FOR THE INCREASE AND DIFFUSION OF KNOWLEDGE AMONG MEN

PER ORBEM

SMITHSONIAN INSTITUTION

WASHINGTON 1846

E Burne Jones

THE HELIOTYPE PRINTING CO., BOSTON.

ANNUAL REPORT

OF THE

BOARD OF REGENTS

OF THE

SMITHSONIAN INSTITUTION,

SHOWING

THE OPERATIONS, EXPENDITURES, AND CONDITION
OF THE INSTITUTION

FOR THE

YEAR ENDING JUNE 30, 1897.

REPORT

OF THE

U. S. NATIONAL MUSEUM.

Part II.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

AN ACT PROVIDING FOR THE PUBLIC PRINTING AND BINDING, AND THE DISTRIBUTION OF PUBLIC DOCUMENTS.

Approved January 12, 1895.

"Of the Report of the Smithsonian Institution, ten thousand copies; one thousand copies for the Senate, two thousand for the House, five thousand for distribution by the Smithsonian Institution, and two thousand for distribution by the National Museum."

A MEMORIAL

OF

GEORGE BROWN GOODE,

TOGETHER WITH

A SELECTION OF HIS PAPERS

ON

MUSEUMS

AND ON THE

HISTORY OF SCIENCE IN AMERICA.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1901.

INTRODUCTION.

The influence of Doctor George Brown Goode on the growth and character of the United States National Museum was profound, and it extended to museum development in all parts of the world. It is desirable that an account of his life and services should appear, together with reprints of his valuable papers on American science and public museums, as well as several on related subjects that have never been published, in this portion of the Smithsonian report devoted to the work of the National Museum. Most of these papers appeared originally in publications not easily accessible to students, and all reprints have long since been distributed.

GEORGE BROWN GOODE.

Every student of nature the world over has profited by the work of Doctor Goode. Everyone interested in the advancement of science and in the development of museums as the graphic representatives of history and science has been and will be encouraged and assisted because he lived and worked. Every person can emulate his example of right living and honest service with gain individually and as a member of the community and of the body politic, and every Virginian can point with pride to the fact that Doctor Goode's ancestors were from that historic State.

Personally I knew him as the man of science, the museum administrator, the patriot, the valued adviser, and the loyal friend. Two years have passed since his death, and I feel the personal and public loss more and more. No one has come to take his place in many of the fields of his activity. Science, and particularly Government scientific institutions, will long miss the wholesome influence that he exerted on the minds of scientific and public men. But all that could be said by me has been spoken by those whose tributes follow. We loved the man, and we cherish his memory in secret thought and honor it in the written words of this memorial volume.

CHARLES D. WALCOTT.

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MEMORIAL MEETING.

PAPERS BY GEORGE BROWN GOODE.

LIST OF PLATES.[1]

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REPORT

OF THE

MEETING HELD IN COMMEMORATION OF THE LIFE AND SERVICES

OF

GEORGE BROWN GOODE,

Assistant Secretary of the Smithsonian Institution, in charge of the United States National Museum.

MEMORIAL EXERCISES.

On Saturday evening, February 13, 1897, a meeting was held in the lecture room of the United States National Museum to commemorate the life and services of George Brown Goode. Over four hundred persons were assembled, representing the seven scientific societies, the patriotic and historical societies, of Washington, the American Philosophical Society, and the American Society of Naturalists.

The programme was as follows:

MEMORIAL MEETING.

You are invited to attend a Memorial Meeting, under the auspices of the Joint Commission of the Scientific Societies, and in co-operation with the Patriotic and Historical Societies, of Washington, to commemorate the life and services of

George Brown Goode, LL.D.,

Assistant Secretary of the Smithsonian Institution, in charge of the United States National Museum.

The meeting will be held in the Lecture Room of the National Museum, Saturday evening, February 13, 1897, at 8 o'clock.

Washington, February 6, 1897.

PROGRAMME.

Introductory remarks by the President of the Joint Commission,
HON. GARDINER G. HUBBARD

Address by the Secretary of the Smithsonian Institution,
DR. S. P. LANGLEY

Goode as a Historian and Citizen,
HON. WILLIAM L. WILSON

Goode as a Naturalist,
PROF. HENRY F. OSBORN

Goode's Activities in Relation to American Science
PROF. WILLIAM H. DALL

INTRODUCTORY REMARKS.

By Gardiner Greene Hubbard,
President of the Joint Commission of the Scientific Societies.

This day was selected as the day to pay tribute to Doctor G. Brown Goode, as it is his natal day. On my return to Boston from the maritime provinces last summer, I heard with deep regret of the death, a few days before, of Doctor George Brown Goode. To me he had been a friend; to me his death was a deep personal loss and sorrow. To him I have turned for counsel, for advice, for sympathy, and his response was prompt, earnest, and cordial. Do I not express the feeling of all who knew him? Never was there a truer and more intelligent counselor, a more sympathetic friend, a more ready helper, a more kindly nature.

> None knew him but to love him,
> None named him but to praise.

It was at Twin Oaks, one of the last Sundays in June, that he spent the last morning with us. He walked with us through the grounds' twining ways, pointing out the beauties of the flowers, which he was so quick to see, and showing a knowledge of the habits and needs of every tree and shrub. He passed through the grounds to the library and looked over a portfolio of recent Japanese prints. He showed a perfect familiarity with them, selecting the good, rejecting the poor, and knowing the value of each. With books he was equally familiar, and more than once suggested some rare book that I should like to obtain. Books were his friends and companions. His reading was extensive and varied. He knew my pedigree better than I, and corrected mistakes that I had made in preparing my genealogy for the Society of Colonial Wars, in which organization he was deeply interested. His mind was versatile, his interests widespread, his tastes refined, his judgment correct. He was a true lover of nature, of art, of beauty everywhere. He heralded to us the first coming of the birds, he knew their notes, and welcomed the opening of the spring blossoms. He was alive to every bit of earth and sky. With all the pressure of numerous and varied cares and responsibilities, he lent a ready ear, a helping hand, to all who asked his aid. He would read and correct a manuscript for a friend, conduct another through the Museum and open to him its treasures, or prepare a scheme for an exposition at Chicago or Atlanta. Into the work of the Museum he threw his whole heart and life. He knew it in all its strength and weakness, its deficiencies, its wealth, its possibilities, and therefore believed in its glorious future. He knew it in all its different departments—in its minute details. He welcomed every new object that was brought into the Museum and directed its disposition. He refused the appointment of Commissioner of Fisheries and remained in charge of the Museum at a smaller salary, because he felt his services were more needed there. He was urged last summer to go to the Seal Islands, a trip he would gladly have taken, but he was reluctant to leave his work. He remained to die at his post.

Others will speak of him in his public relations; others can estimate his scientific attainments and the debt of gratitude the Museum owes to his faithful and skillful administration; others will weave and lay upon his tomb wreaths and garlands. I bring but a few violets, the expression of my personal love and esteem. He was a friend whom I loved and whom I miss from my daily life.

OPENING ADDRESS.

By Samuel Pierpont Langley,
Secretary, Smithsonian Institution.

While I am aware that it is only fitting that I should say something here about one I knew so well as the late Doctor Goode, I feel the occasion a trying one, for he was so dear a friend that my very nearness and sense of a special bereavement must be a sufficient excuse for asking your indulgence, since I can not speak of him even yet without pain, and I must say but little.

Here are some who knew him still longer than I, and many who can estimate him more justly in all his scientific work, and to those who can perform this task so much better, I leave it. I will only try to speak, however briefly, from a personal point of view, and chiefly of those moral qualities in which our friendship grew, and of some things apart from his scientific life which this near friendship showed me.

As I first remember him it seems to me, looking back in the light of more recent knowledge, that it was these moral qualities which I first appreciated, and that if there was one which more than another formed the basis of his character it was sincerity—a sincerity which was the ground of a trust and confidence such as could be instinctively given, even from the first, only to an absolutely loyal and truthful nature. In him duplicity of motive even, seemed hardly possible, for, though he was in a good sense, worldly wise, he walked by a single inner light, and this made his road clear even when he was going over obscure ways, and made him often a safer guide than such wisdom alone would have done. He was, I repeat, a man whom you first trusted instinctively, but also one in whom every added knowledge explained and justified this confidence.

This sincerity, which pervaded the whole character, was united with an unselfishness so deep-seated that it was not conscious of itself, and was, perhaps, not always recognized by others. It is a subject of regret to me, now it is too late, that I seem myself to have thus taken it too much as a matter of course in the past, at times like one I remember, when, as I afterwards learned, he was suffering from wretched health, which he concealed so successfully while devoting himself to my help, that I had no suspicion till long after of the effort this must have cost him. He lived not for himself, but for others and for his work. There was no occasion when he could not find time for any call to aid, and the Museum was something to which he was willing to give of his own slender means.

Connected with this was an absence of any wish to personally dominate others or to force his own personal ways upon them. It is pleasantest to live our own life if we can, and with him every associate and subordinate had a moral liberty that is not always enjoyed, for apart from his official duties, he obtruded himself upon no one with advice, and his private opinion was to be sought, not proffered.

His insight into character was notable, and it was perhaps due as much as anything to a power of sympathy that produced a gentleness in his private judgment of others, which reminded one of the saying, that if we could comprehend everything we could pardon everything. He comprehended and he pardoned.

Associate this tolerance of those weaknesses in others, even which he did not share, with the confidence he inspired and with this clear insight, and we have some idea of the moral qualities which tempered the authority he exercised in his administrative work, and which were the underlying causes of his administrative excellence. I do not know whether a power of reading character is more intuitive or acquired; at any rate without it men may be governed, but not in harmony, and must be driven rather than led. Doctor Goode was in this sense a leader, quite apart from his scientific competence. Every member of the force he controlled, not only among his scientific associates, but down to the humblest employees of the Museum, was an individual to him, with traits of character which were his own and not another's, and which were recognized in all dealings. And in this I think he was peculiar, for I have known no man who seemed to possess this sympathetic insight in such a degree; and certainly it was one of the sources of his strength.

I shall have given, however, a wrong idea of him if I leave anyone under the impression that this sympathy led to weakness of rule. He knew how to say "no," and said it as often as any other, and would reprehend where occasion called, in terms the plainest and most uncompromising a man could use, speaking so when he thought it necessary, even to those whose association was voluntary, but who somehow were not alienated, as they would have been by such censure from another. "He often refused me what I most wanted," said one of his staff to me, "but I never went to sleep without having in my own mind forgiven him."

I have spoken of some of the moral qualities which made all rely upon him, and which were the foundation of his ability to deal with men. To them was joined that scientific knowledge without which he could not have been a Museum administrator, but even with this knowledge he could not have been what he was, except from the fact that he loved the Museum and its administration above every other pursuit, even, I think, above his own special branch of biological science. He was a man of the widest interests I have ever known, so that whatever he was speaking of at any moment, seemed to be the thing he knew best. It was often hard to say, then, what love predominated; but I think that he had, on the whole, no pleasure greater than that in his Museum administration, and that, apart from his family interests and joys, this was the deepest love of all. He refused advantageous offers to leave it, though I ought to gratefully add here, that his knowledge of my reliance upon him and his unselfish desire to aid me, were also among his determining motives in remaining. They were natural ones in such a man.

What were the results of this devotion may be comprehensively seen in the statement that in the year in which he was first enrolled among the officers of the Museum the entries of collections numbered less than 200,000, and the staff, including honorary collaborators and all subordinates, thirteen persons, and by comparing these early conditions with what they became under his subsequent management.

Professor Baird at the first was an active manager, but from the time that he became Secretary of the Institution he devolved more and more of the Museum duties on Doctor Goode, who for nine years preceding his death was practically in entire charge of it. It is strictly within the truth then to say that the changes which have taken place in the Museum in that time are more his work than any other man's, and when we find that the number of persons employed has grown from thirteen to over two hundred, and the number of specimens from 200,000 to over 3,000,000, and consider that what the Museum now is, its scheme and arrangement, with almost all which make it distinctive; are chiefly Doctor Goode's, we have some of the evidence of his administrative capacity. He was fitted to rule and administer both men and things, and the Museum under his management was, as someone has called it, "A house full of ideas and a nursery of living thought."

Perhaps no one can be a "naturalist," in the larger sense, without being directly a lover of Nature and of all natural sights and sounds. One of his family says:

> He taught us all the forest trees, their fruits and flowers in season, and to know them when bare of leaves by their shapes; all the wayside shrubs, and even the flowers of the weeds; all the wild birds and their notes, and the insects. His ideal of an old age was to have a little place of his own in a mild climate, surrounded by his books for rainy days, and friends who cared for plain living and high thinking, with a chance to help someone poorer than he.

He was a loving and quick observer, and in these simple natural joys his studies were his recreations, and were closely connected with his literary pursuits.

I have spoken of his varied interests and the singular fullness of his knowledge in fields apart from biologic research. He was a genealogist of professional completeness and exactitude, and a historian, and of him in these capacities alone, a biography might be written; but his well-founded claim to be considered a literary man as well as a man of science, rests as much on the excellent English style; clear, direct, unpretentious, in which he has treated these subjects, as on his love of literature in general. I pass them, however, with this inadequate mention, from my incompetence to deal with him as a genealogist, and because his aspect as a historian will be presented by another; but while I could only partly follow him in his genealogical studies, we had together, among other common tastes, that love of general literature just spoken of, and I, who have been a widely discursive reader, have never met a mind in touch with more far-away and disconnected points than his, nor one of more breadth and variety of reading, outside of the range of its own specialty. This reading was also, however, associated with a love of everything which could illustrate his special science on this literary side. The extent of this illustration is well shown by the wealth and aptness of quotation in the chapter headings of his American Fishes, his Game Fishes of North America, and the like, and in his knowledge of everything thus remotely connected with his ichthyologic researches, from St. Anthony's Sermon to Fishes, to the Literature of Fish Cookery, while in one of his earliest papers, written at nineteen, his fondness for Isaac Walton and his familiarity with him, are evident. He had a love for everything to do with books, such as specimens of printing and binding, and for etchings and engravings, and he was an omnivorous reader, but he read to collect, and oftenest in connection with the enjoyment of his outdoor life and all natural things. One of these unpublished collections, The Music of Nature, contains literally thousands of illustrated poems or passages from his favorite poets.

These were his recreations, and among these little excursions into literature, "the most pathetic, and yet in some respects the most consolatory," says his literary executor, "seems to have been suggested by an article on the literary advantages of weak health, for with this thought in mind he had collected from various sources accounts of literary work done in feeble health, which he brought together under the title Mens Sana in Corpore *In*sano."

Still another collection was of poems relating to music, of which he was an enthusiastic lover. He sang and played well, but this I only learned after his death, for it was characteristic of his utter absence of display, that during our nine years' intimacy he never let me know that he had such accomplishments; though that he had a large acquaintance with musical instruments I was, of course, aware from the collections he had made.

We must think of him with added sympathy, when we know that he lost the robust health he once enjoyed, at that early time during his first connection with the Museum, when he gave himself with such uncalculating devotion to his work as to overtask every energy and permanently impair his strength. It was only imperfectly restored when his excessive labors in connection with the Centennial Exposition brought on another attack, and this condition was renewed at times through my acquaintance with him. When we see what he has done, we must remember, with now useless regret, under what conditions all this was accomplished.

I have scarcely alluded to his family life, for of his home we are not to speak here, further than to say that he was eminently a domestic man, finding the highest joys that life brought him with his family and children. Of those who hear me to-night most knew him personally, and will bear me witness, from his daily life, that he was a man one felt to be pure in heart as he was clean of speech, always sociable, always considerate of his associates, a most suggestive and helpful man; an eminently unselfish man—may I not now say that he was what we then did not recognize, in his simplicity, a *great* man?

It is a proof [says one who knew him] of the unconsciousness and unobstrusiveness which chracterized Doctor Goode in all his associations and efforts that, until his death came, few, if any, even of his intimate friends, realized the degree to which he had become necessary to them. All acknoweledged his ability, relied on his sincerity, knew how loyally he served every cause he undertook. The news of his death showed them for the first time what an element of strength he was in the work and ambitions of each of them. With a sudden shock they saw that their futures would have less of opportunity, less of enthusiasm and meaning, now that he was gone.

He has gone; and on the road where we are all going, there has not preceded us a man who lived more for others, a truer man, a more loyal friend.

GOODE AS A HISTORIAN AND CITIZEN.

By William Lyne Wilson,
Postmaster-General of the United States.

It has been most appropriately assigned to those who saw, and were privileged to see, more of Doctor Goode than myself, in his domestic life and in daily official intercourse, to speak of his virtues and his most charming and lofty traits as a man; and to speak of him in his chosen field of science must be assigned to those who do not, like myself, stand outside of the pale of scientific attainment. The somewhat humbler part is mine to speak of Doctor Goode in those relations in life in which he was probably less known and less thought of than as a man of science or in other fields of his distinguished attainment.

The German professor, of whom it is related that on his deathbed he mourned the waste of his life work in expending his energies on the entire Greek language instead of concentrating them on the dative case, gives a ludicrous and extreme illustration of that necessity for division of labor and of specialization which all men recognize in this age of ours. In the field of intellectual, as in that of mechanical, occupation, the "jack-of-all-trades" is master of none; and while the rule for the intellectual man and for the great student must always be to endeavor to know everything of something and something of everything—at least of everything connected with that something—it is becoming more and more difficult in the compass of human life and human attainment to live up to that rule.

Doctor Goode was honored in his own country and in other countries as an eminent man of science, and deservedly so honored, and his lasting fame must rest upon his solid and substantial contributions to science and the advancement of human knowledge, on his eminent success as an administrator of scientific organizations, and on that work which all his life shows to have been most congenial to him—the bringing of science down to the interest and instruction of the people.

He was a richly endowed man, first with that capacity and that resistless bent toward the work in which he attained his great distinction that made it a perennial delight to him; but he was scarcely less richly endowed in his more unpretending and large human sympathies, and it was this latter that distinguished him as a citizen and a historian.

It has been said time and again, with more or less truth, of the great English universities, and possibly of similar great schools in our own country, that they tend to make a caste, and that men who come out from them find themselves separated from the great mass of their fellow-citizens, out of sympathy with the thought, the action, and the daily life of the generation in which they move. This certainly could never be said of Doctor Goode. As a citizen he was full of patriotic American enthusiasm. He understood, as all must understand who look with seriousness upon the great problems that confront a free people and who measure the difficulties of those problems—he understood that at least one preparation for the discharge of the duties of American citizenship was the general education of the people, and so he advocated as far as possible bringing within the reach of all the people not only the opportunities but the attractions and the incitements to intellectual living. It was one of his favorite ideas that there should be in every town, and even in the villages of the country, at least some sort of a library, at least some sort of a reading room, at least some sort of a museum, to quicken and generate the intellectual life of that community, and possibly to stimulate men to the high career which he and others like him have been stimulated to from such beginnings.

But Doctor Goode knew also that mere education—literary or scientific—whatever it might do for the individual, however much of power or distinction it might give to him, and however much of personal enjoyment and luxury it might bring to him, is not the only thing required to make an American citizen, and I am satisfied that the work which he did in the field of American history was connected, closely connected, with this general idea. It is not only that we have free institutions in this country, it is not only that we have universal education, at least within the reach of the people of this country; we have as our chief reliance for success in the future, as it has been our chief safety in the past, the rich political heritage of hundreds of years' training in these institutions, and Doctor Goode, with the quick and warm sympathies of the man and of the historian, seems to have felt that he could do no greater service to the people of his day and generation and to his country than in the most attractive and concrete way (if I may so express it) to lead the young men of this country to the study of the history of the past—to the deeds and the writings of the great men to whom we owe the foundation and the perpetuation of our institutions. This was probably somewhat the result of his personal sympathies, feeling that what influenced him would influence others, and it was a wise and proper conclusion.

The study of the past, the study of the lives of those who have been eminent and useful men in the past, is a potent influence on high, intelligent, patriotic effort in the present. The *noblesse oblige* of a patriotic and substantial ancestry, not only for the individual but for the country itself, is a power whose influence we can scarcely exaggerate. I have thought, as I have visited the great universities of England and seen in their common halls, where once a day the students meet to partake of one meal at least in common, as upon their walls I have seen in living canvas the portraits of the great men of their special colleges—of Isaac Barron, Thomas Babington Macaulay, and all the English bishops at Trinity—and each exhibiting groups of those who have risen to usefulness and done great deeds in literature, in science, in public life, in war, or in any of the elements and fields of English greatness, that there was a mute appeal to every Englishman from those walls to be worthy of his country and of his college.

It must have been something of this idea that induced the old Roman to place in the entrance to his house the effigies of every member of his family who had borne a high office in the state. As his son came in and out of that house, he passed between effigies, as lifelike as Roman art could make them, of every member of that family who had held a high office, or magistracy, in the Roman commonwealth. He was stimulated to patriotism by the examples of his fathers—of those who had led armies, of those who had extended the limits of the empire, of those who had triumphed on returning from foreign fields of conquest and victory, of those whose names were revered in the annals of his country—and so it must have been, consciously or unconsciously, some feeling of this kind that seems almost from Doctor Goode's youth to have led him into the field of genealogical inquiry and study, led him into the field of historic study, grouping his studies, as he seems to have done, around great and inspiring characters.

Perhaps no family in this country has had so perfect a book, so complete a study of all of its branches, as Doctor Goode gave to the family whose name he bore in that book entitled Virginia Cousins, and it is especially gratifying to me to know that Virginia history, so much neglected, was perhaps the favorite field of Doctor Goode's study and investigation. He was a student of the writings of Washington, and gathered all the material he could find about that great Virginian. He was a student of the writings of Jefferson; he was a student of the lives of other distinguished men of that old Commonwealth, and I am told that he had in contemplation the publication of a book to be called Virginia Worthies, in which doubtless he would have tried to give the proper standing to that minor and second class of Virginia's great men of whom the country at large knows so much less to-day than it ought to know.

Not only, however, in the study of the men and the history of the Commonwealth from which in one line of his ancestry he was sprung was Doctor Goode a student. He was a student of American history at large. He was one of the Council of the American Historical Association, and it was particularly through his efforts that the connection between that association and the Smithsonian Institution was brought about. He was one of the organizers here but a few months ago of the Southern History Association, and took great interest in the work that is projected by it. He was connected with the great organizations, the Sons of the American Revolution and the Sons of the Revolution, president of the first and vice-president of the other, and not as a mere office-holder, not as a mere member, but as a zealous, enthusiastic, intelligent worker.

But Doctor Goode was not only a historian in this respect and in this peculiar way. He was also a historian of science, and he seems here likewise to have followed the same general idea of grouping scientific history—the history of scientific progress—around the particular men and individuals connected with that progress.

I am assured by those who are more capable of speaking authoritatively on such a subject than I am, that in certain papers of his, partly published, and partly as yet unpublished, he has given us the most interesting and instructive history yet produced of the progress of science in the United States; so that it is not attributing to Doctor Goode a novel and undeserved character to speak of him to-night as a historian. Had his life been spared, in his peculiar way, in his own personal and attractive manner, he would doubtless have made most substantial contributions to the study of American history, and I can not doubt, as I have already said, that in doing this he was impelled by the patriotic idea that he was helping to build up a strong American intelligent citizenship in the country he loved so well.

GOODE AS A NATURALIST.

By Henry Fairfield Osborn,
DaCosta Professor of Zoology, Columbia University.

