, to be hoped that other means will hereafter be found to support these objects, and that the whole bequest of Smithson will be devoted to purposes more immediately in accordance with the words of the will of a man accustomed to the definite expression of ideas in scientific terms.

I will not, ladies and gentlemen, detain you longer than to thank you for the attention and indulgence with which you have listened to my statements.