The designation "naturalist" was one which Goode richly earned and which he held most dear, and our deep sorrow is that his activity as a naturalist extended only over a quarter of a century. We are cheered by the thought that he was a man of whom no adverse word can ever be spoken either in science or in character. We think of both at this time, because in him the man and the profession were inseparable and constantly interacting. His scientific virtues were of the order rare as the Christian virtues, and we can not thoroughly understand his scientific career unless we understand him as a man. Errors of judgment, misleading tenets, and adherence to false hypotheses among some of the most gifted of our professional ancestors have arisen as often from defect of principle and from personal prejudices as from defect of knowledge. We see in our friend, on the other hand, that the high standard of scientific achievement was constantly parallel with and very largely the outgrowth of a high standard of personal character and motive.

In brief, the work of the true naturalist is ever lighted by the four lamps, of love, of truth, of breadth, and of appreciation, and all of these shone brightly upon the path of Goode. His love of nature was inborn, predetermining his career, and so far surpassing his self-interest we fear it is only too true that he sacrificed his life for the diffusion of natural truth. So far as I know, he never entered a scientific controversy and was never under temptation to warp or deflect facts to support an hypothesis; yet he was incapable of tampering with truth under any circumstances which might have arisen. His presidential address of 1887 before the Biological Society of Washington showed him as scrupulous not to overestimate as he was eager not to underestimate the existing status of American science. While largely cultivated by wide experience in contact with nature and men, his breadth of view was certainly innate. If Goode had a fault, it was that his interests were too numerous and his sympathies too broad. He displayed not only a warm appreciation of those around him and an enthusiasm for contemporary research, but an exceptional sense of the close bonds between the present and the past—

as seen in his admiration for the pioneers of American science and his repeated vindication of their services. This passion for history led to an important phase of his literary work. His fine addresses, The Beginnings of Natural History in America (1886), The Beginnings of American Science (1887), The Literary Labors of Benjamin Franklin (1890), The Origin of the National Scientific and Educational Institutions of the United States (1890), and An Account of the Smithsonian Institution (1895), sprang from the same instinct which prompted him to compile the valuable bibliographies of Baird, of Girard, of Lea, and of Sclater, and to undertake the remarkable genealogy of his own family entitled Virginia Cousins. The time between 1887 and 1895 which he devoted to these subjects caused some of his fellow-naturalists anxiety; yet I fancy this work was largely sought by him for diversion and rest, just as Michael Foster tells us that philosophy and controversy served as recreation to Huxley, at a time when overwork had given him a passing distaste for morphology.

His trend of life guided by these four beacon lights was swayed by two countercurrents—first, his strong impulses as an original investigator, and, second, his convictions as to the duty of spreading the knowledge of nature. These currents moved him alternately. The most superficial view of his career shows that his whole environment fostered his public spirit and made difficult and at times impossible the retirement so essential to studies in nature.

Goode's practical and public achievements for natural history therefore do him even more honor than his writings, because from June, 1870, when he graduated from Wesleyan University, to September, 1896, administrative service became paramount, and he was free to devote only the odd intervals of his time to research. Our great gain in the national institutions he has advanced is our corresponding loss in ichthyology and the kindred branches of zoology.

Goode's successful work in the natural history courses at Wesleyan led at graduation to a place in the college museum, where in 1870 he at once showed his great talent for systematic arrangement. In further preparation for zoology, he went to Harvard, and for a few months came under the genial influence of Louis Agassiz. But the turning point in his life came in 1872, when, working as a volunteer upon the United States Fish Commission, at Eastport, he met Spencer F. Baird. The kind of simple but irresistible force which Abraham Lincoln exerted among statesmen Baird seems to have exerted among naturalists. He at once noted young Goode's fine qualities, adopted him, and rapidly came to be the master spirit in his scientific life. Goode delighted to work with a man so full of all that constitutes true greatness. He frequently spoke of Baird as his master, and intimate friends say that he never showed quite the same buoyant spirit after Baird's death—he felt the loss so keenly. Baird took Goode to Washington in the winter of 1872 and practically determined his career, for he promoted him rapidly through every grade of the Fish Commission and Museum service. It is hard to realize now the intensely rapid and eager development of our national scientific institutions in those years.

No doubt Baird's mantle fell fittingly upon Goode's shoulders, and he had all but the magnificent physique of his master to qualify him for this heavy burden. His talents and methods were of a different order. Both men enjoyed universal admiration, respect, and even love, but Baird drove men before him with quiet force while Goode drew men after him. Lacking the self-confidence of Baird, Goode was rather persuasive than insistent. His success of administration also came partly from an instinctive knowledge of human nature and his large faculty of putting himself in other men's shoes. He sought out the often latent best qualities of the men around him and developed them. When things were out of joint and did not move his way, he waited with infinite patience for the slow operation of time and common sense to set them right. He was singularly considerate of opinion. Not "I think," but "Don't you think," was his way of entering a discussion. I am reminded of the gentleness of my teacher, Francis Balfour, when one of his students carelessly destroyed a rare and valuable preparation, as I learn from one of Goode's associates that under similar provocation, without a word of reproof, he stooped over to repair the damage himself. He was fertile of original ideas and suggestions, full of invention and of new expedients, studying the best models at home and abroad, but never bound by any traditions of system or of classification. He showed these qualities in a marked degree in the remarkable fisheries exhibit which he conceived and executed for Berlin in 1879, and continued to show them in his rapid development of the scope as well as of the detail of a great museum. To all his work also he brought a refined artistic taste, shown in his methods of printing and labeling, as well as in his encouragement of the artistic, and, therefore, the truthful and realistic development of taxidermy in the arrangement of natural groups of animals. To crown all, like Baird, he entered into the largest conception of the wide-reaching responsibilities of his office under the Government, fully realizing that he was not at the head of a university or of a metropolitan museum, but of the Museum of a great nation. Every reasonable request from another institution met a prompt response. I well recall Goode's last visit to the American Museum in New York, and his hearty approval of the work there, especially his remark, "I am glad to see these things being done so well in this country." Not the advancement of Washington science but of American science was his dominating idea.

In fact, every act and every word of Goode's breathed the scientific creed which he published in 1888:

> The greatest danger to science is, perhaps, the fact that all who have studied at all within the last quarter of a century have studied its rudiments and feel competent to employ its methods and its language and to form judgments on the merits of current work. . . . In the meantime the professional men of science, the scholars,

and the investigators seem to me to be strangely indifferent to the questions as to how the public at large is to be made familiar with the results of their labors. . . . It may be that the use of the word naturalist is to become an anachronism, and that we are all destined to become generically biologists and specifically morphologists, histologists, embryologists, physiologists. . . .

I can but believe, however, that it is the duty of every scientific scholar, however minute his specialty, to resist in himself, and in the professional circles which surround him, the tendency toward narrowing technicality in thought and sympathy, and above all in the education of nonprofessional students. . . .

I can not resist the feeling that American men of science are in a large degree responsible if their fellow-citizens are not fully awake to the claims of scientific endeavor in their midst. . . .

I am not in sympathy with those who feel that their dignity is lowered when their investigations lead toward improvement in the physical condition of mankind, but I feel that the highest function of science is to minister to their mental and moral welfare. Here in the United States, more than in any other country, it is necessary that sound, accurate knowledge and a scientific manner of thought should exist among the people, and the man of science is becoming, more than ever, the natural custodian of the treasured knowledge of the world. To him, above all others, falls the duty of organizing and maintaining the institutions for the diffusion of knowledge, many of which have been spoken of in these addresses—the schools, the museums, the expositions, the societies, the periodicals. To him, more than to any other American, should be made familiar the words of President Washington in his farewell address to the American people:

"Promote, then, as an object of primary importance, institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinions it should be enlightened."

As a naturalist Goode did not close any of the windows opening out into nature. His breadth of spirit in public affairs displayed itself equally in his methods of field and sea work and in the variety of his observations and writings. While fishes became his chief interest, he knew all the Eastern species of birds after identifying and arranging the collection in his college museum. He loved plants, and in the latter years of his life took great pleasure in the culture of the old-fashioned garden around his house. He was not wedded to his desk, to dry bones, nor to alcoholic jars. His sea studies and travels ranged as early as 1872 from the Bermudas to Eastport on the Bay of Fundy; to Casco Bay in 1873, to Noank, on Long Island Sound, in 1874. Here he conceived a great Index Bibliography of American Ichthyology, a work which he did not live to complete, and here he met his future colleague, Bean, who describes him as "a young man with plump cheeks and a small moustache." During the following two years his assistant curatorship at the National Museum confined him, but in 1877 he was studying the fisheries off Halifax, and in 1879 at Provincetown. The work of the fishery census was starting up in earnest, and Goode was busy planning and getting together his men. Special agents were sent out, to every part of the coast and to the Great Lakes, to gather information. Goode worked at it himself on Cape Cod, and manifested the same enthusiasm as in every other piece of work he took up. He interested himself in getting together a collection representing the methods of the fisheries and the habits of the fishermen. Neglecting neither the most trivial nor important objects, branching out into every collateral matter, he showed his grasp both of principles and of details.

His literary bent and facility of written expression showed itself before his graduation at Wesleyan in the College Argus, which contains seven brief papers, including his first scientific article, prophetically entitled Our Museum. He contributed to the American Naturalist in 1871 a note upon The Billfish in Fresh Water, and in 1872 A Sea Bird Inland. He published and presented before the American Association in 1873 his first paper of importance, entitled Do Snakes Swallow Their Young? These studies of real merit foreshadow two marked features of his later work—first, his recognition of the importance of distribution, which culminated in the preparation of his unfinished memoir upon the Geographical Distribution of Deep Sea Fishes; second, his close observance of the habits of animals, which was of marked usefulness in his subsequent Fish Commission service and treatises upon fish-culture. His Catalogue of the Fishes of the Bermudas, from his visit in 1872, indicates how early in life he had thought out a thoroughly philosophical method of studying a local fauna: "In working up my notes," he says, "I have endeavored to supplement previous descriptions by (1) descriptions of the colors of the fishes while living, (2) notes on size and proportions, (3) observations on habits, (4) hints in reference to the origin and meaning of their popular names, (5) notes upon modes of capture and economic value." He increased the number of recorded species from seven to seventy-five, and gave a careful analysis of their probable geographical derivation.

Many of his briefer papers deal directly with the biological problems which attracted his interest, especially among reptiles and fishes, touching such questions as migration, coloring, albinism, mimicry, parasitism, feeding and breeding habits, and the relation of forest protection to the protection of fishes.

It is difficult to classify the papers, long and short, which we find rapidly succeeding each other in the valuable bibliography prepared by Doctor Adler and Mr. Geare. Of his 193 independent papers, 21 are biological, 9 treat of reptiles and amphibians, 38 are devoted to the structure, life habits, and distribution of the fishes, in addition to 15 purely systematic contributions upon the fishes. Among the former are his large memoirs upon the Menhaden, his shorter treatises upon the Trunk Fishes, the Pampanos, the Sword Fishes, and the Eel. The work of the Fish Commission is described, and published at home and abroad, in 30 reports and popular papers. The special branch of Fisheries Exhibits is treated in 8 papers, and of fish-culture in 12 papers. Besides his 14 reports as Director of the National Museum he published, between 1881 and 1896, 13 papers developing the theory and practice of museum administration, leading up to his very notable articles, Museums of the Future, Museum History and Museums of History in 1889, and his invaluable memoir upon Museum Administration in 1895. His labors and writings placed him in the lead of museum experts in this country and upon the level of the distinguished leader of museum development in England, Sir William Flower. The closing sentence of his address before the English Museums Association must be quoted. "The degree of civilization to which any nation, city, or province has attained is best shown by the character of its public museums and the liberality with which they are maintained."

His popular works include the Game Fishes of the United States, published in 1879, a book written in charming literary style, besides innumerable short articles in the Chautauquan, Forest and Stream, and Science. In 1888 appeared his American Fishes: A Popular Treatise upon the Game and Food Fishes of North America, with special reference to habits and methods of capture. These writings give us a further insight not only into the two sides of Goode's scientific nature, the theoretical and the practical, but into his artistic and poetical sentiment and into the wide extent of his reading. Besides the long list enumerated above, he published 51 joint ichthyological papers with G. Brown, W. O. Atwater, R. E. Earll, A. Howard Clark, Joseph W. Collins, Newton P. Scudder, but his main collaborateur was Tarleton H. Bean. Under their names appear 35 papers, but, chief of all, the Oceanic Ichthyology, a Treatise on the Deep Sea and Pelagic Fishes of the World, based chiefly upon the collections made by steamers *Blake*, *Albatross*, and *Fish Hawk* in the Northwestern Atlantic.

In 1877 Goode saw his first deep-sea fish drawn fresh from the bottom, and experienced a sensation which he thus describes in the preface of his monograph:

> The studies which have led to the writing of this book were begun in the summer of 1877, when the first deep-sea fishes were caught by American nets on the coast of North America. This took place in the Gulf of Maine, 44 miles east of Cape Ann, on the 19th of August, when from the side of the United States Fish Commission steamer *Speedwell* the trawlnet was cast in 160 fathoms of water. The writers were both standing by the mouth of the net when, as the seamen lifted the end of the bag, two strange forms fell out on the deck. A single glance was enough to tell us that they were new to our fauna, and probably unknown to science. They seemed like visitors from another world, and none of the strange forms which have since passed through our laboratory have brought half as much interest and enthusiasm. *Macrurus bairdii* and *Lycodes verrillii* were simply new species of well-known deep-dwelling genera, and have since been found to be very abundant on the continental slope, but they were among the first fruits of that great harvest in the field of oceanic ichthyology which we have had the pleasure to garner in the fifteen years which have passed since that happy and eventful morning. It seems incredible that American naturalists should not then have known that a few miles away there was a fauna as unlike that of our coast as could be found in the Indian Ocean or the seas of China. . . .

In one of the latest of his 45 contributions to the Bulletins of the United States National Museum is the description of the discovery of the new deep-sea Chimæroid, for which, true to his appreciation of the past, he proposed the name *Harriotta*, in memory of Thomas Harriott, the earliest English naturalist in America.

The quaint, old-fashioned style of some of Goode's essays gives us an insight into his historic sense and his reversion to the ideas and principles of his Virginia ancestors. Seldom have we known the loyal conservative spirit, of reverence for old institutions, fealty to independence of societies, combined with such a grandly progressive spirit in the cooperation of the Government with the state, and of one country with another in the promotion of science.

Again, what impresses us most is Goode as the apostle of scientific knowledge. A conviction of his mission in life breathes forth from his earliest papers in the College Argus to his final appeal in Science for the "Admission of American students to the French universities."

One of his intimate friends writes:

> Sometimes we talked of more far-reaching matters, and in such discussions I often took a position I had no faith in, hoping to draw him out. I remember once we fell to talking of the province of science, and for the sake of argument I took the position that most scientific work was merely a form of intellectual amusement, and benefited no one. He became quite earnest in his protest against that view, and asserted his belief that the majority of scientific men were working toward the improvement of things and that it was the destiny of science to be the salvation of the world. At another time he unfolded the idea that man through science was approaching step by step nearer the Infinite Ruler of the Universe, and that it was only through these activities that he could hope to reach his proper destiny; that every amelioration of life, every improvement in manners, every change in theological tenets was a token of man's unfolding through the working of intellectual forces.

Our lasting regret must be that Goode's life terminated just as he had richly earned the right to retire from the scientific service of his country—from your service and mine, my friends—to devote himself more exclusively to his own researches.

As early as 1880, during the Herculean task of entering the new National Museum building, Goode remarked to one of his friends, "We have had pretty hard scrambling—I think we will take a rest presently"—but, alas! the rest days never came. One duty after another fell heavily upon his too-willing shoulders. All must have observed in later years a certain quiet melancholy which marked his overwork, and conscious inability to cope with all that his ambitious and resourceful spirit prompted. None the less he showed a continuous and rapid intellectual development during the last ten years of his life, and it was evident that his powers were constantly expanding, and that his brightest and most productive days were to come in his projected independent and joint researches. As before noted, his Geographical Distribution of Deep Sea Fishes was nearly completed, the charts having been exhibited before the Biological Society, and a mass of voluminous notes and valuable observations are ready to show that the distribution of deep-sea fishes is far from being so general as has been supposed, and that there are certain well-defined thalassic faunal regions. Another projected work for which extensive materials were collected was upon the Fishes of America, in which Doctor Theodore Gill was to have cooperated.

Goode was always encouraged by his supreme faith in the reward of honest intellectual labor, and it is pleasant to recall now that he took the keenest satisfaction in the completion and publication of the Oceanic Ichthyology, which revived in him all his old natural-history spirit. He regarded it as his chief life work, and once observed to his fellow-writer, Tarleton Bean, "It will be our monument," little foreseeing that so soon after its publication he would be gone and that his friends and admirers all over the world would share this very thought in receiving the fine monograph a few weeks after his sudden and unexpected death.

Our friend has gone to his fathers. As a public-spirited naturalist he leaves us the tender memory and the noble example, which helps us and will help many coming men into the higher conception of duty in the service and promotion of the truth. We can not forget his smile nor his arm passing through the arm of his friend. Thinking little of himself and highly of others, faithful to his duties and loyal to his friends, full of good cheer and hopefulness—it is hard for us to close up the ranks and march on without him.

GOODE'S ACTIVITIES IN RELATION TO AMERICAN SCIENCE.

By William Healey Dall,
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Most persons unacquainted with the interior working of our executive bureaus have an impression that they are the creation of law, in the sense in which the term "creation" was formerly used to describe the coming into being of some part of the material universe. Perhaps this impression is seldom definitely formulated, but, nevertheless, it is common to hear arguments from intelligent people, bent on ameliorating government, which tacitly assume that an act of Congress by some inherent magic will accomplish that which they desire. It is a truism that whole schemes of social reorganization are built on no better foundation, and thousands of earnest reformers work, suffer, and even die for theories erected on this hypothesis.

Whatever of truth there may be in the application of this idea to the purely business offices of the Government, where finance, commerce, invention, or transportation are provided for, nothing could be more mistaken than its application to the scientific bureaus. For each and every one of them the world is indebted to some individual. In the majority of cases the man came with his purpose before the law was thought of, and his devotion to his self-imposed mission, his persistence, and his energy were the inciting causes of some lines in an appropriation bill, with all its potentialities, the seed of the present organization. Sometimes the sower, given the opportunity to dig and water, was spared to reap the first fruits of the harvest. On other occasions worthy successors arose, bore the burden and heat of the day, and carried out the plans to final triumph. Thus, to Hassler and Bache we owe the Coast Survey, which has spread the fame of American achievements in geodetic science through every civilized community; to Hayden, King, and Powell are due the organization and success of the Geological Survey of the United States; to the initiative of Smithson and guiding hand of Henry we owe the Smithsonian Institution; the Fish Commission was the embodied work of Baird; and to Baird and Goode's untiring labors we are indebted for the National Museum. There remain very few persons with intimate personal knowledge of the unwritten history of the gradual development of the Museum. To Professor Henry American science owes a debt which is but seldom realized and can hardly be exaggerated. It is difficult for anyone, even with the printed records before him, to form an adequate idea of the conditions under which the Smithsonian Institution grew to its present stature, nor what unceasing vigilance was required of its head to avoid the pitfalls which everywhere beset its path in adolescence. Opinions, emphatic and divergent, were abundant, in and out of Congress, as to the policy and methods deemed desirable for the Institution. Men would have used the fund for a great library, museum of art, or university. The original act by which it was constituted was a compromise, leaving a door open for the advocates of either opinion to modify the policy of the Institution should the time come when any particular view could command a majority in the governing board. Professor Henry was determined that the "increase and diffusion of knowledge among men" in the highest and broadest sense of the words should be the object to be attained, and that nothing local or special should absorb the funds or the energies of the Institution. Such things as could and would be done by other agencies were not to be attempted by the Smithsonian, but rather the things worth doing, which, except for the aid given by the Institution, could not get done at all. Those branches of activity prescribed by the act creating the Institution, but which tended to outgrow a strict subordination and absorb undue proportions of the income, were rigorously pruned and sternly repressed. It seems strange to recall a time when free speech did not exist in the capital of the nation, yet it is within my memory when so great was the irritability of the proslavery element in Washington that Professor Henry, with an eye single to the welfare of his beloved Institution, felt it necessary to warn foreign men of science invited to work or lecture here that certain topics must not be touched upon, directly or indirectly. Professor Henry knew that the resources of the Smithsonian could not support a great museum or a great library and still carry out the promotion of science in the wider sense, which was his ideal aim. He wished for a national museum and a national library, but only at national expense. He approved of the far-reaching explorations and collections which the genius of Professor Baird initiated and by untiring labors promoted, but he did not wish the enormous mass of material thus brought together to be a charge upon the slender funds of the Institution. His policy was to distribute to other institutions of learning, museums, and colleges, as soon as worked up, everything except a typical series of the specimens, thus at once promoting research at other points and economizing space and the expenses of preservation. Arrangements were made with naturalists all over the country by which material in their special lines of research was shipped to them as soon as received, to remain indefinitely, until reported upon. The same policy led to placing in the Corcoran Gallery of Art such objects of art spared by the great fire of 1865 as that establishment could utilize; and to the deposit in the Library of Congress of the great collection of scientific books and periodicals, which was rapidly outgrowing all the limits set by his prudence. In his determination that nothing should be permitted to divert the progress of the Institution from the lines laid down for it, Professor Henry thought no labor too great, no personal supervision too minute, no just economy too paltry. Who shall say that his lofty purposes and unceasing struggles have not been justified by his success?

Meanwhile Baird's ambitions and endeavors were leading toward the establishment of a national museum in fact, if not in name. Multitudinous expeditions were set on foot for Pacific railway routes, military surveys, the coast survey, the routes for an Isthmian canal, the exploration of the Hudson Bay territory, Lower California, and Alaska. From each and all of these a stream of the most precious material for study flowed toward the Smithsonian Institution. The natural sciences all over the world were enriched by the countercurrent of published researches which poured from those Elizabethan towers. A bevy of students, poor in purse, but rich in enthusiasm, in energy and devotion, found shelter there. From time to time, as opportunities came, they sallied forth, one by one, to the ends of the earth, bent on enriching the collection and advancing science, in which they usually succeeded.

How difficult in such a case to hold the balance true! To preserve for study what was needed and yet not to exceed the limits imposed by circumstances. To be loyal and true in spirit, as well as in the letter, to the policy of the chief, and yet to hold securely for the future that which the future would need. Yet this task, so perplexing and so difficult, was successfully performed by Baird. He had for Henry an affectionate loyalty and veneration as strong in its way as his devotion to biological research, and which supplied a never-failing and most elevating example to the younger men about him.

The establishment of the Fish Commission with its separate income partly available for research somewhat ameliorated the situation. The establishment of a national museum, as urged by Baird and Henry, became a more familiar idea to Congress and the country. With the Centennial Exposition of 1876, came an opportunity of which Baird was not slow to take advantage. He determined that the exhibition made by the United States should bear testimony to what the Museum could do both in the way of material and in its presentation. The Government made a loan of several millions to the Exposition, which no one then supposed would ever be repaid. Members of the appropriations committee felt quite safe in half jokingly assuring Professor Baird that if the money ever was repaid an appropriation for a National Museum building should not be withheld. The entire staff of the Museum, including several unpaid volunteers, with Goode at their head, gave all their energies for nearly a year to make the Government and especially the Museum exhibit a success, feeling that the future of the Museum was really at stake. Individuals all over the country were called upon to assist by advice or material in their special lines. Thousands of letters were written and thousands of exhibits gathered. Here Goode had his first training in the arts of exposition, in which he finally became the acknowledged master. Many were the discussions as to system, selection of exhibits, cases, labels, and methods in general. It was indeed a liberal education to those engaged in the work. No test could have been contrived which would better have revealed the strength or weakness, on certain sides, of all engaged in it. Men of whom much was expected failed utterly. Others developed unexpected capacity and talent. The result was a glorious success, acknowledged by all beholders.

After a certain time the Government loan was repaid, and at last the unofficial promises of members of Congress were kept. A sum, pitiably small if compared with the money devoted by most civilized nations to housing their national museums, was appropriated, and, by a lucky chance, an unparalleled depression in the iron trade enabled contracts to be made to the great advantage of the Government. A building without any architectural pretensions, but giving light and floor space at a lower cost than in any other permanent structure of equal size ever erected by the United States, was finally put up, a new organization effected, and at last the National Museum possessed a local habitation and a name. The direction of its activities, under the supervision of Professor Baird, was placed in Goode's hands, and his career as a Museum administrator officially began.

It may be thought that the preceding remarks have included very little about Goode and a great deal about other matters. This is true; but no account of the man and his activities would be adequate which omitted a delineation of the struggles, fears, and hopes of which, in his position, he was the natural heir. A great institution is not created; it is built up. With the mortar of its foundations is mixed the blood and sweat of the builders. Something of the very soul of its architect springs with its pinnacles toward the heavens. The capacity for administration may be inborn, the professional knowledge must be earned. These truths are singularly ignored, even by those who should know better. In fact our people, even those who have much advanced the cause of education, and those who have won repute in the fields of politics or business, have not wholly shaken off the provincial notion that a museum is a sort of toy which an intelligent window-dresser might be competent to manage. The realization of the fact that museum administration is a profession, as arduous as that of medicine or law, seems to be confined almost entirely to those who have actually been devoting their lives to it. That in the case of a national museum, as a sort of general clearing house of national activities in science, and the chief arena of international scientific reciprocity, still wider knowledge of men and their work, a still broader mental horizon, and infinite tact and patience are urgently required, is still less appreciated.

It is true that every administrator must learn and grow with the progress of his work; but that the work should be put into the hands of total inexperience, as is frequently suggested, is like insisting that all our genealogies should be traced from Adam and Eve.

The relations which Goode bore to the scientific activity of the country and less directly to that of the world are best understood through a sketch of Museum administration in the concrete. We may begin with conditions in such an institution itself.

It is hardly true, as I have heard it somewhat broadly stated by one of the uninitiated, that "scientific men are all cranks," though this estimate is by no means without its supporters. Yet it can not be denied that there is something out of the common and, to the average citizen, peculiar in the mental constitution which leads to the adoption of a profession which offers no pecuniary reward at all adequate to the required exertion; which, in this country at least, extends little hope of discrimination from quacks and charlatans adept at attracting public notice; in which the modest prizes are few and far between, promotion problematical; where the worker must congratulate himself if he is able to support and educate his family without actual privation, and must find his reward, if at all, in the consciousness of work well done and the esteem of a few contemporary toilers. Such a mental constitution, I repeat, does have in it something different from that of the ordinary mind and something which the average man finds difficult to reconcile with his idea of common sense. Only the other day I heard of a conscientious guardian of an orphan with a small competence, who refused to allow the boy to follow his natural bent and become a naturalist, on the ground that it would be a dereliction of duty if the guardian permitted his ward to enter upon a career in which the rewards are so few and financial success so doubtful.

Those in whom the bent is so strong as to defy all obstacles not infrequently are somewhat one-sided people. They feel, as they ought to feel, that their own specialty is the most important of the many domains of science. Since they have not hesitated at any sacrifice to devote themselves to it, it is not unnatural that they should feel that from colaborers in science, support, encouragement, and a sufficient allotment from the common fund are justly due. In a great museum this common fund or income is never sufficient to meet all demands. The director must be more than human who can apportion disappointment without exciting disapproval. Yet in the midst of annual expressions of regret I never heard Goode's justice or kindly feeling questioned.

It sometimes happens, as a scientist is human, that the weaknesses or faults of our common humanity find a lodgment with him, possibly even to the point where a love of science seems the only thread withholding him from utter shipwreck. The kindly and generous nature of Professor Baird, joined to a certain practical shrewdness, enabled him to utilize and succor, from time to time, such waifs, putting them where the redeeming virtue might exert its wholesome influence and the broken soul might feel the comfort, in hours of remorse, that, after all, its life had not been wholly wasted. Baird's example was not forgotten by his pupil.

Lest engrossment in a specialty breed indifference to progress in common, it is of the highest importance that the leader in a band of workers shall use every opportunity of emphasizing their joint responsibility to science and to the public, for whose entertainment and instruction the museum is supported by public funds. This duty Goode never forgot, and by example and precept he continually stimulated each and every one to his best efforts.

The experiments in methods of preservation and exhibition, by which the best results are reached, are of interest and value to the whole scientific community. It often happens that only through a long series of failures, all more or less costly, is success at last attained. Were each museum, private or public, obliged to run the whole gamut of experiment, the losses would be irreparable and the cost enormous. In this direction, as did Baird in his time, Goode developed a particular genius, and his successes placed him early in his career in the very front rank, if not at the virtual head, of all Museum experts. The results of this work were placed freely at the disposition of all interested, and nearly all museums in this country and many abroad have materially profited by the skill and ingenuity thus displayed. It is highly probable, so modest was the originator, that few of those whose work is thus assisted have any definite idea of the source from which the facilities came.

Looking beyond the Museum itself and considering its external relations, we find that naturalists and anthropologists all over the country are in the habit of appealing to the Director or staff of the National Museum for scientific information, advice, or needed assistance in all sorts of directions. In many cases the question is not simple, but one requiring the utmost consideration and delicacy.

The needs or requests of different institutions or persons are not infrequently conflicting, and the decision may be far-reaching. The competition between different workers or institutions in the same field is liable, unless treated with great tact, to rouse antagonisms. Small societies sometimes inadvisedly identify themselves with the opinions or theories of some individual member, and if the latter prove contestable the amount of human nature which may be displayed is astonishing. It has happened that such an organization, in a fit of pique, has showered abusive pamphlets over the inhabited universe. Rival candidates for coveted posts resort to the most ingenious methods for securing indorsement contrary to the rules of the institution. Occasions arise when advice is sought with seriousness and given with anxiety, as a matter of duty. In short, it is required of the head of the Museum to have a general knowledge of the character, responsibility, and reliability of all the professional and most of the amateur scientific workers of the country and of the character and interrelations of all the more or less scientific societies, not only for the use and benefit of the outsiders, but for the safety and protection of the Museum itself. While no one could exceed Professor Baird in the breadth and accuracy of his information on such topics, yet the traditions he handed down and Goode's own wide knowledge of the younger generation gave him satisfactory qualifications of this most necessary and special kind.

Leaving the ostensibly scientific, not the least embarrassing duty the head of the Museum has to perform is the answering of letters from the people at large. Here the variety ranges from the intelligent seeker for an explanation of some observed phenomenon, to the fraudulent scheme of some rascal for securing books or specimens by false pretenses. The most ignorant are often the most confident in their own explanation of something which has temporarily puzzled them; nevertheless they seek official sanction and approval. Cranks write letters in blue ink, the nouns filled in with red. So and so announces that the Apollonian Library, upon whose letter head he writes, is desirous of a full set of the publications and, being the only library in a large region round about, should undoubtedly receive them; and signs himself librarian. It is known to the initiated that the signer is himself the Apollonian Library and its only reader. Ill-spelled letters tell of natural curiosities, marvelous to behold, sometimes for sale, sometimes to be freely donated. It would be a great mistake to suppose that these letters may be treated with scorn, or ignored. It has often happened that the layman in his blindness has stumbled upon something good. At any rate he is one of the great American people whose taxes support the Museum, and is entitled to courtesy and illumination if it can be furnished. At all events, it will be clear to you that special knowledge, tact, and kindliness will not be superfluous in the treatment of the daily mass of correspondence.

I have tried to throw a little light on the difficulties and problems our dear friend met and solved so well. Illustrations might be greatly multiplied did time permit. What has been said, I trust, is enough to show that no ordinary man could have done this work (and much else) and yet have left behind him no antagonisms, no memories of failure, no hint of insufficiency, associated with his name. He is remembered as one never weary of welldoing; who reached the heights, though ever aiming higher; whose example stimulated and whose history will prove a lasting inspiration.

RESOLUTIONS AND MESSAGES OF SYMPATHY.

On the completion of the reading of the formal addresses, General Orlando B. Willcox, U. S. A., representing the Society of the Sons of the American Revolution of the District of Columbia, offered the following resolutions, which were seconded by Rear-Admiral James A. Greer, U. S. N., representing the Society of the Sons of the Revolution, and adopted by a rising vote:

We, the associates and friends of the late George Brown Goode in the scientific, patriotic, and historical societies of the city of Washington, being met together to commemorate his life and service, do recognize:

That in his death the world has lost a great man of true moral worth, unusual breadth of intellect, profound human sympathy, unswerving loyalty to his duty, and devotion to his family and his friends.

That America has been deprived of a most patriotic, public-spirited, and loyal citizen, American science of its first historian, and American history of an original investigator.

That universal science has lost one of its foremost ichthyologists and a man broadly learned in the entire field of natural history.

That the scientific service of the United States Government, the societies to which he belonged, and all the institutions in America for the promotion of knowledge have lost in him an ever faithful and willing cooperator.

Resolved, That this minute be communicated to the societies of which Doctor Goode was a member and a copy be sent to his family, to whom the persons here assembled extend their sincere sympathy.

RESOLUTIONS ADOPTED IN THE SMITHSONIAN INSTITUTION.

By the Board of Regents of the Smithsonian Institution:

Whereas the assistant secretary of the Smithsonian Institution, Doctor G. Brown Goode, died on September 6, 1896,

Resolved, That the Board of Regents wish to here record their sense of the devotion to duty which in the late Doctor Goode came before any consideration of personal advancement, or even before the care of his own health, and of their recognition that his high administrative ability and wide knowledge were devoted unselfishly to the service of the Institution, with results whose value they can not too highly acknowledge; and they desire to express their feeling of the loss that the Institution, the National Museum, and the cause of science has sustained in his untimely death.

Resolved, That a copy of these resolutions be suitably engrossed and transmitted to the family of Doctor Goode.

By the employees of the National Museum:

Whereas, in the untimely death of Doctor G. Brown Goode the scientific world and the American people have suffered an immeasurable loss—we, his assistants, collaborators, and friends, knew and esteemed him as an investigator of signal honesty and ability, as an earnest and efficient administrator whose willing aid and forbearance endeared him to all, as a man of pure motives and stainless life, and as a faithful friend and mentor—therefore,

Resolved, That in Doctor Goode's death we have lost a leader and companion whose teachings will always be in our minds and whose memory will forever live in our hearts.

Resolved, That we extend our heartfelt sympathy to the stricken family in this our common sorrow.

RESOLUTIONS ADOPTED BY THE OFFICERS OF THE FIELD COLUMBIAN MUSEUM.

At a meeting of the director and curators of the Field Columbian Museum, Chicago, Illinois, the following preamble and resolutions were adopted:

Whereas, We have learned with great sorrow of the death of the distinguished scholar and scientist, Doctor George Brown Goode, Director of the National Museum; be it therefore, in grateful tribute to his memory,

Resolved, That we recognize, as the world has already recognized, the conspicuous abilities displayed by him in the particular field of science in which he chose to labor, but still more fully we appreciate the fact that in the broader field of museum organization and management, a work which he had reduced to science, he stood without a peer. Not less admirable, as a feature of his career, is the enviable position always held by him as an adviser and helper among his associates, scientific, official, and personal. His strong, helpful hand was ever extended.

Resolved, That we mourn his loss not only on account of these attainments and qualities, but also as a man of broad sympathies and tender heart, upright cheerful character, and honest, virtuous life.

Resolved, That our sincere sympathies are hereby extended to the members of his bereaved family in the hour of their affliction, and that a copy of these resolutions be transmitted to them in token thereof.

F. J. V. Skiff,
Director.
Wm. H. Holmes,
Curator, Department of Anthropology.
C. F. Millspaugh,
Curator, Department of Botany.
O. C. Farrington,
Curator, Department of Geology.
H. W. Nichols,
Curator, Department of Economic Geology.
Charles B. Cory,
Curator, Department of Ornithology.
S. A. Simms,
Assistant Curator, in Charge of Industrial Arts.
E. L. Burchard,
Recorder and Librarian.

RESOLUTIONS ADOPTED BY THE NEW YORK ACADEMY OF SCIENCES.

At a meeting of the biological section of the New York Academy of Sciences held October 12, 1896, the following resolution, introduced by Professor Henry F. Osborn and seconded by Mr. William T. Hornaday, was unanimously adopted by a rising vote:

Resolved, That the members of the biological section of the New York Academy of Sciences desire to express their deep sense of loss in the death of Professor G. Brown Goode, of the United States National Museum. In common with all naturalists in this country, we have admired his intelligent and highly successful administration of the National Museum, as well as his prompt and ready response to the requests and needs of similar institutions throughout the country.

In face of the arduous and exacting duties of his directorship, he has held a leading position among American zoologists, and we are indebted to him for a series of invaluable investigations, especially upon the fishes.

Those of us who had the good fortune to know Professor Goode personally, recall his singular charm of character, his genial interest in the work of others, his true scientific spirit. We have thus lost one of our ablest fellow-workers and one of the truest and best of men.

JOHN G. CURTIS, *Chairman.*
CHARLES L. BRISTOL, *Secretary.*

CIRCULAR ORDER OF THE UNITED STATES COMMISSIONER OF FISH AND FISHERIES.

UNITED STATES COMMISSION OF FISH AND FISHERIES,
Washington, D. C., September 8, 1896.

[Circular Order No. 139.]

It becomes my painful duty to announce to the employees of the United States Commission of Fish and Fisheries the death in this city, on the 6th instant, of Doctor George Brown Goode, Assistant Secretary of the Smithsonian Institution, and at one time United States Commissioner of Fish and Fisheries. Although his official connection, strictly speaking, has always been with the former establishment, Doctor Goode is best known for his researches and publications on the fishes and fisheries of the United States, on which subjects he came to be recognized as the leading authority. He first joined in the investigations of the Fish Commission on the Atlantic coast in 1872 as a volunteer, and in that capacity continued to participate in its scientific work up to the time of Professor Baird's death in 1887. He was appointed to succeed the latter as Fish Commissioner, but relinquished that position after a few months, upon the passage of the act giving it an independent status. Doctor Goode had charge of the Fishery Division of the Tenth Census, and was also the United States Commissioner to the Fishery Expositions at Berlin and London. He has been one of the most fruitful and valued contributors to the reports and bulletins of the Fish Commission, and in his death the fishing interests of the country have sustained a severe loss.

J. J. BRICE, *Commissioner.*

EXTRACTS FROM PROCEEDINGS OF ASSOCIATIONS.

[From a report of the proceedings of the Seventh Annual General Meeting of the Museums Association held in Glasgow July 21 to 25, 1896.]

At the meeting of the Association held in Newcastle last year was read a contribution from Doctor G. Brown Goode on The principles of Museum Administration; and afterwards the author sent a reprint of the paper to each member of the Association. To most members he was already known by his contributions to museum literature in the Reports of the National Museum of the United States, and other publications; but a more personal feeling of intimacy was engendered by the direct communication of his thoughts to the Association at Newcastle. It was therefore with a feeling of the deepest regret the news of his untimely death was received. Doctor Goode died in Washington on 6th of September at the age of forty-five years. His early death is a great loss, not only to the United States Museum, but to museums in general, for he took a deep and active interest in all things affecting their development and well-being.

[From the proceedings of the Thirtieth Annual Convention, American Institute of Architects, 1896.]

Of the corresponding members the institute loses Professor G. Brown Goode, the well-known Assistant Secretary of the Smithsonian Institution and Curator of the National Museum, who brought out of a chaos of inaccessible treasures the orderly, well-arranged, enjoyable, and instructive collection which makes the Smithsonian Institution take rank with the finest museums in the world.

MESSAGES OF SYMPATHY.

From among a large number of letters received since the death of Mr. Goode, appreciating his great services and offering consolation at his death, the following few extracts are made.

Sir William H. Flower, director of the British Museum, said:

I should like to take part in any tribute to the memory of a man I admired so much and was in such sympathy with as Brown Goode.

Professor Enrico H. Giglioli, of Florence, on October 3, 1896, spoke of Mr. Goode as one of the men he loved and esteemed most:

I feel so crushed [he said] by this terrible blow that I hardly know what I am writing. . . . He was so full of energy and work it is hard to believe that he is now no more. To you all at the National Museum the loss must be immense, but to many abroad it is a great and much felt sorrow. To science in America not alone, but in the civilized world, his loss is indeed irreparable and will be felt for years.

The Honorable William Wirt Henry, of the Virginia Historical Society, wrote:

It is a source of great satisfaction to me that I knew Doctor Goode personally and was privileged to be associated with him in his work in the patriotic and historical societies with which he was connected. No one could know him without being impressed with his learning and modesty and the sterling qualities of the man. I feel that his death is a loss which will be felt in every path in which he walked, and will be mourned by every votary of science.

M. Henri de Varigny, of Paris, wrote to Secretary Langley:

I have received the card which notified [me of] the sad news of the death of that excellent and most distinguished man, G. Brown Goode. I was already acquainted with the fact, and had published a few lines of obituary notice in the Revue Scientifique, but I have not adequately expressed the feeling of true sorrow I experience when I remember that he is no more, and that his writing, activity, and energetic kindness have ceased to be. He was very kind and obliging to me, and I shall keep a warm remembrance of him. Your loss is a great one.

Mr. Valdemar Knudsen, of Honolulu, Hawaii, wrote:

The card announcing the death of George Brown Goode, LL. D., has just been received, and my full sympathy for his loss to your institution and to mankind in general is hereby humbly tendered.

Doctor Karl Möbius, of Berlin, wrote, under date of January 26, 1897:

The unexpected death of Mr. George Brown Goode has deeply affected me. We were in agreeable communication, to the advantage of our museums. We have lost in him a distinguished promoter of our scientific efforts.

Professor Alfonso L. Herrera, of the National Museum in Mexico, wrote:

I have received the notice of the lamented death of George Brown Goode, LL. D., and after thanking you for this mark of attention, I offer my most sincere condolence, and on my part I deplore the loss sustained by science, the National Museum, the Smithsonian Institution, and all persons who, like myself, had the good fortune to receive consideration from the deceased. I shall never forget his kindness and courtesy.

Mr. John Crawford, of Managua, Nicaragua, wrote:

On my return here from an excursion among the mountains I learned with much surprise and great regret of the death of Doctor G. Brown Goode. On many occasions he was very patient and kind to me, and no doubt was so to many other naturalists who, like myself, are far from museums and the advantages of daily conferring with and receiving instruction from scientists. I esteemed him highly, and had hoped that he would live many years in good health, and in physical and mental vigor continue and enjoy his useful life.

Mr. Julius Neumann, of the Chinese Custom Service, Shasi, China, on March 15, 1897, wrote:

It was with extreme regret that I have just received your card of the 16th of November last announcing the death of Professor G. Brown Goode, and I write this note to condole with you on the loss your great Institution and science at large have to deplore.

I had the pleasure of meeting the deceased first in London in 1883, and then in the following year in New Orleans, and ever since we had kept up friendly relations. I shall always fondly cherish his memory.

The Honorable John Boyd Thacher, of Albany, New York, wrote:

My personal knowledge of Professor Brown Goode began in 1890, when he gave his advice and counsel to the World's Columbian Commission in classifying the various objects into proper departments for exhibition, and more particularly in advising and establishing an adequate method in passing judgment upon the exhibits. In these matters I can testify to his ability and consummate skill. It was purely voluntary service he rendered, and I at once formed—and have since maintained—a profound sense of his goodness to those who were officially charged with work for which he knew we were most imperfectly equipped, and to whom he gave not only suggestions but detailed and elaborate and finished plans. It is the glory of the modern scientist and scholar that he subordinates himself to the accomplishment of public work. Our friend never asked to be identified personally with the accomplished thing. It was enough for him to know that some good was done and not that the world should know that it was done by him. The utter absence of selfishness in any life is worthy of recording in brass or in marble or in formulated words.

Doctor Alfred Dugès, of Guanajuato, Mexico, expressed his profound regrets.

Doctor Leon Vaillant, professor of the Museum of Natural History in Paris, said that the ichthyological world has experienced a great loss.

Doctor J. B. de Lacerda, director of the National Museum in Rio de Janeiro, and Baron C. R. Osten-Sacken, tendered their sympathy.

Doctor H. von Ihering, of San Paulo, Brazil, spoke of the loss the National Museum suffered in its administrative and scientific interests.

Doctor R. Schöne, director-general of the Royal Museums in Berlin, expressed his sincere regret at the death of this worthy scholar and extends his sympathy.

Professor Pietro Pavesi, director of the Zoological Museum of the University of Pavia, offered his condolence. A similar message was received from the Museum Francisco-Carolinum in Linz.

MEMOIR OF GEORGE BROWN GOODE, 1851–1896.

BY

SAMUEL PIERPONT LANGLEY,
Secretary, Smithsonian Institution.

MEMOIR OF GEORGE BROWN GOODE, 1851-1896.[1]

By Samuel Pierpont Langley,
Secretary, Smithsonian Institution.

George Brown Goode was born at New Albany, Indiana, on February 13, 1851, and died at his home in Washington on September 6, 1896, after a life of forty-five years, than which few human lives have ever been better filled.

In those years he won the warm affection of a wide circle of friends and the trust and confidence of a multitude of subordinates in the position to which his own abilities had carried him. He interested himself and interested others in ever-widening circles of research, and such varied work that it seemed to those who knew what he was doing, incomprehensible that one man could accomplish so much in one single life; and when this came to an end, its cessation was like the loss of a part of themselves to those who knew him best, by whom he is remembered with an affection which men rarely gain from one another.

He was the son of Francis Collier Goode and Sarah Woodruff Crane. The Goode family trace their ancestry in this country to John Goode, of Whitby, who settled in Virginia prior to 1661.[2]

While still settled in Virginia, many members of the Goode family went to the South and West to do pioneer work in building up villages and towns on what was then the outskirt of civilization.

Doctor Goode's father, Francis Collier Goode, was born in Waynesville, Ohio, and was a merchant in Ohio and Indiana. In 1857 he retired from business, removing to Amenia, New York; subsequently to Middletown, Connecticut, and later to Arlington, Florida, and occasionally spent winters in the Bermudas, Tennessee, North Carolina, Virginia, and Washington City.

[1] Read before the National Academy of Sciences, April 21, 1897.

[2] The history of this family has been carefully traced by Doctor Goode in Virginia Cousins: A Study of the Ancestry and Posterity of John Goode, of Whitby, a Virginia Colonist of the Seventeenth Century, with notes upon related families, a key to southern genealogy and a history of the English surname Gode, Goad, Goode, or Good from 1148 to 1887, by G. Brown Goode, with a preface by R. A. Brock, Secretary of the Virginia and Southern Historical Societies. Richmond, Virginia, J. W. Randolph & English, MDCCCLXXXVII.

His mother, Sarah Woodruff Crane, was a descendant of Jasper Crane, who came to New England during the first ten years of the first settlement, and was one of the pioneers of Newark, New Jersey.

Doctor Goode was thus of sturdy American parentage on both sides, numbering among his ancestors the founders of the Virginia, Massachusetts, Connecticut, and New Jersey colonies. The family was singularly free from foreign mixture, not 10 per cent of the marriages among the numerous descendants having been with persons whose ancestors came to America later than 1725.[1]

He passed his early childhood in Cincinnati and his later childhood and early youth in Amenia, New York, where he was prepared for college by private tutors. His father was a man of studious habits and not devoid of an interest in science. He had assembled in his library a set of the Smithsonian Reports, which young Goode read as a boy. It was through these volumes that he was first attracted to science and to the Smithsonian Institution, his boyish ambition being to become connected with it and to study under Professor Baird.

He entered Wesleyan University at Middletown, Connecticut, in 1866, and was graduated in 1870. Although scarcely more than fifteen when he entered college and a little over nineteen years of age at the time of his graduation, being the youngest member of the class, his work in the studies of the natural history group was so satisfactory as to attract the favorable notice of his teachers. The years at Middletown foreshadowed the strong love for nature, the museum interest, ability in classification, and even the literary talent, which were the distinguishing features of all Doctor Goode's later career.

When he went to college, his father removed to Middletown and became a neighbor to Orange Judd, the pioneer of agricultural journalism in this country and closely identified with the advancement of scientific agriculture. There sprang up between the daughter of Mr. Judd and young Goode a friendship which ripened into love and resulted in their marriage, of which I speak here because Doctor Goode himself felt that the friendship with Mr. Judd, thus brought about through his daughter, had the largest share in determining his future career. The two young people had similar tastes in natural history and outdoor life. As early as 1869 Doctor Goode commenced to record in the College Argus and the College Review his outdoor rambles. He was at this time a young man of stout frame and vigorous health, engaging in all of the athletic sports known to college students of that day.

In 1870 he entered Harvard University as a post-graduate student under Professor Louis Agassiz, whose genial influence he glowingly describes in his youthful letters.

Mr. Judd had presented to Wesleyan University a building known as the Orange Judd Hall of Natural Science. This building was in progress

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[1] Virginia Cousins, p. xiv.

of erection during Mr. Goode's student years and was dedicated in the commencement week of 1871.

> Before that time [says Professor Rice] the natural history collections of Wesleyan University were scattered in several buildings, very imperfectly labeled and arranged, and most inaccessible to students or visitors. The spacious rooms in Judd Hall first gave the opportunity to arrange and display these collections in such manner as to give them the dignity of a museum.

The work which Doctor Goode had done while a student under Professor Agassiz caused an invitation to be extended to him to undertake the arrangement of this collection, and in 1871, when but a little over twenty, he was given the title of Curator of the Museum, and undertook the installation of the collections. It was in this work that he "first showed that genius for museum administration which he was destined afterwards to display in the larger field." He retained his official connection with Middletown until 1877, although the greater part of these years was spent either in Washington or in the field. During a portion of this time, although absent from Middletown, he received a salary from Wesleyan University, and was allowed in exchange to send to the Museum duplicates of natural history specimens in the Smithsonian Institution, as well as the duplicates of the collections which he made. He always retained a strong feeling of affection for his alma mater, and founded the Goode prize, intended to stimulate an interest in biologic studies. He was one of the editors of the 1873 and 1883 editions of the Alumni Record of Wesleyan University, and received the honorary degree of Doctor of Laws from that institution in 1893.

Doctor Goode's mother died in his infancy, and he found in his father's second wife an affectionate and sympathetic helper, who was a strong believer in the possibility of his future scientific career. To her he owed his introduction to Professor Baird, whom he first saw at Eastport, Maine, in 1872, and this meeting was the turning point of his professional life. Through it he not only got the larger opportunities for natural history work afforded by the Fish Commission and the Smithsonian Institution, but Professor Baird singled him out almost from the first as his chief pupil, his intimate friend, his confidential adviser, and his assistant in all the natural history work in which he was engaged. The splendid advantages which Professor Baird accorded his young friend were repaid by an intense devotion.

Mr. Goode said once that he could lay down his life for such a man, and indeed he almost did so, for his originally robust health was impaired by this devotion to Professor Baird's service, particularly at the Centennial Exposition of 1876, which he left invalided, and the effects of his overwork in which left him a weaker man through his after life. The death of Professor Baird in 1887 affected him so deeply that it was not until 1895 that he was once heard to say that he had but just recovered from the loss.

He became in 1872 a volunteer in the United States Fish Commission, the year after the organization of that Bureau, and he continued this work, making collections in 1872 at Eastport, Maine, in 1873 in Casco Bay, and in 1874 at Noank, on Long Island Sound. The years from 1872 to 1878 show collections of fishes made by him at the points named, as well as in Bermuda, Florida, Connecticut, and other places. Nearly twenty papers and articles relating to the Fish Commission and to fisheries appeared from his pen during the first four years of this voluntary association with the Fish Commission. He was interested not only in the scientific side of ichthyological work, but devoted great attention to the economic side. It was in 1877 that he found his first specimen of a deep-sea fish and laid the foundation of the studies which culminated in the splendid memoir on Oceanic Ichthyology by himself and Doctor Bean. During these years with Professor Baird he became experienced in all the work of the Fish Commission, and upon his death was appointed Commissioner of Fisheries by the President. The position up to this time had been an honorary one, but Mr. Goode informed President Cleveland that the work had grown to such an extent that it was not possible for any person who was actively engaged in the Smithsonian Institution or elsewhere to continue it. President Cleveland urged him several times to permanently accept the position of Commissioner of Fisheries, and the Committee on Appropriations of Congress had provided a salary which was larger than the one which Mr. Goode was receiving or ever did receive, but he resolutely declined, asserting that his life's ambition had been to become associated with the Smithsonian Institution; that his heart was in the Museum, and that he could not give it up. As related to his work in the Fish Commission, the facts may be mentioned that in 1877 he was employed by the Department of State on statistical work in connection with the Halifax Commission, and in 1879 and 1880 he was in charge of the Fisheries Division of the Tenth Census. His administrative abilities were strongly brought out in the organization of this work. Professor Henry F. Osborn describes his method as follows:

> Special agents were sent out, to every part of the coast and to the Great Lakes, to gather information. Goode worked at it himself on Cape Cod, and manifested the same enthusiasm as in every other piece of work he took up. He interested himself in getting together a collection representing the methods of the fisheries and the habits of the fishermen. Neglecting neither the most trivial nor important objects, branching out into every collateral matter, he showed his grasp both of principles and of details.

He was United States commissioner to the Internationale Fischerei Ausstellung in 1880 at Berlin and to the International Fisheries Exposition held at London in 1883. From circular order No. 139, issued by Commander J. J. Brice, United States Commissioner of Fish and Fisheries, I extract the following sentences:

> Doctor Goode is best known for his researches and publications on the fishes and fisheries of the United States, on which subjects he came to be recognized as the

leading authority. . . . He has been one of the most fruitful and valued contributors to the reports and bulletins of the Fish Commission, and in his death the fishing interests of the country have sustained a severe loss.

As I have before said, his connection with the Smithsonian Institution followed shortly after the acquaintance with Professor Baird, who invited him to spend the winter of 1873 in Washington for the purpose of arranging the ichthyological specimens and with the understanding that as a payment for this service he was to be allowed to select duplicates for the museum at Middletown. At that time he had the title of Assistant Curator, which was later changed to Curator, and although the relations to Middletown continued, the ties with the Institution were becoming stronger and stronger. He now met Professor Henry for the first time, and became one of the small coterie of Smithsonian men who at that time lived in the Smithsonian building and formed a part of the hospitable household which Professor Henry maintained. In these early days the staff was an extremely small one, being only thirteen persons, including honorary collaborators and subordinates. Doctor Goode threw himself into this work with uncalculating devotion. Professor Baird's duties were becoming more and more numerous, and after he became Secretary of the Institution Doctor Goode took the Museum work upon his willing shoulders. In 1881, when the new Museum building was completed and the United States National Museum really organized, Mr. Goode, then thirty years of age, was made Assistant Director. In that year he prepared a circular, known as Circular No. 1 of the National Museum, which set forth a scheme of administration for the Museum so comprehensive in its scope, so exact in its details, so practical in its ideas that it is with but few modifications still the guide for the Museum staff. On January 12, 1887, Professor Baird, whose health was then failing, appointed Mr. Goode as Assistant Secretary of the Smithsonian Institution in charge of the National Museum, and from that time until his death he had the fullest charge of the entire administration of the Museum.

It is hard to say whether Mr. Goode was best known as a museum director or a naturalist. I, of course, had more occasion to see his work from the administrative side. It would be impossible to understand his success in this field without thinking of the character of the man, and here I may repeat what I have said elsewhere, that if there was one quality more than another which formed the basis of his character it was sincerity—a sincerity which was the ground of a trust and confidence such as could be instinctively given even from the first only to an absolutely loyal and truthful nature.

I do not know whether a power of reading character is more intuitive or acquired, but at any rate without it men may be governed, but not in harmony, and must be driven rather than led. Doctor Goode was in this sense a leader, quite apart from his scientific competence. Every member of the force he controlled, not only among his scientific associates, but down to the humblest employees of the Museum, was an individual to him, with traits of character which were his own and not another's, and which were recognized in all dealings, and in this I think he was peculiar, for I have known no man who seemed to possess this sympathetic insight in such a degree, and certainly it was one of the sources of his strength.

I shall have given, however, a wrong idea of him if I leave anyone under the impression that this sympathy led to weakness of rule. He knew how to say "no," and said it as often as any other, and would reprehend, where occasion called, in terms the plainest and most uncompromising a man could use, speaking so when he thought it necessary, even to those whose association was voluntary, but who somehow were not alienated as they would have been by such censure from another. "He often refused me what I most wanted," said one of his staff to me; "but I never went to sleep without having in my own mind forgiven him."

I have spoken of some of the moral qualities which made all rely upon him and which were the foundation of his ability to deal with men. To them was joined that scientific knowledge without which he could not have been a museum administrator; but even with this knowledge he could not have been what he was, except from the fact that he loved the Museum and its administration above every other pursuit, even, I think, above his own special branch of biological science. He was perhaps a man of the widest interests I have ever known, so that whatever he was speaking of at any moment seemed to be the thing he knew best. It was often hard to say, then, what love predominated; but I think that he had, on the whole, no pleasure greater than that in his Museum administration, and that, apart from his family interests and joys, this was the deepest love of all. He refused advantageous offers to leave it, though I ought to gratefully add here, that his knowledge of my reliance upon him and his unselfish desire to aid me were also among his determining motives in remaining. They were natural ones in such a man.

What were the results of this devotion may be comprehensively seen in the statement that in the year in which he was first enrolled among the officers of the Museum, the entries of collections numbered less than 200,000, and the staff, including honorary collaborators and all subordinates, thirteen persons, and by comparing these early conditions with what they became under his subsequent management.

Professor Baird at the first was an active manager, but from the time that he became Secretary of the Institution he devolved more and more of the Museum duties on Doctor Goode, who for nine years preceding his death was practically in entire charge of it. It is strictly within the truth, then, to say that the changes which have taken place in the Museum in that time are more his work than any other man's, and when we find that the number of persons employed has grown from thirteen to over two hundred, and the number of specimens from 200,000 to over 3,000,000, and consider that what the Museum now is, its scheme and arrangement, with almost all which make it distinctive, are chiefly Doctor Goode's, we have some of the evidence of his administrative capacity. He was fitted to rule and administer both men and things, and the Museum under his management was, as some one has called it, "A house full of ideas and a nursery of living thought."

> His success of administration [says Professor Osborn] also came partly from an instinctive knowledge of human nature. . . . He sought out the often latent best qualities of the men around him and developed them. When things were out of joint and did not move his way, he waited with infinite patience for the slow operation of time and common sense to set them right. He was singularly considerate of opinion, . . . fertile of original ideas and suggestions, full of invention and of new expedients, studying the best models at home and abroad, but never bound by any traditions of system or of classification. . . . To all his work also he brought a refined artistic taste, shown in his methods of printing and labeling, as well as in his encouragement of the artistic, and, therefore, the truthful and realistic development of taxidermy in the arrangement of natural groups of animals. To crown all, like Baird, he entered into the largest conception of the wide-reaching responsibilities of his office under the Government, fully realizing that he was not at the head of a university or of a metropolitan museum, but of the Museum of a great nation. Every reasonable request from another institution met a prompt response. . . . Not the advancement of Washington science, but of American science, was his dominating idea.

There was no subject in connection with the administration of the Museum to which he did not at some time or other give his personal attention. He had a quick eye for color and for form, understood the art of decorating and case building, and had besides a special knowledge of subjects so widely remote from his own biologic interests that it is a question whether a new species or a new musical instrument gave him the greater pleasure. So fully could I rely on his judgment in all things, that even in matters not connected with the Museum I frequently sought the benefit of his advice, and this was sure to be sound, whether it related to the typography or paper of a new volume of the publications, or to some weighty question of policy. It is difficult to single out from among the manifold matters relating to the Institution proper which were confided to him one single thing. I can not, however, but recall the fact that he seemed to me, both because of the soundness of his judgment and the wide domain of science with which he was acquainted, the fittest person to place in charge of the Hodgkins award made two years ago. To this entire work, from the time of Mr. Hodgkins's gift down to the closing of the award, Mr. Goode gave unremitting and zealous attention, having served as chairman both of the preliminary committee and the committee on award.

The field of natural history, of antiquities, of art, of books, is so vast that a mere assemblage of objects, of books, of prints, of engravings, is not in itself significant. Collecting is an art which many essay but few attain. Mr. Goode was eminently a collector. As early as 1872 we find him collecting the fishes of the Bermudas, which he worked up in a catalogue, giving in each case, in addition to characteristics previously noted, descriptions of the colors of the fishes while living, notes on the size and proportions, observations of habits, hints in reference to the origin and meaning of their popular names, and notes upon modes of capture of economic value. The same careful methods of collection he followed in the subsequent expeditions which he undertook in the field. It was not alone in natural history, however, that this talent for collecting displayed itself. Every possible sort of specimen or information which was at hand he collected. He would bring back from every exposition which he attended methodical collections, frequently of materials overlooked by others. Every visit to a foreign country resulted in the bringing back of a collection, not of miscellaneous objects, but of a series which could themselves be placed on exhibition. These might be musical instruments, ecclesiastical art, early printed books, medals, or ivories, and the same taste and discrimination and good judgment were displayed in their selection. He collected, however, not only objects, but also words and ideas. From the assembling of the common names of plants and animals in America there grew a large collection of Americanisms, probably larger than any single collection published. Portraits of scientific men, portraits of Washington and Jefferson, autographs, Confederate imprints, Americana, American scientific text-books—these are but a few of the fields in which Doctor Goode collected.

He was a naturalist in the broadest sense of that word, following in the footsteps of Agassiz and Baird.

> He had [says Doctor Gill] acquaintance with several classes of the animal kingdom, and especially with the vertebrates. He even published several minor contributions on herpetology, the voices of crustaceans, and other subjects. . . . The flowering plants also enlisted much of his attention, and his excursions into the fields and woods were enlivened by a knowledge of the objects he met with.
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> The designation naturalist [says Professor Osborn] was one which Goode richly earned and which he held most dear, and our deep sorrow is that his activity as naturalist extended only over a quarter of a century. . . . As a naturalist Goode did not close any of the windows opening out into nature. His breadth of spirit in public affairs displayed itself equally in his methods of field and sea work and in the variety of his observations and writings. While fishes became his chief interest, he knew all the Eastern species of birds after identifying and arranging the collection in his college museum. He loved plants, and in the later years of his life took great pleasure in the culture of the old-fashioned garden around his house. . . . Many of his briefer papers deal directly with the biological problems which attracted his interest, especially among reptiles and fishes, touching such questions as migration, coloring, albinism, mimicry, parasitism, feeding and breeding habits, the relation of forest protection to the protection of fishes.

Perhaps no one can be a "naturalist" in the larger sense without being directly a lover of Nature and of all natural sights and sounds. One of his family says:

> He taught us all the forest trees, their fruits and flowers in season, and to know them when bare of leaves by their shapes; all the wayside shrubs, and even the

flowers of the weeds; all the wild birds and their notes, and the insects. His ideal of an old age was to have a little place of his own in a mild climate, surrounded by his books for rainy days, and friends who cared for plain living and high thinking, with a chance to help someone poorer than he.

He was a loving and quick observer, and in these simple, natural joys, his studies were his recreations, and were closely connected with his literary pursuits.

He was of course first and foremost an ichthyologist, and this through no lack of sympathy with the larger field, but because of the recognition of the fact that the larger field could not be successfully covered by one man.

His adherence to this subject as a specialty was undoubtedly determined by his long and intimate connection with the Fish Commission during the period of greatest advancement in methods of deep-sea exploration, the rich collections of fishes derived from that source being placed at his command. The novelties of structure and environment presented by this material, ever increasing as the work progressed, proved an attraction too strong to be resisted, even in the face of his varied official duties, and caused him to become distinctively a student of the marine forms.

His observations were not confined to any single branch of the subject, but were given the widest latitude that his time permitted. He was the discoverer of many new and strange species and an acknowledged authority on classification; but he took perhaps the greatest interest in questions regarding the geographical and bathymetrical distribution of fishes, a field in which his opportunities for investigation had been unexcelled. The color of fishes had also been a favorite study with him, and he had paid attention to many points in their morphology and in the functions of special organs. He was especially well versed in the literature of ichthyology from the earliest times, and after Professor Baird, was the most eminent exponent in this country of the benefits to be secured to the practical fisheries through the application of scientific teachings.

Doctor Gill, in reviewing his scientific career, said:

A Catalogue of the Fishes of the Bermudas,[1] published in 1876, furnished additional evidence of knowledge of the literature of his subject and ability to use it to advantage in the discussion of mooted questions, and it also evinced his power of observation.

In the same year, 1876, appeared another work which, to a still greater degree, rendered manifest those same mental characteristics. The work was only a catalogue, but perhaps from no other publication can some intellectual qualities be so readily and correctly gauged by a competent judge as an elaborate catalogue. Powers of analysis and synthesis, and the ability to weigh the relative values of the material at hand, may make a "mere catalogue" a valuable epitome of a collection and of a science. Such a production was the Classification of the Collection to illustrate the

[1] Catalogue of the Fishes of the Bermudas. Based chiefly on the collections of the United States National Museum. Washington: Government Printing Office, 1876 (8°, pp. (2) 1–82, Bulletin United States National Museum, No. 5).

Animal Resources of the United States,[1] a work of 126 pages; three years later this catalogue served as the basis for and was elaborated and expanded into a large Catalogue of the Collection to illustrate the Animal Resources and the Fisheries of the United States,[2] a volume of 351 pages. These catalogues were for the tentative and adopted arrangement of material exhibited by the Smithsonian Institution and the United States Fish Commission at the International Exhibition, 1876.

It was the ability that was manifested in these catalogues and the work incidental to their preparation that especially arrested the attention of Professor Baird and marked the author as one well adapted for the direction of a great museum. For signal success in such direction special qualifications are requisite. Only some of them are a mind well trained in analytical as well as synthetic methods, an artistic sense, critical ability, and multifarious knowledge, but above all the knowledge of men and how to deal with them. Perhaps no one has ever combined in more harmonious proportions, such qualifications than G. Brown Goode. In him the National Museum of the United States and the world at large have lost one of the greatest of museum administrators.

As a naturalist, the attention of Doctor Goode was especially directed to and even concentrated on the fishes. His memoirs, contributed mostly to the Proceedings of the United States National Museum, were numerous and chiefly descriptive of new species. (For many of these he had, as a collaborator Doctor Tarleton Bean, then the curator of fishes of the United States National Museum.) Some of the memoirs, however, dealt with special groups, as the Menhaden (1879), Ostraciontidæ (1880), Carangidæ (1881), the Swordfishes (1881), and the Eel (1882). His monograph of the Menhaden (*Brevoortia tyrannus*) contributed originally to the Report of the United States Commissioner of Fisheries[3] and then published as a separate work[4]—a large volume of nearly 550 pages and with 30 plates—is a model of critical treatment of information collected from all quarters. But his most important contributions were published as official Government reports and were the results of investigations especially undertaken for such reports. Especially noteworthy were the volumes comprising the results of the census of 1880.

The 1880 census was planned and carried out on an unusual scale. For the fisheries the United States Commission of Fish and Fisheries cooperated and Doctor Goode had general charge of the entire work. The assistants and special agents

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[1] International Exhibition, 1876. Board in behalf of United States Executive Departments. Classification of the Collection to illustrate the Animal Resources of the United States. A list of substances derived from the animal kingdom, with synopsis of the useful and injurious animals and a classification of the methods of capture and utilization. Washington: Government Printing Office. 1876. (8° pp. 126, a Second edition with supplementary title as Bulletin No. 6, United States National Museum).

[2] International Exhibition, 1876. Catalogue of the Collection to illustrate the Animal Resources and the Fisheries of the United States, exhibited at Philadelphia in 1876 by the Smithsonian Institution and the United States Fish Commission, and forming a part of the United States National Museum. Washington: Government Printing Office. 1879. (8°, pp. 351. (1)—Bulletin United States National Museum, No. 14).

[3] The Natural and Economical History of the American Menhaden. In Report United States Commission of Fish and Fisheries, Part v, 1879, Appendix A, pp. 1–529, pls. I–XXXI (XXX canceled), pp. 194–267 by Professor W. O. Atwater.

[4] American Fisheries. A History of the Menhaden by G. Brown Goode, with an account of the Agricultural Uses of Fish by W. O. Atwater. . . . And an introduction, bringing the subject down to date. Thirty plates. New York: Orange Judd Company, 1880. (8° pp. x (i), III–XII, 1–529 (1); 31 pls., pl. 30 canceled).

were consequently selected with judgment and the results were very valuable. The huge mass of statistics was digested and condensed in seven large quarto volumes representing five sections separately devoted to special branches of the subject.[1]

Doctor Goode's cares were mainly concentrated on the first section, treating of the Natural History of Aquatic Animals, which was discussed in over 900 pages of text and illustrated by 277 plates. This work was by far the most complete survey of the economical fishes of the country that had ever appeared and has since been the most prized; it led to another.

After the appearance of the census volumes, Doctor Goode was urged to prepare a work for popular use. His consent to do so was followed by a volume, entitled American Fishes, A Popular Treatise upon the Game and Food Fishes of North America,[2] published by the Standard Book Company of New York. Inasmuch as none of the previous popular works on the American fishes had emanated from men of scientific eminence, it scarcely need be added that the new work had no rival in the field, so far as accurate information and details of habits were involved.

A short time previously Doctor Goode had also prepared the text to accompany a series of twenty large folio colored portraits by an eminent artist, Mr. S. A. Kilbourne, of the principal Game Fishes of the United States.[3]

Never had investigations of the deep sea been conducted with such assiduity and skill as during the last two decades. The chief honors of the explorations were carried off by the British and American governments. As the fishes obtained by the vessels of the United States Fish Commission were brought in, they were examined by Doctor Goode (generally in company with Doctor Bean) and duly described. At length Doctors Goode and Bean combined together data respecting all the known forms occurring in the abysmal depths of the ocean and also those of the open sea, and published a résumé of the entire subject in two large volumes entitled Oceanic Ichthyology.[4]

This was a fitting crown to the work on which they had been engaged so long and the actual publication only preceded Doctor Goode's death by a few weeks.

But the published volumes did not represent all the work of Doctor Goode on the abyssalian fishes. He had almost completed an elaborate memoir on the distribu-

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[1] The Fisheries and Fishery Industry of the United States. Prepared through the cooperation of the Commissioner of Fisheries and the Superintendent of the Tenth Census. By George Brown Goode, Assistant Director of the United States National Museum, and a staff of associates. Washington: Government Printing Office, 1884 (–1887, 5 sections in 7 volumes). Section I, Natural History of Aquatic Animals, was mainly prepared by Doctor Goode.

[2] American Fishes. A Popular Treatise upon the Game and Food Fishes of North America, with especial reference to habits and methods of capture,. By G. Brown Goode. With numerous illustrations. New York; Standard Book Company. 1888. (8°, XVI + 496 pp., colored frontispiece.)

[3] Game Fishes of the United States. By S. A. Kilbourne. Text by G. Brown Goode. New York: Published by Charles Scribner's Sons. 1879–1881. (Folio, 46 pp., 20 plates and map.—published in ten parts, each with 2 plates, lithographs in water color, and four page folio of text.)

[4] Smithsonian Institution. United States National Museum. Special Bulletin. Oceanic Ichthyology. A Treatise on the Deep-sea and Pelagic Fishes of the World, based chiefly upon the collections made by the steamers *Blake*, *Albatross*, and *Fish Hawk* in the Northwestern Atlantic, with an atlas containing 417 figures, by George Brown Goode, Ph. D., LL. D., and Tarleton H. Bean, M. D., M. S. Washington: Government Printing Office. 1895. 2 vols., 4°; I, xxxv + 26*, 553 pp.; II, xxiii + 26* pp., 123 pls.

tion of those fishes, and, contrary to the conclusions of former laborers in the same field, had recognized for them a number of different faunal areas. It is to be hoped that this may yet be given to the world.

Morphological and descriptive ichthyology were not cultivated to the exclusion of what is regarded as more practical features. In connection with his official duties as an officer of the United States Fish Commission he studied the subject of pisciculture in all its details. Among his many contributions to the subject are one on The First Decade of the United States Commission, its plan of work and accomplished results, scientific and economical (1880), another treating of the Epochs in the History of Fish Culture (1881), and two encyclopedic articles—The Fisheries of the World (1882), and the one entitled Pisciculture, in the Encyclopedia Britannica (1885).

The great work of his life, Oceanic Ichthyology [says Doctor Jordan], was, however, written during the period of his directorship of the National Museum, and it was published but a month before his death. Almost simultaneously with this were other important publications of the National Museum, which were his also in a sense, for they would never have been undertaken except for his urgent wish and encouragement. If a personal word may be pardoned, The Fishes of North and Middle America, which closely followed Oceanic Ichthyology, would never have been written except for my friend's repeated insistence and generous help.

The first recorded scientific paper of Doctor Goode is a note[1] On the Occurrence of the Bill-fish in fresh Water in the Connecticut River. The next is a critical discussion of the answers to the question Do Snakes Swallow their Young? In this paper he shows that there is good reason to believe that in certain viviparous snakes, the young seek refuge in the stomach of the mother when frightened, and that they come out unharmed when the reason for their retreat has passed.

The first of the many technical and descriptive papers on fishes was the Catalogue of the Fishes of the Bermudas,[2] published in 1876. This is a model record of field observations and is one of the best of local catalogues. Doctor Goode retained his interest in this outpost of the great West Indian fauna, and from time to time recorded the various additions made to his first Bermudan catalogue.

After this followed a large number of papers on fishes, chiefly descriptions of species or monographs of groups. The descriptive papers were nearly all written in association with his excellent friend, Doctor Tarleton H. Bean, then Curator of Fishes in the National Museum.

In monographic work Doctor Goode took the deepest interest, and he delighted especially in the collection of historic data concerning groups of species. The quaint or poetical features of such work were never overlooked by him. Notable among these monographs are those of the Menhaden, the Trunk-fishes, and the Sword-fishes.

The economic side of science also interested him more and more. That scientific knowledge could add to human wealth or comfort was no reproach in his eyes. In his notable monograph of the Menhaden[3] the economic value as food or manure of this plebeian fish received the careful attention which he had given to the problems of pure science.

Doctor Goode's power in organizing and coordinating practical investigations was shown in his monumental work[4] on the American Fisheries for the Tenth Census

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[1] American Naturalist, V, p. 487.

[2] Bulletin No. 5, United States National Museum.

[3] The Natural and Economical History of the American Menhaden. In Report of United States Commission of Fish and Fisheries, Part 5. Washington, 1879.

[4] The Fisheries and Fishery Industry of the United States. Prepared through the cooperation of the Commissioner of Fisheries and the Superintendent of the Tenth Census, Washington, 1884.

in 1880. The preparation of the record of the fisheries and associated aquatic industries was placed in his hands by Francis A. Walker, Superintendent of the Census. Under Doctor Goode's direction skilled investigators were sent to every part of the coast and inland waters of the country.

His American Fishes, a popular treatise upon the game and food fishes of North America, published in 1888, is deserving of a special mention both because of the charming literary style in which it is written as well as its scientific accuracy and excellence. The wealth and aptness of the chapter headings of this book show that Mr. Goode's wide reading was associated with everything which could illustrate his science on the literary side. He had a knowledge of everything even remotely connected with his ichthyological researches, from St. Anthony's Sermon to Fishes, to the literature of fish cookery, while in one of his earliest papers, written at nineteen, his fondness for Isaac Walton and his familiarity with him are evident.

While never claiming the title of anthropologist, he was yet a close student of the anthropological and ethnological work in this country and abroad, and it is not too much to say that no professional anthropologist had a higher ideal of what his science might come to be or exercised a more discriminating criticism on its present methods and conditions than did Doctor Goode. He was, moreover, not only interested in the biological problems of the anthropologist, but in technology and the history of art. The history of human invention and archæology were equally in his mind, and his suggestiveness in each of these fields could be attested by all of the anthropologists with whom he came in contact.

It would be difficult [says Professor Mason] to find among those who are professional anthropologists a man who had a more exalted idea of what this science ought to be. There is not, perhaps, another distinguished scholar who has endeavored to collect into one great anthropological scheme all of the knowledge of all men in all ages of the world and in all stages of culture.

Doctor Goode was peculiarly related to the management of expositions and did more than any other person in America to engraft upon them museum ideas and widen their scope from the merely commercial and industrial to the educational and scientific.

His first experience in this field was in 1876, at the Centennial Exhibition held in Philadelphia. Professor Baird was in charge of the exhibits of the Smithsonian Institution and Fish Commission, and being much occupied at the time with other matters, the greater part of the installation and other work connected with the exhibit was placed under the immediate supervision of Mr. Goode. The work done by the Smithsonian and Government departments at this exhibition was pioneer work, it being the first international exhibition in which the United States Government was engaged. It is not too much to say that the arrangement of the Smithsonian exhibit at Philadelphia was the model on which all subsequent exhibits of the kind were based, and that the classification, the installation, and the arrangement have had a lasting influence on exhibition work everywhere. But every administrative activity of this sort was sure to result in some literary product, so that we find in 1876 Mr. Goode published A Classification of the Collections to illustrate the Animal Resources of the United States: A list of substances derived from the animal kingdom, with synopsis of the useful and injurious animals, and a classification of the methods of capture and utilization. This work was afterwards published in an enlarged form as a bulletin of the National Museum.

His services as commissioner for the United States Government at the Fisheries Exhibition of Berlin in 1880 and London in 1883 have already been alluded to. These, too, resulted in several articles in German and in a bulletin of the Museum, while several addresses and papers delivered at the Conferences of the International Fisheries Exhibition in London were published in the papers of the conferences, and full reports were made by Doctor Goode on his return to this country and published at the Government Printing Office.

He was the representative of the Smithsonian Institution at all the subsequent exhibitions held in this country—Louisville, 1884; New Orleans, 1885; Cincinnati, 1888; Chicago, 1893, and Atlanta, 1895—serving also as a commissioner and for a time acting Commissioner-General to the Columbian Exposition held at Madrid in 1892.

The exhibits made under his direction were never repetitions. Each one contained new material never shown before, and exhibited the progress of the Institution and Museum, as well as the advances made in the arts of taxidermy, installation, and labeling. Mr. Goode, too, always bore in mind the local interest, and endeavored to show specimens and materials which would be instructive to persons residing in the neighborhood of the place at which the exposition was held. Thus at Cincinnati objects were prominent which related to the Ohio Valley, for Madrid he prepared an exhibit to illustrate the conditions of human and animal life in America at the time of the Spanish discovery, whilst at Atlanta especial stress was laid on showing the fauna, flora, archæology, and mineral resources of the South Atlantic States. He prepared the report on the Madrid Exposition, and at the request of the Government Commission drew up a provisional classification for the Chicago Exposition, which, while not formally accepted, was used throughout in the official classification, many pages being copied without a change. For the Chicago, as well as the Atlanta Exposition, he prepared a carefully written catalogue, and for the latter an excellently condensed sketch of the Smithsonian Institution.

Nowhere were Mr. Goode's administrative talents more strongly shown than in an exhibition. The plans of the floor space, the cases, the specimens were all carefully arranged in advance. Boxes were especially made of lumber which could be utilized for cases or platforms. Cases were marked, and not very long before the opening of the exposition the entire mass would be deposited on the bare space assigned to the Smithsonian exhibit. Usually other exhibitors had their material half arranged by this time, and the fear was expressed by sympathetic bystanders that the Smithsonian would not be ready. The cases would be unpacked and the specimens put in them in whatever position they happened to stand, and up to the last day all would seem to be in confusion; but Doctor Goode knew his resources and his men as a general knows his army. Suddenly all detailed work would come to an end, and in the course of a few hours, as if by magic, the entire exhibit would be put in place. He had a pardonable pride in this sort of generalship, for whether at Chicago or Atlanta it had never failed him, and it earned the highest encomiums at Berlin, London, and Madrid.

Doctor Goode's services at these various expositions were recognized by diplomas and medals, and from the Spanish Government he received the order of Isabella the Catholic, with the grade of commander.

I have already spoken of Mr. Goode's administrative qualities as shown in his management of the National Museum; but his contributions to museum administration and the history of museums were not confined to his own work. From all parts of America and even as far distant as Australia his opinion was sought with regard to the plans for museum buildings as well as on minor matters of installation. All requests for such information and advice were fully answered in minute detail.

It was into his papers on museums that some of his best thoughts went, and it was there that we find epigrammatic statements which are constantly quoted by all interested in the matter.

The first paper by him on this subject appeared in the College Argus, March 22, 1871. It was entitled Our Museum, and was a description of the collection in Judd Hall. This article indicated plainly the museum instinct, for it was largely intended to make known the deficiencies in the collection, and pointed out how students and professors could make these good on their summer excursions. He also published a guide to this museum.

In 1888 he read before the American Historical Association a paper entitled Museum History and Museums of History. Here he traced the growth of the museum idea from the beginning down to the present time, repeating his now oft-quoted phrase, "An efficient educational museum may be described as a collection of instructive labels, each illustrated by a well-selected specimen." Atlases of ethnological portraits and works like those of Audubon he described as "not books, but museum specimens, masquerading in the dress of books."

Even more forcible was a lecture delivered before the Brooklyn Institute in 1889, entitled Museums of the Future. "The museum of the past," he wrote, "must be set aside, reconstructed, transformed from a cemetery of bric-a-brac into a nursery of living thoughts." . . . "The people's museum should be much more than a house full of specimens in glass cases. It should be a house full of ideas, arranged with the strictest attention to system." . . . "A finished museum is a dead museum, and a dead museum is a useless museum."

Most noteworthy, however, was his paper contributed to the Museums Association of Great Britain in 1895, entitled The Principles of Museum Administration. This was a carefully prepared codification of "the accepted principles of museum administration," which Mr. Goode hoped would "be the cause of much critical discussion." The ideas were presented in the form of aphorisms and were exceptionally clear cut, ending with the assertion that "the degree of civilization to which any nation, city, or province has attained is best shown by the character of its public museums and the liberality with which they are maintained."

This paper was warmly welcomed by museum experts, many of whom testified by their letters the interest they had in the clear presentation of the principles which should guide the museum administrator. At the 1896 meeting of the same association Mr. Bather said: "When I read the magnificently exhaustive address by Doctor G. Brown Goode, published in our last report, it was manifest that all the ideas I had ever had were anticipated in that masterly production;" whilst an obituary note in the same volume says, "His early death is a great loss, not only to the United States Museum, but to museums in general, for he took a deep and active interest in all things affecting their development and well-being."

The Manchester Guardian, September 20, 1896, says:

> He was a recognized authority on all matters affecting museum administration, and in this capacity he last year wrote a paper on the principles of museum management and economy, which was brought before the annual congress of the Museums Association at Newcastle, and has since attracted much attention as an admirable exposition of the general theory of administration applicable to museum work in all its branches. It is of interest to note that Doctor Goode's definition of a museum is an institution for the preservation of those objects which best illustrate the phenomena of nature and the works of man, and the utilization of these for the increase of knowledge and for the culture and enlightenment of the people. In this spirit Doctor Goode worked, and he not only achieved much in his own country, but was also ever ready to cordially cooperate with foreign kindred institutions, especially those in England, for the advancement of museum work as a means of education.

These activities would have been sufficient for an ordinary man, but in addition he was the historian of American science.

In 1886 he delivered, as president of the Biological Society of Washington, an address entitled The Beginnings of Natural History in America, tracing it from Thomas Harriott, who came to this country in 1585, reciting the scientific labors of Captain John Smith, John Ray, Thomas Jefferson, and a host of others. The spirit which actuated this address is well illustrated in the following paragraph:

> It seems to me unfortunate, therefore, that we should allow the value of the labors of our predecessors to be depreciated, or to refer to the naturalists of the last century as belonging to the unscientific or the archaic period. It has been frequently said

by naturalists that there was no science in America until after the beginning of the present century. This is, in one sense, true, in another, very false. There were then, it is certain, many men equal in capacity, in culture, in enthusiasm, to the naturalists of to-day, who were giving careful attention to the study of precisely the same phenomena of nature. The misfortune of the men of science of 1785 was that they had three generations fewer of scientific predecessors than have we.

This address he followed up by a second, entitled The Beginnings of American Science. The Third Century, delivered in 1887, also before the Biological Society. He divided the period from 1782 to 1888 into three periods, which he called after the names of Jefferson, Silliman, and Agassiz.

Continuing along this same line, he contributed to the American Historical Association, in 1890, a paper on The Origin of the National Scientific and Educational Institutions of the United States.

The material contained in these various papers was summed up in an unpublished work entitled What has been done for Science in America, 1492–1892, which illustrates in an interesting way the development of Doctor Goode's mind, for in this study as much attention is given to astronomy, physics, and even comparative philology as is paid to natural history. Parallel with this work may be mentioned a collection of portraits of almost every scientific man of importance mentioned in any of these four essays. Besides these, he wrote an article in the Science News, 1878, entitled The earliest American Naturalist, Thomas Harriott.

He was greatly interested in American history, a close student of the writings of the fathers—more especially of Washington and Jefferson—and an enthusiastic investigator of Virginia history, for which he had assembled a great mass of original material. He was especially interested in the study of institutional history, which he thought approximated most nearly to the scientific method. It is more than likely that this interest grew out of his studies in genealogy, the most splendid result of which is his Virginia Cousins, though a great mass of material, still unpublished, attests the fact that these genealogical collections were intended to cover the South and to serve as a contribution to Southern history. He relates in the prologue to his Virginia Cousins that his interest in the Goode family tree was awakened in him by his father at the age of twelve.

The significance of genealogical studies for American history he recognizes in the following words: "The time is coming when the sociologist and the historian will make an extensive use of the facts so laboriously gathered and systematically classified by genealogists, and it is probable that this can be better done in the United States than elsewhere;" and again, "One of the elements of satisfaction in genealogical study legitimately arises from the success of our attempts to establish personal relations with past ages and to be able to people our minds with the images of our forefathers as they lived two, three, four hundred years ago."

But there was a scientific interest which attached to this work, as well as an historical one, for Doctor Goode was a strong believer in heredity, and he was profoundly impressed with the idea that man's capabilities and tendencies were to be explained by the characteristics of the men and women whose blood flowed through their veins.

This idea, too, is brought out strongly in his biographical work, nowhere more strongly than in his biographies of Henry, Baird, and Langley (almost the last work he ever did) for the Smithsonian Memorial Volume, and it is carefully worked out in an elaborate plan of a biography of Professor Baird, which would probably have been the next literary work he would have undertaken had his life been spared.

He was greatly interested in bibliography, his methods in this work being most exact. He published bibliographies of Spencer Fullerton Baird, Charles Girard, Philip Lutley Sclater, and had under way bibliographies of Theodore Gill and David Starr Jordan.

> A gigantic work in the same line [says Dr. Gill] had been projected by him and most of the materials collected; it was no less than a complete bibliography of Ichthyology, including the names of all genera and species published as new. In no way may Ichthyology, at least, more feel the loss of Goode than in the loss of the complete bibliography.

Mr. Goode was a student of the history of the scientific societies, and was himself deeply interested in their welfare. In all the Washington scientific societies he was an active member, serving as president both of the Biological Society and the Philosophical Society, before which he delivered notable addresses on the history of American science. He also belonged to the Anthropological and Geographic societies of Washington and stoutly maintained the traditions of all these. He was elected a member of the National Academy of Sciences in 1888, was for many years a member of the Association for the Advancement of Science, being elected vice-president of the zoological section last summer, a few days before his death. He was a member of the American Philosophical Society, of the American Society of Naturalists, and a Fellow of the American Academy of Arts and Sciences, and among foreign societies he had been honored by election to the Société des Amis des Sciences Naturelles de Moscou, Société Zoölogique de France, Zoological Society of London, and the Société Scientifique du Chile.

He seemed to regard historical and patriotic societies with an equal interest, being a member of the council of the American Historical Association and a member of the Virginia Historical Society, and the Columbian Historical Society of Washington, and of the newly formed Southern Historical Society. His work in connection with the hereditary and patriotic societies was so especially near to him as to demand an unusual mention. He was one of the organizers of the Sons of the American Revolution of the District of Columbia, holding the offices of vice-president-general and registrar-general in the national society, and at the time of his death of president in the local society. He stimulated this society to issue historical publications, and saw a number through the press himself. A society known as the Sons of the Revolution having been founded with somewhat similar aims, Mr. Goode joined this organization with the avowed purpose of bringing them together. In this society he held the office of vice-president. He was lieutenant-governor of the Society of Colonial Wars of the District of Columbia. He gave constant advice to the Daughters of the American Revolution during the period of their organization, and was instrumental in having the State of Massachusetts present, as a home for the Daughters of the American Revolution in Georgia, its building at the Atlanta Exposition, which was a copy of the old Craigie house in Cambridge, once occupied by Washington as his headquarters, and later the residence of Longfellow. The success of this effort gave him special pleasure, for he regarded it as one of the means for promoting friendliness between the people of New England and the people of the South.

Although these numerous duties and activities would seem to have been more than enough for any single man, Mr. Goode did not stop here. Every scientific activity of the Government had at some time or other the advantage of his wise counsel and his active cooperation. His public duties outside of the Smithsonian in connection with the Department of State, the Fish Commission, the census, and the various expositions abroad at which he represented his Government I have already alluded to; but he was possessed of a higher order of patriotism which even this service did not satisfy. Mr. William L. Wilson, Regent of the Smithsonian Institution, lately Postmaster-General of the United States, and president of Washington and Lee University, says:

> He was a richly endowed man, first, with that capacity and that resistless bent toward the work in which he attained his great distinction that made it a perennial delight to him; but he was scarcely less richly endowed in his more unpretending and large human sympathies, and it was this latter that distinguished him as a citizen and a historian.
>
> As a citizen he was full of patriotic American enthusiasm. He understood, as all must understand who look with seriousness upon the great problems that confront a free people and who measure the difficulties of those problems—he understood that at least one preparation for the discharge of the duties of American citizenship was the general education of the people, and so he advocated as far as possible bringing within the reach of all the people not only the opportunities but the attractions and the incitements to intellectual living.
>
> Doctor Goode, with the quick and warm sympathies of the man and of the historian, seems to have felt that he could do no greater service to the people of his day and generation and to his country than in the most attractive and concrete way, if I may so express it, to lead the young men of this country to the study of the history of the past, to the deeds and the writings of the great men to whom we owe the foundation and the perpetuation of our institutions.

He was greatly interested in the establishment of a national university, and in 1891 read a paper in Philadelphia, afterwards printed in the magazine Lend a Hand, edited by Edward Everett Hale, entitled Washington's University the Nation's Debt of Honor. In this article he computed that the bequest of Washington to the United States for a national university would, at compound interest, amount, in 1892, to $4,100,000, and he proposed that the National Government should restore this sum as the nucleus of the endowment for the National University. He acted as secretary of the executive committee, of which the Chief Justice was chairman, which was laboring to this end, and spared no effort to bring it to a successful conclusion.

Another project in which he was interested and for which he labored was a movement to fully open French universities to American students. His interest was excited in this movement because he thought that American science was becoming one-sided, owing to the fact that all of the students who went abroad visited German universities. Of the American committee, which, in cooperation with the French committee, had this matter in charge, Doctor Goode was the secretary, and he had the satisfaction of seeing this project brought to a successful issue before his death.

He had a strong interest in literature, and wrote in an excellent English style—clear, direct, and unpretentious. I have never met a mind in touch with more far-away and disconnected points than his, nor one of the same breadth and variety of writing, outside of the range of his own specialty. He had fine æsthetic tastes and derived keen enjoyment from everything that was beautiful in nature or in art. He knew all natural sights and sounds, and recognized the note of every bird. He knew good pictures and good prints, was familiar with all the processes of graphic arts, and a good judge of them, both on the technical and the artistic side. He loved a beautifully printed book and an artistic binding. All these tastes he utilized in the publications which he wrote or edited. The work which he had in hand at the time of his death and to which he devoted so much loving care, the History of the First Half Century of the Smithsonian Institution, he aimed to make the expression of all these tastes. To no writing which he ever did, did he bring a higher literary expression than to the pages which he prepared for this book. He was at infinite trouble in discussing such matters as the form of the page, the style of the type, the quality of the paper, the initial letters, the headlines and illustrations, and the binding, and when he discussed any of these points with the expert craftsmen his knowledge of the details was as full as their own.

In spite of ill health and suffering, his overwrought nervous system, and his occasional severe mental depression, he never allowed himself to take a cynical view of human nature. He was a man who loved his fellow-men, and to whom that love was repaid with a warmth to a degree rare in this day. He made all other men's concerns his own. He sent notes and suggestions to hundreds of scientific men, whose work profited thereby, and in the large circle of friends he had, scarcely one did not at one time or other come to Mr. Goode for advice and sympathy upon his own private affairs. He was an intensely loyal American patriot, ever careful that nothing should be said or done that should in anyway reflect upon his country. He was especially devoted to Virginia and never happier than when he could spend a few days on her soil, looking over a historic house or copying some of the records which he hoped to turn to advantage in his historical studies.

"He is remembered," says Doctor Dall, "as one never weary of well-doing; who reached the heights, though ever aiming higher; whose example stimulated and whose history will prove a lasting inspiration."

"As a public-spirited naturalist," says Professor Osborn, "he leaves us the tender memory and the noble example, which helps us and will help many coming men into the higher conception of duty in the service and promotion of the truth. We can not forget his smile nor his arm passing through the arm of his friend."

I have never known a more perfectly sincere and loyal character than Doctor Goode's, or a man who, with better judgment of other men or greater ability in molding their purposes to his own, used these powers to such uniformly disinterested ends, so that he could maintain the discipline of a great establishment like the National Museum while still retaining the personal affection of every subordinate.

I have scarcely alluded to his family life, for of his home we are not to speak here, further than to say that he was eminently a domestic man, finding the highest joys that life brought him with his family and children.

He has gone; and on the road where we are all going there has not preceded us a man who lived more for others, a truer man, a more loyal friend.

MUSEUM-HISTORY AND MUSEUMS OF HISTORY.

BY

GEORGE BROWN GOODE,

Assistant Secretary, Smithsonian Institution, in charge of the U. S. National Museum.

MUSEUM-HISTORY AND MUSEUMS OF HISTORY.[1]

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The true significance of the word museum may perhaps best be brought to our apprehension by an allusion to the ages which preceded its origin—when our ancestors, hundreds of generations removed, were in the midst of those great migrations which peopled Europe with races originally seated farther to the east.

It has been well said that the story of early Greece is the first chapter in the history of the political and intellectual life of Europe.

To the history of Greece let us go for the origin of the museum idea, which in its present form seems to have found its only congenial home among the European offshoots of the Indo-Germanic division of the world's inhabitants.

Museums, in the language of ancient Greece, were the homes of the muses. The first were in the groves of Parnassus and Helicon, and later they were temples in various parts of Hellas. Soon, however, the meaning of the word changed, and it was used to describe a place of study, or a school. Athenæus described Athens in the second century as "the museum of Greece," and the name of museum was definitely applied to that portion of the palace of Alexandria which was set apart for the study of the sciences, and which contained the famous Alexandrian library. The museum of Alexandria was a great university, the abiding place of men of science and letters, who were divided into many companies or colleges, and for whose support a handsome revenue was allotted.

The Alexandrian museum was destroyed in the days of Cæsar and Aurelian, and the term museum, as applied to a great public institution, dropped out of use from the fourth to the seventeenth century. The disappearance of a word is an indication that the idea for which it stood has also fallen into disfavor; and such, indeed, was the fact. The history of museum and library run in parallel lines. It is not until the development of the arts and sciences has taken place, until an extensive

[1]A paper read before the American Historical Association, in Washington City, December 26–28, 1888.

written literature has grown up, and a distinct literary and scientific class has been developed, that it is possible for the modern library and museum to come into existence. The museum of the present is more dissimilar to its old-time representative than is our library to its prototype.

There were in the remote past galleries of pictures and sculpture, as well as so-called museums. Public collections of paintings and statuary were founded in Greece and Rome at a very early day. There was a gallery of paintings (Pinacotheca) in one of the marble halls of the propylæum at Athens, and in Rome there were lavish public displays of works of art. M. Dezobry, in his Rome in the Time of Augustus, has described this phase of Latin civilization in the first century before Christ:

> For many years [remarks one of his characters] the taste for paintings has been extending in a most extraordinary manner. In former times they were only to be found in the temples, where they were placed less for purposes of ornament than as an act of homage to the gods; now they are everywhere, not only in temples, in private houses, and in public halls, but also on outside walls, exposed freely to air and sunlight. Rome is one great picture gallery; the Forum of Augustus is gorgeous with paintings, and they may be seen also in the Forum of Cæsar, in the Roman Forum, under the peristyles of many of the temples, and especially in the porticos used for public promenades, some of which are literally filled with them. Thus everybody is enabled to enjoy them, and to enjoy them at all hours of the day.

The public men of Rome, at a later period in its history, were no less mindful of the claims of art. They believed that the metropolis of a great nation should be adorned with all the best products of civilization. We are told by Pliny that when Cæsar was dictator, he purchased, for 300,000 deniers, two Greek paintings, which he caused to be publicly displayed, and that Agrippa placed many costly works of art in a hall which he built and bequeathed to the Roman people. Constantine gathered together in Constantinople the paintings and sculptures of the great masters, so that the city, before its destruction, became a great museum, like Rome.

The taste for works of art was generally prevalent throughout the whole Mediterranean region in the days of the ancient civilizations, and there is abundant reason to believe that there were prototypes of the modern museum in Persia, Assyria, Babylonia, and Egypt, as well as in Rome. Collections in natural history also undoubtedly existed, though we have no positive descriptions of them. Natural curiosities, of course, found their way into the private collections of monarchs, and were doubtless also in use for study among the savants in the Alexandrian museum. Aristotle, in the fourth century before Christ, had, it is said, an enormous grant of money for use in his scientific researches, and Alexander the Great, his patron, "took care to send to him a great variety of zoological specimens, collected in the countries which he had subdued," and also "placed at his disposal several thousand persons, who were occupied in hunting, fishing, and making the observations which were necessary for completing his History of Animals." If human nature has not

J. J. Abert.

changed more than we suppose, Aristotle must have had a great museum of natural history.

When the Roman capital was removed to Byzantium, the arts and letters of Europe began to decline. The Church was unpropitious, and the invasions of the northern barbarians destroyed everything. In 476, with the close of the Western Empire, began a period of intellectual torpidity which was to last for a thousand years.

It was in Bagdad and Cordova that science and letters were next to be revived, and Africa was to surpass Europe in the extent of its libraries. In the Periplus, or Voyage of Hanno, occurs the following passage in regard to specimens of Gorillas, or "Gorgones:"

> Pursuing them, we were not able to take the men (males); they all escaped, being able to climb the precipices, and defended themselves with pieces of rock. But three women (females), who bit and scratched those who led them, were not willing to follow. However, having killed them, we flayed them, and conveyed the skins to Carthage; for we did not sail any further, as provisions began to fail.[1]

With the Renaissance came a period of new life for collectors. The churches of southern Europe became art galleries, and monarchs and noblemen and ecclesiastical dignitaries collected books, manuscripts, sculptures, pottery, and gems, forming the beginning of collections which have since grown into public museums. Some of these collections doubtless had their first beginnings in the midst of the dark ages, within the walls of feudal castles, or the larger monasteries, but their number was small, and they must have consisted chiefly of those objects so nearly akin to literature as especially to command the attention of bookish men.

As soon as it became the fashion for the powerful and the wealthy to possess collections, the scope of their collections began to extend, and objects were gathered on account of their rarity or grotesqueness, as well as for their beauty or instructiveness. Flourens, in his Life and Works of Blumenbach, remarks: "The old Germany, with its old chateaux, seemed to pay no homage to science; still the lords of these ancient and noble mansions had long since made it a business, and almost a point of honor, to form with care what were called cabinets of curiosities."

To the apothecary of old, with his shop crowded with the curious substances used in the medical practice of his day, the museum owes some of its elements, just as the modern botanic garden owes its earliest history to the "physic garden," which in its time was an outgrowth of the apothecary's garden of simples. The apothecary in Romeo and Juliet—

> In whose needy shop a tortoise hung,
> An alligator stuff'd, and other skins
> Of eel-shaped fishes,—

was the precursor of the modern museum keeper. In the hostelries and taverns, the gathering places of the people in the sixteenth and seven-

[1] Owen, Transactions, Zoological Society of London, V, p. 266, footnote.

teenth centuries, there grew up little museums of curiosities from foreign lands, while in the great fairs were always exhibited sundry gatherings of strange and entertaining objects.

At the middle of the last century there appear to have been several such collections of curiosities in Britain.

In Artedi's ichthyological works there are numerous references to places where he had seen American fishes, especially at Spring Garden (later known as the Vauxhall Garden, a famous place of resort), and at the Nag's Head, and the White Bear, and the Green Dragon in Stepney, in those days a famous hostelry in London. He speaks also of collections at the houses of Mr. Lillia and in that of Master Saltero (the barber-virtuoso, described by Bulwer in his Devereux), in Chelsea and at Stratford, and also in the collection of Seba, in Amsterdam, and in that of Hans Sloane.

With the exception of "*the monk* or *Angel-fish*, *Anglis*, alias *Mermaid-fish*," probably a species of *Squatina*, which he saw at the Nag's Head, all the fishes in these London collections belonged to the order Plectognathi.

Josselyn, in his Two Voyages to New England (1638–1673), after telling us how a Piscataway colonist had the fortune to kill a Pilhannaw—the king of the birds of prey—continues, "How he disposed of her I know not, but had he taken her alive and sent her over into England, neither Bartholomew or Sturbridge Fair could have produced such another sight."

Shakespeare's mirror strongly reflects the spirit of the day. When Trinculo, cast ashore upon a lonesome island, catches a glimpse of Caliban, he exclaims:

> What have we here? A man or a fish? Dead or alive? A fish: he smells like a fish; a very ancient and fish-like smell. . . . a strange fish! Were I in England now, (as once I was), and had but this fish painted, not a holiday fool there but would give a piece of silver; there would this monster make a man; any strange beast there makes a man: when they will not give a doit to relieve a lame beggar, they will lay out ten to see a dead Indian.

The idea of a great national museum of science and art was first worked out by Lord Bacon in his New Atlantis, a philosophical romance published at the close of the seventeenth century. The first scientific museum actually founded was that begun at Oxford in 1667, by Elias Ashmole, still known as the Ashmolean Museum, composed chiefly of natural history specimens collected by the botanists Tradescant, father and son, in Virginia, and in the north of Africa. Soon after, in 1753, the British Museum was established by act of Parliament, inspired by the will of Sir Hans Sloane, who, dying in 1749, left to the nation his invaluable collection of books, manuscripts, and curiosities.[1]

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[1] The collections of Sloane, who was one of the early scientific explorers of America, were like those of the Tradescants, contained many New World speci-

LOUIS AGASSIZ.

Many of the great national museums of Europe had their origin in the private collections of monarchs. France claims the honor of having been the first to change a royal into a national museum, when, in 1789, the Louvre came into the possession of a republican government. It is very clear, however, that democratic England, by its action in 1753, stands several decades in advance—its act, moreover, being one of deliberate founding rather than a species of conquest.

The first chapter in the history of American museums is short. In colonial days there were none. In the early years of the Republic, the establishment of such institutions by city, State, or Federal Government would not have been considered a legitimate act. When the General Government came into the possession of extensive collections as the result of the Wilkes Exploring Expedition in 1842, they were placed in charge of a private organization, the National Institution, and later, together

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mens, and the British Museum as well as the Ashmolean was built around a nucleus of American material. Indeed, we can not doubt that interest in American exploration had largely to do with the development of natural history museums.

In those days all Europe was anxious to hear of the wonders of the new-found continent, and to see the strange objects which explorers might be able to bring back with them, and monarchs sought eagerly to secure novelties in the shape of animals and plants.

Columbus was charged by Queen Isabella to collect birds, and it is recorded that he took back to Spain the skins of several kinds of animals. Even to this day may be seen in the old collegiate church in Siena a votive offering placed there nearly four centuries ago by the discoverer of America. It consists of the armor worn by him when he first stepped upon the soil of the New World and the rostrum of a swordfish killed on the American coast.

The state papers of Great Britain contain many entries of interest in this connection. King James I was an enthusiastic collector. December 15, 1609, Lord Southampton wrote to Lord Salisbury that he had told the King about Virginia squirrels brought into England which were said to fly. The King very earnestly asked if none were provided for him—whether Salisbury had none for him—and said he was sure Salisbury would get him one. The writer apologizes for troubling Lord Salisbury, "but," continued he, "you know so well how he [the King] is affected to such toys."

Charles I appears to have been equally curious in such matters. In 1637 he sent John Tradescant the younger to Virginia "to gather all rarities of flowers, plants, and shells."

In 1625 we find Tradescant writing to one Nicholas that it is the Duke of Buckingham's pleasure that he should deal with all merchants from all places, but especially from Virginia, Bermuda, Newfoundland, Guinea, the Amazons, and the East Indies, for all manner of rare beasts, fowls and birds, shells and shining stones, etc.

In the Domestic Correspondence of Charles I, in another place, July, 1625, is a "Note of things desired from Guinea, for which letters are to be written to the merchants of the Guinea Company." Among other items referred to are "an elephant's head, with the teeth very large; a river horse's head; strange sorts of fowls; birds' and fishes' skins; great flying and sucking fishes; all sorts of serpents; dried fruits, shining stones, etc." Still farther on is a note of one Jeremy Blackman's charge—in all, £20—for transporting four deer from Virginia, including corn and a place made of wood for them to lie in.

with other similar materials, in that of a corporation, the Smithsonian Institution, which was for a long period of years obliged to pay largely for their care out of its income from a private endowment. It was not until 1876, however, that the existence of a National Museum, as such, was definitely recognized in the proceedings of Congress, and its financial support fully provided for.

In early days, however, our principal cities had each a public museum, founded and supported by private enterprise. The earliest general collection was that formed at Norwalk, Connecticut, prior to the Revolution, by a man named Arnold, described as "a curious collection of American birds and insects." This it was which first awakened the interest of President Adams in the natural sciences. He visited it several times as he traveled from Boston to Philadelphia, and his interest culminated in the foundation of the American Academy of Arts and Sciences.[1] In 1790 Doctor Hosack brought to America from Europe the first cabinet of minerals ever seen on this continent.

The earliest public establishment, however, was the Philadelphia Museum, established by Charles Willson Peale in 1785, which had for a nucleus a stuffed paddlefish and the bones of a mammoth, and which was for a time housed in the building of the American Philosophical Society. In 1800 it was full of popular attractions.

> There were a mammoth's tooth from the Ohio, and a woman's shoe from Canton; nests of the kind used to make soup of, and a Chinese fan six feet long; bits of asbestus, belts of wampum, stuffed birds and feathers from the Friendly Islands, scalps, tomahawks, and long lines of portraits of great men of the Revolutionary war. To visit the museum, to wander through the rooms, play upon the organ, examine the rude electrical machine, and have a profile drawn by the physiognomitian, were pleasures from which no stranger to the city ever refrained.

Doctor Hare's oxyhydrogen blowpipe was shown in this museum by Mr. Rubens Peale as early as 1810.

The Baltimore Museum was managed by Rembrandt Peale, and was in existence as early as 1815 and as late as 1830.

Earlier efforts were made, however, in Philadelphia. Doctor Chovet, of that city, had a collection of wax anatomical models made by him in Europe, and Professor John Morgan, of the University of Pennsylvania, who learned his methods from the Hunters in London and Sué in Paris, was also forming such a collection before the Revolution.

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[1] This collection [we are told] was sold to Sir Ashton Lever, in whose apartments in London Mr. Adams saw it again, and felt a new regret at our imperfect knowledge of the productions of the three kingdoms of nature in our land. In France his visits to the museums and other establishments, with the inquiries of Academicians and other men of science and letters respecting this country, and their encomiums on the Philosophical Society of Philadelphia, suggested to him the idea of engaging his native State to do something in the same good but neglected cause.—Kirtland, Mem. American Academy of Sciences, Boston, I, xxii.

JOHN JAMES AUDUBON.

The Columbian Museum and Turrell's Museum, in Boston, are spoken of in the annals of the day, and there was a small collection in the attic of the statehouse in Hartford.

The Western Museum, in Cincinnati, was founded about 1815 by Robert Best, M. D., afterwards of Lexington, Kentucky, who seems to have been a capable collector, and who contributed matter to Godman's American Natural History. In 1818 a society styled the Western Museum Society was organized among the citizens, which, though scarcely a scientific organization, seems to have taken a somewhat liberal and public-spirited view of what a museum should be. With the establishment of the Academy of Natural Sciences in Philadelphia in 1812, and the New York Lyceum of Natural History, the history of American scientific museums had its true beginning.

The intellectual life of America is so closely allied to that of England that the revival of interest in museums and in popular education at the middle of the present century is especially significant to us. The great exhibition of 1851 was one of the most striking features of the industrial revolution in England, that great transformation which, following closely upon the introduction of railroads, turned England feudal and agricultural into England democratic and commercial.

The great exhibition marked an epoch in the intellectual progress of English-speaking people. "The great exhibition," writes a popular novelist, and a social philosopher as well, "did one great service for country people. It taught them how easy it is to get to London, and what a mine of wealth, especially for after memory and purposes of conversation, exists in that great place."

Under the wise administration of the South Kensington staff, a great system of educational museums has been developed all through the United Kingdom.

Our own Centennial Exhibition in 1876 was almost as great a revelation to the people of the United States. The thoughts of the country were opened to many things before undreamed of. One thing we may regret—that we have no such widespread system of museums as that which has developed in the motherland with South Kensington as its administrative center. England has had nearly forty years, however, and we but thirteen, since our exhibition. May we not hope that within a like period of time, and before the year 1914, the United States may have attained the position which England now occupies, at least in the respects of popular interest and substantial governmental support? There are now over one hundred and fifty public museums in the United Kingdom, all active and useful.

The museum systems of Great Britain are, it seems to me, much closer to the ideal which America should follow, than are those of either France or Germany. They are designed more thoughtfully to meet the needs of the people, and are more intimately intertwined with the policy of national popular education.

Sir Henry Cole, the working founder of the Department of Science and Art, speaking of the purpose of the museums under his care, said to the people of Birmingham in 1874:

> If you wish your schools of science and art to be effective, your health, the air, and your food to be wholesome, your life to be long, your manufactures to improve, your trade to increase, and your people to be civilized, you must have museums of science and art to illustrate the principles of life, health, nature, science, art, and beauty.

Again, in words as applicable to Americans of to-day as to Britons in 1874, said he:

> A thorough education and a knowledge of science and art are vital to the nation, and to the place it holds at present in the civilized world. Science and art are the lifeblood of successful production. All civilized nations are running a race with us, and our national decline will date from the period when we go to sleep over the work of education, science, and art. What has been done is at the mere threshold of the work yet to be done.

The people's museum should be much more than a house full of specimens in glass cases. It should be a house full of ideas, arranged with the strictest attention to system. I once tried to express this thought by saying: "An efficient educational museum may be described as a collection of instructive labels, each illustrated by a well-selected specimen."

The museum, let me add, should be more than a collection of specimens, well arranged and well labeled. Like the library, it should be under the constant supervision of one or more men, well informed, scholarly, and withal practical, and fitted by tastes and training to aid in the educational work. I should not organize the museums primarily for the use of people in their larval or school-going stage of existence. The public school-teacher, with the illustrated text-books, diagrams, and other appliances, has in these days a professional outfit which is usually quite sufficient to enable him to teach his pupils.

School days last at the most only from four to fifteen years, and they end, with the majority of mankind, before their minds have reached the stage of growth most favorable for the reception and assimilation of the best and most useful thought. Why should we be crammed in the time of infancy and kept in a state of mental starvation during the period which follows, from maturity to old age—a state which is disheartening and unnatural all the more because of the intellectual tastes which have been stimulated and partially formed by school life?

The museum idea is much broader than it was fifty or even twenty-five years ago. The museum of to-day is no longer a chance assemblage of curiosities, but rather a series of objects selected with reference to their value to investigators, or their possibilities for public enlightenment. The museum of the future may be made one of the chief agencies of the higher civilization.

I hope that the time will come when every town shall have both its public museum and its public library, each with a staff of competent men, mutually helpful, and contributing largely to the intellectual life of the community.

The museum of the future in this democratic land should be adapted to the needs of the mechanic, the factory operator, the day laborer, the salesman, and the clerk, as much as to those of the professional man and the man of leisure. It is proper that there be laboratories and professional libraries for the development of the experts who are to organize, arrange, and explain the museums.

It is proper that laboratories be utilized to the fullest extent for the credit of the institution to which they belong. No museum can do good and be respected which does not each year give additional proofs of its claims to be considered a center of learning. On the other hand, the public have a right to ask that much shall be done directly in their interest. They will gladly allow the museum officer to use part of his time in study and experiment. They will take pride in the possession by the museum of tens of thousands of specimens, interesting only to the specialist, hidden away perpetually from public view, but necessary for proper scientific research. They are the foundations of the intellectual superstructure which gives to the institution its proper standing.

Still, no pains must be spared in the presentation of the material in the exhibition halls. The specimens must be prepared in the most careful and artistic manner, and arranged attractively in well-designed cases and behind the clearest of glass. Each object must bear a label giving its name and history so fully that all the probable questions of the visitor are answered in advance. Books of reference must be kept in convenient places. Colors of walls, cases, and labels must be restful and quiet, and comfortable seats must be everywhere accessible, for the task of the museum visitor is a weary one at best.

All intellectual work may be divided into two classes, the one tending toward the increase of knowledge, the other toward its diffusion; the one toward investigation and discovery, the other toward the education of the people and the application of known facts to promoting their material welfare. The efforts of learned men and of institutions of learning are sometimes applied solely to one of these departments of effort—sometimes to both—and it is generally admitted, by the most advanced teachers, that, for their students as well as for themselves, the happiest results are reached by carrying on investigation and instruction simultaneously. Still more is this true of institutions of learning. The college which imparts only second-hand knowledge to its students belongs to a period in the history of education which is fast being left behind.

The museum must, in order to perform its proper functions, contribute to the advancement of learning through the increase as well as through the diffusion of knowledge.

We speak of "educational" museums and of the "educational" method of installation so frequently that there may be danger of inconsistency in the use of the term. An educational museum, as it is usually spoken of, is one in which an attempt is made to teach the unprofessional visitor of an institution for popular education by means of labeled collections, and it may be, also, by popular lectures. A college museum, although used as an aid to advanced instruction, is not an "educational museum" in the ordinary sense, nor does a museum of research, like the Museum of Comparative Zoology at Cambridge, Massachusetts, belong to this class, although, to a limited extent, it attempts and performs popular educational work in addition to its other functions.

In the National Museum in Washington the collections are divided into two great classes: The exhibition series, which constitutes the educational portion of the Museum, and is exposed to public view, with all possible accessories for public entertainment and instruction; and the study series, which is kept in the scientific laboratories, and is rarely examined except by professional investigators.

In every properly conducted museum the collections must, from the very beginning, divide themselves into these two classes, and, in planning for its administration, provision should be made not only for the exhibition of objects in glass cases, but for the preservation of large collections not available for exhibition, to be used for the studies of a very limited number of specialists. Lord Bacon, who, as we have noticed, was the first to whom occurred the idea of a great museum of science and art, complains thus, centuries ago, in his book, On the Advancement of Learning, that up to that time the means for intellectual progress had been used exclusively for "amusement" and "teaching," and not for the "augmentation of science."

The boundary line between the library and the museum is neither straight nor plain. The former, if its scope be rightly indicated by its name, is, primarily, a place for books. The latter is a depository for objects of every kind, books not excepted. The British Museum, with its libraries, its pictures, its archæological galleries, its anthropological, geological, botanical, and zoological collections, is an example of the most comprehensive interpretation of the term. Professor Huxley has described the museum as "a consultative library of objects." This definition is suggestive but unsatisfactory. It relates only to the contents of the museum as distinguished from those of the library, and makes no reference to the differences in the methods of their administration.

The treasures of the library must be examined one at a time, and by one person at a time. Their use requires long-continued attention, and their removal from their proper places in the system of arrangement. Those of the museums are displayed to public view in groups, in systematic sequence, so that they have a collective as well as an individual significance. Furthermore, much of their meaning may be read at a

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glance. The museum cultivates the powers of observation, and the casual visitor even makes discoveries for himself, and, under the guidance of the labels, forms his own impressions. In the library one studies the impressions of others.

The library is most useful to the educated; the museum to educated and uneducated alike, to the masses as well as to the few, and is a powerful stimulant to intellectual activity in either class.

The influence of the museum upon a community is not so deep as that of the library, but extends to a much larger number of people. The National Museum in Washington has 300,000 visitors a year, each of whom carries away a certain number of new thoughts.

The two ideas may be carried out, side by side, in the same building, and, if need be, under the same management, not only without antagonism, but with advantage. That the proximity of a good library is absolutely essential to the influence of a museum, will be admitted by everyone. I am confident, also, that a museum wisely organized and properly arranged is certain to benefit the library near which it stands in many ways, and more positively than through its power to stimulate interest in books, and thus to increase the general popularity of the library and to enlarge its endowment.

Many books and valuable ones would be required in this best kind of museum work, but it is not intended to enter into competition with the library. When necessary, volumes might be duplicated. It is very often the case, however, that books are more useful and safer in the museum than on the library shelves, for in the museum they may be seen daily by thousands, while in the library their very existence is forgotten by all except their custodian.

Audubon's Birds of North America is a book which everyone has heard of and which every one wants to see at least once in his lifetime. In a library, it probably is not examined by ten persons in a year. In a museum, if the volume were exposed to view in a glass case, a few of the most striking plates detached, framed, and hung upon the wall near at hand, it will teach a lesson to every passer-by.

The library may be called upon for aid by the museum in many directions. Pictures are often better than specimens to illustrate certain ideas. The races of man and their distribution can only be shown by pictures and maps. Atlases of ethnological portraits and maps are out of place in a library if there is a museum nearby in which they can be displayed. They are not even members of the class described by Lamb as "books which are not books." They are not books, but museum specimens, masquerading in the dress of books.

In selecting courses for the development of a museum, it may be useful to consider what are the fields open to museum work. As a matter of convenience, museums are commonly classed in two groups—those of science and those of art—and in Great Britain the great national system is mainly under the control of The Science and Art Department of the Committee of Council on Education.

This classification is not entirely satisfactory, since it is based upon methods of arrangement rather than upon the nature of the objects to be arranged, and since it leaves in a middle territory (only partially occupied by the English museum men of either department) a great mass of museum material, of the greatest moment, both in regard to its interest and its adaptability for purposes of public instruction.

On the other side stand the natural history collections, undoubtedly best to be administered by the geologist, botanist, and zoologist. On the other side are the fine-art collections, best to be arranged, from an æsthetic standpoint, by artists. Between is a territory which no English word can adequately describe—which the Germans call *Culturgeschichte*—the natural history of civilization, of man and his ideas and achievements. The museums of science and art have not yet learned how to partition this territory.

An exact classification of museums is not at present practicable, nor will it be until there has been some redistribution of the collections which they contain. It may be instructive, however, to pass in review the principal museums of the world, indicating briefly their chief characteristics.

Every great nation has its museum of natural history. The natural history department of the British Museum, recently removed from the heart of London to palatial quarters in South Kensington, is probably the most extensive, with its three great divisions, zoological, botanical, and geological.

The historian and the naturalist have met upon common ground in the field of anthropology. The anthropologist is, in most cases, historian as well as naturalist; while the historian of to-day is always in some degree an anthropologist, and makes use of many of the methods at one time peculiar to the natural sciences. The museum is no less essential to the study of anthropology than to that of natural history. The library formerly afforded to the historian all necessary opportunities for work. It would seem from the wording of the new charter of the American Historical Association that its members consider a museum to be one of its legitimate agencies.

Your secretary has invited me to say something about the possibilities of utilizing museum methods for the promotion of historical studies. This I do with much hesitation, and I hope that my remarks may be considered as suggestions rather than as expressions of definite opinion. The art of museum administration is still in its infancy, and no attempt has yet been made to apply it systematically to the development of a museum of history. Experiment is as yet the museum administrator's only guide, and he often finds his most cherished plans thoroughly impracticable. That museums can ever be made as useful to history as they are to physical science, their most enthusiastic friend dares not hope. The two departments of science are too unlike.

The historian studies events and their causes; the naturalist studies objects and the forces by which their existence is determined. The naturalist may assemble in a museum objects from every quarter of the globe and from every period of the earth's history. Much of his work is devoted to the observation of finished structure, and for this purpose his specimens are at all times ready. When, however, he finds it necessary to study his subject in other aspects, he may have recourse to the physical, chemical, and physiological laboratories, the zoological and botanical gardens, and aquaria, which should form a part of every perfect museum system. Here, almost at will, the phenomena of nature may be scrutinized and confirmed by repeated observation, while studies impracticable in the nursery may usually be made by members of its staff, who carry its appliances with them to the seashore or to distant lands.

The requirements of the historian are very different. Nevertheless, I am confident that the museum may be made in his hands a most potent instrumentality for the promotion of historical studies. Its value is perhaps less fully realized than it would be were it not that so many of its functions are performed by the library. In the library may be found descriptive catalogues of all the great museums, and books by the hundred, copiously illustrated with pictures of the objects preserved in museums. A person trained to use books may by their aid reap the advantage of many museums without the necessity of a visit to one.

The exhibition series would be proportionately larger in an historical than in a natural-history museum. The study series of a historical museum would mostly be arranged in the form of a library, except in some special departments, such as numismatics, and when a library is near might be entirely dispensed with.

The adoption of museum methods would be of advantage to the historian in still another way, by encouraging the preservation of historical material not at present sought for by librarians, and by inducing present owners of such material to place it on exhibition in public museums.

Although there is not in existence a general museum of history arranged on the comprehensive plan adopted by natural-history museums, there are still many historical collections of limited scope, which are all that could be asked, and more.

The value to the historian of archæological collections, historic and prehistoric, has long been understood. The museums of London, Paris, Berlin, and Rome need no comment. In Cambridge, New York, and Washington are immense collections of the remains of man in America in the pre-Columbian period—collections which are yearly growing in significance, as they are made the subject of investigation, and there is an immense amount of material of this kind in the hands of institutions and private collectors in all parts of the United States.

The museum at Naples shows, so far as a museum can, the history of Pompeii at one period. The museum of St. Germain, near Paris, exhibits the history of France in the time of the Gauls and of the Roman occupation. In Switzerland, especially at Neuchatel, the history of the inhabitants of the Lake Dwellings is shown.

American ethnological museums are preserving with care the memorials of the vanishing race of red men. The George Catlin Indian Gallery, which is installed in the room in which this society is now meeting, is valuable beyond the possibility of appraisement, in that it is the sole record of the physical characters, the costumes, and the ceremonies of several tribes long extinct.

Other countries recently settled by Europeans are preserving the memorials of the aboriginal races, notably the colonies in Australia and New Zealand. Japan is striving to preserve in its Government museum examples of the fast-disappearing memorials of feudal days.

Ethnographic museums are especially numerous and fine in the northern part of Europe. They were proposed more than half a century ago, by the French geographer, Jomard, and the idea was first carried into effect about 1840, on the establishment of the Danish Ethnographical Museum, which long remained the best in Europe. Within the past twenty years there is an extraordinary activity in this direction.

In Germany, besides the chief museum in Berlin, considerable ethnographical collections have been founded in Hamburg and Munich. Austria has in Vienna two for ethnography, the Court Museum (Hof-Museum), and the Oriental (Orientalisches Museum). Holland has reorganized the National Ethnographical Museum (Rÿks Ethnographisch Museum) in Leyden, and there are smaller collections in Amsterdam, Rotterdam, and The Hague. France has founded the Trocadero (Musée de Trocadero). In Italy there is the important Prehistoric and Ethnographic Museum (Museo preistorico ed ethnografico) in Rome, as well as the collection of the Propaganda, and there are museums in Florence and Venice.

Ethnographical museums have also been founded in Christiania and Stockholm, the latter of which will include the rich material collection by Doctor Stolpe on the voyage of the frigate *Vanadis* around the world.

In England there is less attention to the subject, the Christy collection in the British Museum being the only one specially devoted to ethnography, unless we include also the local Blackmore Museum at Salisbury.

In the United States the principal establishment arranged on the ethnographic plan is the Peabody Museum of Archæology in Cambridge, and there are important smaller collections in the American Museum of Natural History in New York and the Peabody Academy of Sciences at Salem.

The ethnological collections in Washington are classified on a double system, in one of its features corresponding to that of the European, in the other like the famous Pitt-Rivers collection at Oxford, arranged to show the evolution of culture and civilization without regard to race. This broader plan admits much material excluded by the advocates of ethnographic museums, who devote their attention almost exclusively to the primitive or non-European peoples.

In close relation to the ethnographic museums are those which are devoted to some special field of human thought and interest. Most remarkable among these probably is the Musée Guimet, recently removed from Lyons to Paris, which is intended to illustrate the history of religious ceremonial among all races of men.

Other good examples of this class are some of those in Paris, such as the Musée de Marine, which shows not only the development of the merchant and naval marines of the country, but also, by trophies and other historical souvenirs, the history of the naval battles of the nation.

The Musée d'Artillerie does for war, but less thoroughly, what the Marine Museum does in its own department, and there are similar museums in other countries.

Historical museums are manifold in character, and of necessity local in interest. Some relate to the history of provinces or cities. One of the oldest and best of these is the Märkisch Provinzial Museum in Berlin. Many historical societies have collections of this character.

There are museums which illustrate the history of particular towns, events, and individuals. The museum of the city of Paris, in the Hôtel des Invalides, is one of these. The museum of the Hohenzollerns, in Berlin, contains interesting mementos of the reigning family of Germany. The cathedrals of southern Europe, and St. Paul's, in London, are in some degrees national or civic museums. The Galileo Museum in Florence, the Shakespeare Museum at Stratford, are good examples of the museums devoted to the memory of representative men and the Monastery of St. Mark, in Florence, does as much as could be expected of any museum for the life of Savonarola. The Soane Museum in London, the Thorvaldsen Museum in Copenhagen, are similar in purpose and result, but they are rather biographical than historical. There are also others which illustrate the history of a race, as the Bavarian National Museum in Nuremberg.

The study of civilization or the history of culture and of the developments of the various arts and industries have brought into being special collections which are exceedingly significant and useful. Doctor Klemm and General Pitt-Rivers, in England, were pioneers in the founding of collections of this kind, and their work is permanently preserved in the Museum für Völkerkunde, in Leipzig and at the University of Oxford.

Nearly every museum which admits ethnological material is doing something in this direction. There are a number of beginnings of this sort in this very building.

The best of the art museums are historically arranged and show admirably the development of the pictorial and plastic arts—some, like that in Venice, for a particular school; some that of a country, some that of different countries side by side.

The art museum, it need scarcely be said, contains, more than any other, the materials which I should like to see utilized in the historical museum.

Incidentally or by direct intention, a large collection of local paintings, such as those in Venice or Florence, brings vividly into mind the occurrences of many periods of history, not only historical topography—the architecture, the utensils, weapons, and other appurtenances of domestic, military, ecclesiastical, and governmental routine—but the men and women who made the history, the lowest as well as the most powerful, and the very performers of the deeds themselves, the faces bearing the impress of the passions by which they were moved.

These things are intelligible to those who are trained to observe them. To others they convey but half the lesson they might, or mayhap only a very small part indeed.

The historical museums now in existence contain, as a rule, chance accumulations, like too many natural-history museums of the present, like all in the past. I do not mean any disrespect by the word *chance*, but simply that, though the managers are willing to expend large sums for any specimens which please them, many most instructive ones have been excluded by some artificial limitation. The National Portrait Gallery in London is an instance. Many illustrious men are not represented upon its walls solely because no contemporary pictures of theirs, reaching a certain ideal standard of merit, are in existence.

So, also, the collection of musical instruments at South Kensington, which admits no specimen which is devoid of artistic suggestions—thus barring out the rude and primitive forms which would give added interest to all. The naturalist's axiom, "any specimen is better than no specimen," should be borne in mind in the formation of historical museums, if not rigidly enforced.

Another source of weakness in all museums is one to which attention has already been directed, namely, that they have resigned, without a struggle, to the library material invaluable for the completion of their exhibition series. Pictures are quite as available for museum work as specimens, and it is unwise to leave so many finely illustrated books, lost to sight and memory, on the shelves of the libraries.

That libraries can do good work through the adoption of museum methods has been clearly shown in the British Museum in the exceedingly instructive collections which have of late years been exhibited by its librarians, to illustrate such subjects as the lives of Luther and Michael Angelo, and by their permanent display of pictures and documents referring to the history of London.

The Dyce-Forster collection of autograph documents, letters, and manuscripts is also, in its own way, suggestive. Every large library has

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done something of this kind in its own way. It remains for some student of history to work out upon a generous plan, and with plenty of exhibition space at his command, the resources which are already in the possession of some great treasure-house like the British Museum.

What the limitations of historical museums are to be it is impossible at present to predict. In museum administration experience is the only safe guide. In the scientific museum many things have been tried, and many things are known to be possible. In the historical museum most of this experimental administration still remains to be performed. The principal object of this communication is to call attention to the general direction in which experiment should be made.

The only safe course to be pursued in the development of plans in any untried department of museum work is to follow the advice which the Apostle Paul proffered to the Thessalonians:

"Prove all things; hold fast that which is good!"

THE GENESIS OF THE UNITED STATES NATIONAL MUSEUM

BY

GEORGE BROWN GOODE,

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When, in 1826, James Smithson bequeathed his estate 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," he placed at the disposal of our nation two valuable collections—one of books and one of minerals.

In the schedule of Smithson's personal effects, as brought to America in 1838, occurs the following entry:

> Two large boxes filled with specimens of minerals and manuscript treatises, apparently in the testator's handwriting, on various philosophical subjects, particularly chemistry and mineralogy. Eight cases and one trunk filled with the like.

This collection and the books and pamphlets mentioned in the same schedule formed the beginnings, respectively, of the Smithsonian library and the Smithsonian museum. The minerals constituted, so far as the writer has been able to learn, the first scientific cabinet owned by the Government of the United States. Their destruction in the Smithsonian fire of 1865 was a serious loss. Our only knowledge of their character is derived from the report of a committee of the National Institution, which in 1841 reported upon it as follows:[1]

> Among the effects of the late Mr. Smithson, is a Cabinet which, so far as it has been examined, proves to consist of a choice and beautiful collection of Minerals, comprising, probably, eight or ten thousand specimens. The specimens, though generally small, are extremely perfect, and constitute a very complete Geological and Mineralogical series; embracing the finest varieties of crystallization; rendered more valuable by accompanying figures and descriptions by Mr. Smithson, and in

[1] Proceedings of the National Institution, July, 1841, 2d Bull., p. 95. Francis Markoe, jr., secretary of the National Institution, in a letter written to the American Philosophical Society in 1841, described as a part of this cabinet "a superb collection, and very large, of precious stones and exquisite crystallized minerals . . . decidedly the richest and rarest collection in the country."

For a catalogue in general terms see Alfred Hunter, Popular Catalogue of the Extraordinary Curiosities in the National Institute, etc., published in 1855, and William J. Rhees, Account of the Smithsonian Institution, etc., 1859.

his own hand-writing. The cabinet also contains a valuable suite of meteoric stones, which appear to be specimens of most of the meteorites which have fallen in Europe during several centuries.

This report was made in July, 1841, at the time when, by order of the Secretary of the United States Treasury, the minerals, books, manuscripts, and other articles forming part of the Smithson bequest, were deposited in the custody of the National Institution, where they remained until 1858.

A room had been planned for their reception in the Smithsonian edifice, which was to be made fireproof,[1] but if this was ever constructed it was not occupied, and the collections having been displayed for some years in the Regents' room, were destroyed by fire January 24, 1865.

The National Institution was for nearly eighteen years the official custodian of these and other museum materials belonging to the nation. This organization, ten years before the Smithsonian Institution was prepared to receive any collections whatever, fourteen years before its buildings were ready for the exhibition of museum objects, and in after years, until its charter expired by limitation in 1862, held many objects whose proper place was in the National Museum. Indeed, the retention of many historical objects in the Patent Office hall until 1883, was an evidence of a lingering uncertainty as to the proper location of responsibility for the care of the national collections.

In order to understand the genesis of the National Museum of the United States, it seems necessary to examine the history of this society, at one time so enterprising and influential.

The National Institution for the Promotion of Science, organized in Washington, May 15, 1840, was for some years the most prominent exponent of the idea of a national museum.[2] The establishment of this society was doubtless to a very great degree due to the stimulating and inspiring effects upon public opinion of the Smithson bequest. The germs of the idea which it represented seem, however, to have been existing in Washington at a much earlier period, for in 1816, or before, a similar society had been organized in the capital under the name of The Columbian Institute for the Promotion of Arts and Sciences.[3]

The Columbian Institute received on May 20, 1818, a charter from Congress which expired in 1838, after which its members "were invited

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[1] Report of the building committee to December 1, 1847, in Report of the Board of Regents, January 6, 1848, Thirtieth Congress, first session, Mis. Doc. 23, p. 8.

[2] The National Institution was organized at the seat of Government on the 15th of May, 1840, by the adoption of a Constitution and the declaration of the objects of the Institution; which are to promote Science and the Useful Arts, and to establish a National Museum of Natural History, etc.—Proceedings of the National Institution, 1841, 1st Bull., p. 3.

[3] Before 1816 an organization known as The Metropolitan Society was in existence in Washington, and the Columbian Institute was an outgrowth of it or replaced it. The United States Military Philosophical Society met in Washington and New York as early as 1805.

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to become members of the National Institution, and to deposit in its Cabinet their effects, books, and papers."[1]

This invitation was accepted July 17, 1841,[2] in a letter from Asbury Dickins, secretary, and although no record of any transfer is to be found in the Bulletin of the National Institution, I have before me a letter from Messrs. John J. Abert, A. O. Dayton, and F. A. Markoe, committee of that society, addressed to the Secretaries of the War and Navy Departments, January 1, 1842, in which, among the other collections in their custody, they mention "the books, minerals, and works of art belonging to the late Columbian Institute," and also the "books, papers, and proceedings of the late American Historical Society," an organization to which also the National Institution stood in the position of an heir.

To Doctor Edward Cutbush is due the preservation of the only statement extant of the objects of the Columbian Institute, embodied apparently in its constitution, and quoted as follows in his address as its president, delivered January 11, 1817, in Congress Hall, Washington:[3]

To collect, cultivate, and distribute the various vegetable productions of this and other countries, whether medicinal or esculent, or for the promotion of arts and manfactures.

To collect and examine the various mineral productions and natural curiosities of the United States, and to give publicity to every discovery that the institute may have been enabled to make.

To obtain information respecting the mineral waters of the United States, their locality, analysis, and utility, together with such topographical remarks as may aid valetudinarians.

To invite communications on agricultural subjects, on the management of stock, their diseases, and the remedies.

To form a topographical and statistical history of the different districts of the United States, noticing particularly the number and extent of streams, how far navigable, the agricultural products, the imports and exports, the value of lands, the climate, the state of the thermometer and barometer, the diseases which prevail in the different seasons, the state of the arts and manufactures, and any other information which may be deemed of general utility.

To publish annually, or whenever the Institution shall have become possessed of a sufficient stock of important information, such communications as may be of public utility, and to give the earliest information in the public papers of all discoveries that may have been made by or communicated to the Institute.

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[1] Proceedings of the National Institution, July 12, 1841, 2d Bull., p. 94.

[2] Idem., p. 113.

[3] Cutbush, Edward. An address | delivered before the | Columbian Institute, | for the Promotion of Arts and Sciences, | at the City of Washington, | on the 11th January, 1817. | —— | By Edward Cutbush, M. D., | Hon. Member of the Philadelphia Medical and Chemical Societies; | Corresponding Member of the Linnæan Society of Philadelphia; | and President of the Institute. | —— | Published by the request of the Columbian Institute, | —— | Washington. | Printed by Gales & Seaton. | Six parts | 1817. 8vo., pp. 1–29.

A copy of this rare pamphlet is in the library of the Surgeon-General's Office, as well as a nearly complete series of the publications of the two brothers Cutbush.

A remark significant in this connection may be found in a letter written by Edward Cutbush, M. D., dated Geneva, New York, January 20, 1842, accepting his election to corresponding membership in the National Institution. After thanking the institution "for this memento of their friendship and recognition of past services in the cause which has been so honorably revived at the seat of Government," he continued thus: "I most sincerely hope that all the objects which engaged the attention of Thomas Law, Esq.,[2] and myself, in 1816, in establishing the Columbian Institute will *now* meet the approbation and support of the Government, and of the scientific men of the District of Columbia." [1]

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[1] Proceedings of the National Institution, 1842, 2d Bull., p. 156.

[2] Thomas Law was a member of an English family of talent and influence. His father, Edmund Law, D. D., born in Cartmel, Lancashire, in 1703, educated at St. John's College, Cambridge, was author of several theological and philosophical works, and in 1769 became Bishop of Carlisle, holding this office till his death in 1787. Of his younger brothers, one was Bishop of Elphin, another, George Henry Law, D. D., (1761–1845) was Bishop of Chester, 1812, and later, 1824, of Bath and Wells. [Biographical Sketch in Gentleman's Magazine, 1845, Pt. 2, p. 529.] His elder brother, Edward Law—Lord Ellenborough—(1750–1818) was an eminent lawyer, principal counsel for Warren Hastings in the great impeachment trial before the House of Lords, Attorney-General and Lord Chief Justice of the King's Bench,and was father of Edward Law, Earl of Ellenborough (1790–1871), Governor-General of India.

Thomas Law was born in 1756, and in 1773, at the age of seventeen, entered the service of the British East India Company in Bengal, and was rapidly promoted, becoming member of the revenue board of Hugli before he was twenty-one, later judge of Poonah, and in 1783 collector, judge, and magistrate of Behar, a province with more than 2,000,000 inhabitants, an office which he administered for six years with great success, afterwards, at the request of Lord Cornwallis, the Governor-General, then engaged in his campaign against Tippoo Saib, serving for two years on the revenue board at Calcutta. In 1791, his health having failed, he sailed for England, where he remained until 1793, the year of his removal to America.

While in India he was the friend and associate of Lord Cornwallis, Lord Terguenett, and Sir William Jones, and was the author of what was known as the Mocurrery system and permanent settlement, a great legislative reform, the accomplishment of which was the principal feature of Cornwallis's administration, which the board of control of the East India Company described as "forming a new epoch in Hindostan, from which, they predict, will be derived security and permanent prosperity, and consider it as an important and most beneficial change to 50,000,000 of people, and full of beneficial consequences."

William Duane, the editor of the Philadelphia *Aurora*, who had known Mr. Law in India, wrote thus concerning him in 1815:

"We have known Mr. Law now more than thirty years. We knew him when he was inferior to no man in eminence and in power, the third or fourth in degree in a great empire; and this was at a time, too, when, by his own generous efforts, pursued with zeal and talent that commanded general admiration and esteem, he brought about a revolution, the influence of which now extends to one hundred and twenty millions of people, as great in its moral and political influences as the extinction of the feudal system. In Hindostan, under the Mogul government, the tenure of land was in the Empire and reverted upon the demise of the holder. The afflictions produced by such a system can not be conceived by those who have not been eye-witnesses of them. Upon the death of a zuinndar, or landholder, where polygamy

The idea of a subsidy from the General Government seems to have been prominent in the minds of the founders of the Columbian Institute. In the closing portion of the same address Doctor Cutbush naïvely remarked as follows:

I can not refrain from indulging in the pleasing hope that the members of our National Government, to whom has been confided the guardianship of the District of Columbia, will extend their fostering care to this establishment, and that a part of the public grounds, reserved for national purposes, may be vested in the Columbian Institute. I would also, with due deference, suggest that a small pecuniary aid would enable the Institute at an earlier period to extend its benefits to all parts of the United States, and to render an essential service to the nation by perpetuating an establishment worthy of the metropolis bearing the name of our illustrious Washington, where at some future period the youth of our country will repair to complete their education at the national seminary, to which the Botanical Garden and Mineralogical Cabinet would be important appendages.

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prevails and the children and females are numerous, the death of the head of the family, where no provision has been otherwise made, can not be well imagined. Mr. Law, who held the government of a rich and populous province under the Bengal administration, proposed what has been called the Mocurrery system, that is to make the land personal property and not to revert to the sovereign. This plan, pursued through several years of zeal and devotion to humanity, he accomplished. The Norman conquest, the revolution in England in 1688, were great events, and they mark epochs in history and are treated as such, while Mr. Law's revolution without bloodshed eventually changed the whole moral and social condition of Hindostan, settled estates in persons and as personal property, and put an end to all the calamities which were consequent of the old system; yet the event is scarcely heard of; perhaps there are not three men in this country who ever heard of it yet."

In a letter written to Law by Marquis Cornwallis in 1796, he said: "We labored together for the security of person and property to the subjects of the British Government in Asia," and referred to "that plan of which I shall ever with gratitude acknowledge you as the founder."

Another reform suggested by Mr. Law was in connection with the commercial relations of India with England. Concerning this Mr. Law writes, in 1824:

"The augmented wealth and prosperity of many of the natives of India since I quitted Bengal is evinced by commercial events and improvements, some of which have fulfilled my anticipations, when I proposed to the company, and was urgent with them, to throw open and enlarge new branches of trade originally in India. Cotton and sugar are now imported thence into England, and British manufactures have been exported to pay for these new and rich Asiatic cargoes, and this to an amount that in 1815 was estimated at £870,177. Five years afterwards, in 1819, the value of such manufactures exported to India exceeded three millions sterling."

One of the results of this Indian reform was doubtless the abolition at so early a day of negro slavery in the British West Indies.

Another of his reforms was that effected when at an early age he was governor of Behar, and which was perhaps his chief popular title to the appellation of "Father of the People." The capital of Behar is as much venerated by the Hindus as Mecca by the Mohammedans. Pilgrims annually resort to it from all parts of India. These pilgrims had been oppressed by heavy taxes ever since the establishment of the Mohammedan Government—taxes imposed according to the apparent dignity of the pilgrims, which was rated by the number of their animals, and the palanquins, horses, or elephants which accompanied them. When Mr. Law became collector the exactions were so onerous that many Hindus were deterred from fulfilling their religious

Cutbush's address before the Columbian Institute, nearly three-quarters of a century ago, is well worthy of study at the present time. It is full of enlightened patriotism and of hopeful prophecy for the United States and for Washington. "Where genius and talent are respected, rewarded, and promoted," wrote he, "the arts and sciences will flourish and the wealth and power of the nation increase."

The wisdom of such men as Cutbush opened the way for the organization of the National Institution, which in its turn, as we shall see, had

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usages, but through his efforts the taxes were diminished to a moderate sum, a greater number of pilgrims would pay it, and, while the demands of the revenue were fulfilled, "purposes of humanity were forwarded and the pious feelings of the natives were gratified." [Law's "Reply," p. 7.]

Mr. Law's removal from England was due in part to an act of injustice on the part of the East India Company, which resulted in considerable financial loss to himself, and in part to his "decided disapprobation of an impolitic and exhausting war that the administration was then carrying on against France."

He conceived a great admiration for the character of Washington, and when he knew of the efforts being made to establish a national capital, he became anxious to identify himself with its growth from the very beginning.

He invested all of his property in houses and lots in Washington, and for forty years was one of the most zealous and enlightened citizens.

S. L. Knapp (Ignatius Loyola Robertson, LL.D.) wrote of him in 1830 in his Sketches of Public Characters:

"He purchased largely of the soil, built on an extensive scale, suggested ten thousand plans for the improvement of the city and for the prosperity of the nation; but the slow, doubtful, and often strange course of Congress came not only in his way, but in the way of all those deeply interested in the welfare of the city; and he has spent the days of his maturity and wisdom in unavailing efforts for the improvement of it. It is happy for him, however, that he has lived to see the dawn of a better day for Washington, and, if he can not stay here long to enjoy it, he will rejoice in the hopes of his friends and descendants."

Among the enterprises in which he participated at an early day was the erection of the great building south of the Capitol which has for so many years borne the inscription "Law House."

Three sons, born in India, accompanied Mr. Law to America, one of whom, Mr. John Law, a lawyer in Washington, died before 1824, and all before 1834.

Mr. Law married, as second wife, Miss Custis, daughter of George Washington Parke Custis, the stepson and adopted son of Washington, thus allying himself by family ties with the man whom he so much revered.

Mr. Law was a zealous advocate of a national paper currency and published a book on currency.

He also wrote poetry and contributed to general literature.

He was one of the leaders in the intellectual life of the infant capital, and notwithstanding his personal eccentricities was universally respected. As one of the founders of the first learned society in Washington, he is worthy of our veneration; and since he has been ignored by the biographical dictionaries this notice of his life has been written.

He died in 1834.

Reference to Mr. Law's character and career may be found in an obituary in the National Intelligencer, 1834, quoted in the New England Magazine, September, 1834, in Sketches of Public Characters, by "Ignatius Loyola Robertson" (S. L. Knapp) in

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an important influence toward shaping the course of the Smithsonian Institution.

Indeed, the germ of the Smithsonian idea may be found in Cutbush's address—and his spirit was kindred to that of Henry and his associates, who worked under more favorable conditions thirty years later.[1]

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the biographical sketch of William Winston Seaton, by his daughter, and in Faux's Memorable Days in America, the review of which in No. 68 of the Quarterly Review evoked Mr. Law's "Reply," which contains much autobiographical matter.

The following are titles of some of Mr. Law's publications, for the verbal accuracy of which no responsibility is taken, since they are usually given second-hand:

1792. LAW, THOMAS. Sketch of some late arrangements and a review of the rising resources of Bengal. London, 1792. 8°. Lib. Congress.

1794. LAW, THOMAS. "On Bengal," etc. Perhaps another ed. of that printed in 1792. Quoted by Allibone.

1806. [LAW, THOMAS.] Ballston Spring. [A poem.] New York, 1806. Boston Ath.

1820. LAW, THOMAS. Remarks on the report of the Secretary of the Treasury, March 1, 1819. Wilmington, 1820. 8°. Boston Ath.

1824. LAW, THOMAS. A reply to certain insinuations, published as an article in the sixty-eighth number of the Quarterly Review. Washington, 1827. 8°. pp. 1–27. (1.) Lib. Cong. Refers to a libelous article; a review of Faux's Memorable Days in America.

1827. LAW, THOMAS (and others). Report of the proceedings of the committee appointed in Washington in 1824 to present a memorial to Congress, praying for the establishment of a national currency. Washington: Way & Gideon. 1824. 8°. 40 pp. Lib. Cong.; Boston Ath.

1825. LAW, THOMAS. Address before the Columbian Institute. Washington, 1825. 8°. Boston Ath.

1826. LAW, THOMAS. Considerations tending to render the policy questionable of plans for liquidating, within the next four years, of the 6 per cent stocks of the United States. Washington: S. A. Elliott. 1826. 8°. pp. 22. Lib. Cong.; Boston Ath.

1827. LAW, THOMAS. Propositions for creating means for commencing the Chesapeake and Ohio Canal, with report of committee thereon. [Washington, 1827?] 1 folio sheet. Lib. Cong.

1828. LAW, THOMAS. Address to the Columbian Institute on a moneyed system. Washington, 1828. 8°. Lib. Cong.; Boston Ath.

1830. LAW, THOMAS. Address to the Columbian Institute on the question, "What ought to be the circulating medium of a nation?" Washington, 1830. 8°. Lib. Cong.; Boston Ath.

1833. LAW, THOMAS. Synopsis of a plan for a national currency. Washington, 1833. 8°. Lib. Cong.

[1] The two brothers James and Edward Cutbush were among the most active of the popular teachers and promoters of science and education at the beginning of the present century, and it would be unjust to allow their names to drop out of the history of American science.

Both were physicians, both teachers of chemistry, both enthusiastic in the work of founding schools and learned societies. They were born, certainly in Pennsylvania, probably Philadelphia, somewhere between the years 1750 and 1770. Edward entered the medical department of the University of Pennsylvania in 1790 and graduated in 1794, and his brother James at about the same time or a little later. James Cutbush at the beginning of the century, and for a few years subsequent, The National Institution began its career at a time when the country was chafing under the irritation of the delays of Congress in organizing

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was engaged in delivering courses of chemical lectures in Philadelphia, presumably for the benefit of medical students.

He appears to have enlisted as a volunteer in a Pennsylvania regiment at the beginning of the war of 1812, and at its close, on the 12th of August, 1814, was appointed assistant apothecary-general in the Regular Army of the United States, which position he held until 1820, when he was appointed post surgeon and chief medical officer of the Military Academy at West Point. In November, 1821, he was made assistant surgeon and acting professor of chemistry and mineralogy in the Academy, in which capacity he served until his death, which occurred on December 15, 1823.

His most important work, A System of Pyrotechny (8vo., Philadelphia, 1825, i–xliv, 1–612), was published in Philadelphia after his death by his widow, aided by a subscription from the cadets of the Military Academy.

Another work, entitled The Philosophy of Experimental Chemistry, in two volumes (Philadelphia, 1813, 12mo., (1) pp. xii, 1–356 (2) i–viii, 1–339), appears to have been the earliest general work or text-book on chemistry written in America, although Benjamin Rush had printed a syllabus of his lectures which gave him the title to be considered "the father of chemistry in America," and James Cutbush himself had, as early as 1807 or 1808, prepared an Epitome of Chemistry, for the use of St. John's College, in which he was a teacher, of the publication of which, however, I have found no record.

In 1812 he delivered an Oration on Education (Philadelphia, 1812, 8vo., pp. 1–50), before the Society for the Promotion of a Rational System of Education, of which he was vice-president—an enlightened and eloquent address full of historical information. He also published in 1808 a book called The Useful Cabinet, a treatise "On hydrostatics and specific gravity," and also certain papers in the American Journal of Science.

Besides holding a corresponding membership in the Columbian Institute at Washington, which was founded by his brother, he was president of the Columbian Chemical Society and member of the Linnæan and Agricultural societies of Philadelphia. Rafinesque, enumerating in 1817 those of the American scientific men whom he considered entitled to rank as philosophers, mentions the name of Cutbush along with his own and those of Jefferson, Clinton, Vaughan, Bentley, Winthrop, Patterson, Williamson, Griscom, Wood, Dupont, Woodward, Rush, Mitchill, Ramsay, and Priestley.

Edward Cutbush, after his graduation at the Philadelphia Medical School in 1794, became attached to the militia of Pennsylvania, first as hospital surgeon and subsequently as surgeon-general. On the 24th of June, 1799, he was appointed a surgeon in the United States Navy, in which capacity he served until June 20, 1829, when he resigned. In the years 1816 and 1817 he appears to have been stationed in Washington, and at this time participated in the foundation of the Columbian Institute for the Promotion of Science. I can find no record of his whereabouts after 1829 until 1835, when he was a resident of Geneva, New York, and participated in the establishment of the medical institute of Geneva College, in which he became professor of chemistry. On the occasion of its formal opening, on February 10, 1835, he delivered a discourse "On the history and methods of medical instruction" (Geneva, 1835, 8vo., pp. 1–24). In 1842 he appears to have been still at Geneva, and at this time was probably a man seventy or eighty years of age. His Washington address and his Geneva address appear to be his only literary remains, with the exception of a book which was published in Philadelphia in 1808 entitled Observations on the Means of Preserving the Health of Soldiers and Sailors, etc. (Philadelphia, 1808, 8vo., pp. i–xvi, 1–316, 1–14).

the institution of learning provided by Smithson, whose legacy had for some years been deposited in the Treasury.[1]

It has already been suggested that the National Institution owed its origin to the influence of the Smithson bequest. Indeed, it may not be altogether impossible that it was founded with special reference to some plan looking toward securing the control of this bequest.

Although less than fifty years have gone by, I can not learn that any of those who were active members at the time of its organization are still living, and unfortunately no one seems to have left any written record of the secret history of this very significant movement.

It seems possible, however, to read between the lines, in the official publications of the society and the utterances of its friends, and thereby to acquire a certain additional insight into their meaning.

With this in mind, it is instructive to review briefly the history of the discussions which preceded the final organization of the Smithsonian Institution—not with reference to its entire policy, for this has already been well done by others, but in connection with its relations to the national institution, and the custodianship of the National Museum.

In 1835, as we have seen, the fact was first made known that Smithson, who had died in Genoa, six years earlier, had bequeathed the reversion of his whole estate 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."

The bequest was communicated to Congress by the President on the 17th of December, and was accepted by Congress by an act approved July 1, 1836, pledging "the faith of the United States" to the due application of the fund to the purposes of the bequest.

On the 1st of September, 1838, the proceeds of the estate, amounting to $508,318.46, was paid into the United States Mint, and shortly after the convening of Congress in that year, in a message dated December 6, President Van Buren informed both Houses that the amount received having been invested, he deemed it proper to invite the attention of Congress to the obligation devolving upon the United States to fulfill the object of the bequest.

Eight sessions of Congress passed by before any definite plan of organization was decided upon, and suggestions from all parts of the country were liberally forthcoming. Strange to say, nearly every suggestion, no

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[1] Smithson had died in 1829, but the legacy did not become available until after the death of his nephew, the residuary legatee, in 1835, after which, in September of that year, the Government of the United States was first apprised of the fact of the existence of such a bequest. The legacy was brought to New York in August, 1838, but no definite action was taken concerning its application until eight years later, when on August 10, 1846, the act of Congress establishing the Smithsonian Institution was passed. The Regents held their first meeting September 7, 1846, and elected a secretary, who accepted the trust on December 7, and entered upon his duties two weeks later.

matter how humble its source, seems to have had its weight in the deliberations, and almost every one was embodied in one or more of the provisions of the numerous bills brought up for the consideration of Congress.

In 1836, when this matter first came to the notice of the Senate, it seems to have been the generally accepted opinion of those who took part in the discussion that the intention of the testator was the establishing of a university.

In this direction, too, was the tendency of the advice of those "persons versed in science and in matters relating to public education," to whom in July, 1838, the Secretary of State addressed letters, asking advice as to the most advantageous mode of applying the proceeds of the bequest.[1]

Of these, three favored a school of high grade. President Wayland, an institution which should occupy "the space between the close of a collegiate education and a professional school;" Doctor Cooper, "an institution of the character of an university;" President Chapin, "an institution for liberal and professional purposes and for the promotion of original investigations—to carry scholars through a range of studies much above those of the ordinary collegiate course."

Horatio Hubbell, of Philadelphia, also, in a letter to President Van Buren, urged a university on the German plan, with numerous professorships, chiefly scientific, and Professor Dunglison, of the University of Virginia, in two very favorable letters in the Southern Literary Messenger (under the signature "*Δ*"), proposed the foundation of "a central school of natural science," to be supplemented in time by a botanical garden, an observatory, a zoological institute, or analogous means (including, doubtless, in his mind, museum collections), for prosecuting in a proper way the great sciences of astronomy and general physiology—"a school where natural philosophy, chemistry, geology, mineralogy, philosophy, and all other sciences could be effectually taught—a school which, so far from clashing with others, would aid them—which, although it might be helped by a gift of funds from the nation, could nevertheless go into operation without them—which, under a wise management, could be speedily brought to yield results of the utmost practical importance, and fulfill to the very letter the wishes of the testator."[2]

Mr. Rush objected to a school of any kind, and proposed a plan which more nearly than any other of the early ones corresponded with that which was finally adopted. In a shadowy way he outlined a system of scientific correspondence, of lectureships, of general cooperation with the scientific efforts of the Government, of a liberal system of publication,

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[1] These are the names of the persons thus addressed:

The Hon. John Quincy Adams, Senator and ex-President; Thomas Cooper, M. D., Columbia, South Carolina; Hon. Richard Rush, Sydenham, near Philadelphia, Pennsylvania; Professor Francis Wayland, President of Brown University, Providence, Rhode Island; Hon. Albert Gallatin, Rev. Stephen Olin, Philip Lindsley, and others.

[2] Southern Literary Messenger, V, 1838, p. 828; VI, 1840, p. 25, and also Rhees, Documents, pp. 864–890.

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and even of collections of geological, zoological, botanical, ethnological, and economical objects.

The fifth response was from the venerable Senator and ex-President, John Quincy Adams, who, from 1835, when he was appointed chairman of the select committee of the House to report upon the Smithson bequest, appears to have taken a deep interest in its fate, and to have felt personally responsible for its judicious administration. In his letters to the Secretary of State, October 8 and 11, 1838, he brought forward with great vigor the proposal that the first use to be made of the fund was the establishment of a great national astronomical observatory, and in January, 1839, as chairman of the House committee, acting jointly with a similar committee from the Senate, he reported a bill (House bill 1161, Senate bill 293) providing for the establishment of an observatory fully equipped, with provision for the publication of its observations, and the annual composition and publication of a nautical almanac.

The bill, which was evidently a minority report of the joint committee, was reinforced by two sets of resolutions, proposed by Mr. Adams in the House, one reported from the committee January 26, providing—

> That the first appropriation from the interest, or income, of the Smithsonian fund, ought to be for the erection and establishment, at the city of Washington, of an astronomical observatory, provided with the best and most approved instruments and books for the continual observation, calculation and recording of the remarkable phenomena of the heavens; for the periodical publication of the observations thus made; and of a nautical almanac for the use of the mariners of the United States and of all other navigating nations.

The second, reported February 6, recited the opinion—

> That the education of the children of these United States is a duty of solemn and indispensable obligation incumbent upon their parents and guardians, not for the increase and diffusion of knowledge among men, but to qualify them for the enjoyment of their rights, and the performance of their duties throughout life [and therefore]
>
> That no part of the Smithsonian fund ought to be applied to the education of the children or youth of the United States, nor to any school, college, university, or institute of education.

The latter resolutions were evidently intended as a counterpoise to the view still held by many members of the Senate, which was brought forward by the speech of Senator Asher Robbins, of Rhode Island, January 10, 1839, in which he urged "that this institution should make one of a number of colleges to constitute a university to be established here, and to be endowed in a manner worthy of this great nation and their immense resources."

On the 18th of February Senator Robbins produced an antidote to Mr. Adam's anti-university resolution in the following:

> 1. *Resolved*, That it is the duty of the United States, they having accepted the trust under the will of Mr. Smithson, of London, to execute that trust *bona fide* according to the true intent and meaning of the testator.

2. *Resolved*, That the trust being to found an institution in the city of Washington for the increase and diffusion of knowledge among men, the kind of institution which will have the effect intended and described, in the most eminent degree, will be the kind of institution which ought, in good faith to be adopted, as being most in accordance with the true intent and meaning of the testator.

3. *Resolved*, That all experience having shown scientific and literary institutions to be by far, the most effectual means to the end of increasing and diffusing knowledge among men, the Smithsonian Institution should be a scientific and literary institution, formed upon a model the best calculated to make those means the most effectual to that end.

4. *Resolved*, That to apply said trust fund to the erection and support of an observatory, would not be to fulfill *bona fide* the intention of the testator, nor would it comport with the dignity of the United States to owe such an establishment to foreign eleemosynary means.

Neither of the bills was received with favor, and the Twenty-fifth Congress came to an end without any decision having been reached. Senator Robbins retired from public life at this time, and the university idea was not subsequently brought prominently forward. During this session, however, various petitions were received. One was from Professor Walter R. Johnson, urging the foundation, advocating the claims of "an institution for researches in practical science."[1]

Another was from Charles Lewis Fleischmann, of the United States Patent Office, proposing the establishment of an institution for the promotion of agriculture, with experimental farms of 1,360 acres, manufactories, mills, and workshops, a considerable staff of teachers and instructors, and one hundred students at the commencement.[2]

The Kentucky State Agricultural Society petitioned for the endowment of an agricultural school or college out of the legacy, and the Superintendent of the Coast Survey, Mr. Hassler, was urging the foundation of an astronomical school.

In the meantime public interest was becoming awakened. The matter was agitated in the newspapers and reviews, petitions were coming in from individuals, urging speedy action, and the corporation of the city of Washington, through their mayor, Peter Force, presented a vigorously worded memorial to Congress.[3]

Early in the first session of the Twenty-sixth Congress, 1839–1841, Mr. Adams again brought up the Smithson bequest, introducing again his bill for the establishment of a national observatory and reenforcing it by his famous report of 1840[4] and a speech of considerable length, supplemented by an elaborate statement from the astronomer royal of Great Britain concerning the observatories at Greenwich and elsewhere.

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[1] Presented to the House of Representatives, May, 21, 1838.—See Rhees, Documents, pp. 171–186.

[2] Reported to the House of Representatives January 9, 1839.—See Rhees, Documents, pp. 186–198.

[3] Rhees, Documents, pp. 200, 201.

[4] First session, House of Representatives Report No. 277. Smithson bequest. (To accompany amendatory bill H. R. No. 1.) May 5, 1840. Washington: Blair & Ross, printers. 8vo., p. 155.

Mr. Adams seems to have been alone in his advocacy of the observatory and his bill and report produced no results.

It was just at this time that the National Institution was organized on the 15th of May, 1840, by the adoption of a constitution and a declaration of its objects, "which are to promote science and the useful arts, and to establish a national museum of natural history, etc."

The constitution of this society in its first form was somewhat meager, but as printed on the cover of the second bulletin of proceedings is decidedly prophetic of the future act of incorporation of the Smithsonian Institution.

Its plan, however, was conceived in a broad and liberal spirit, its membership was a strong one, including at the beginning about ninety representative men of Washington, Members of Congress, scientific men, clergymen, and prominent citizens, and as many more corresponding members, among whom were all the leading men of the country. Among its principal officers were the Secretary of War, the Secretary of the Navy, ex-President Adams, the Chief of Engineers of the Army, and other prominent officials. The meetings were well attended, the membership was enthusiastic, gifts of books and specimens began to flow in, and the prospects of the society looked very bright.

In his discourse[1] on the objects and importance of the National Institution, delivered January 5, 1841, its president, Mr. Poinsett, referred pointedly to the Smithson bequest, saying that it offered a favorable occasion for carrying into effect all the important objects connected with a national institution, such as that just being organized in Washington, enabling the "Government to afford all necessary protection to the promotion of science and the useful arts[2] without the exercise of any doubtful power, etc."

Soon after this, in February, Senators Linn and Preston, both members of the National Institution, proposed new bills for the organization of the Smithsonian Institution, at the same time reporting a bill to incorporate the National Institution for the Promotion of Science.

By these bills the entire management of the Smithsonian fund was to be intrusted to the National Institution. Its officers, a superintendent and six professors, were to be nominated by that society, which was also to prescribe their duties. Provision was made for joint occupancy by the two institutions of buildings to be erected at the cost of the Smithson bequest, and finally it was required—

> That all collections of works of art and of natural history, owned by the United States, not otherwise assigned (or all works of art, and all books relating thereto, and all collections and curiosities belonging to the United States, in the possession of

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[1] Discourse on the Objects and Importance of the National Institution for the Promotion of Science, established at Washington, 1840, delivered at the first anniversary. Washington, 1841, p. 49.

[2] The avowed objects of the National Institution.

any of the Executive Departments, and not necessarily connected with the duties thereof) shall be deposited in said buildings (or shall be transferred to said institution, to be there preserved and arranged).

In these bills, drawn up in 1840, may be found the germ of the National Museum idea, even to the extent of a proposition for an appropriation from the National Treasury, to be expended under the direction of the officers of the National Institution, the president and directors of which were the prototypes of the Smithsonian Chancellor and Regents for purposes connected with the administration of the collections such as it was not deemed proper to pay for out of the Smithsonian fund.[1]

The object of the National Institution was the promotion of science and the useful arts, but the principal agency chosen for accomplishing this object was a national museum of natural history, etc.

This was stated clearly in its declaration of objects at the time of its organization in 1840, as well as in its constitution.[2]

The sections relating to the Museum in the proposed act of incorporation of the Institution of 1841 corresponded precisely to Articles XIV and XVI of the constitution of the society, except that the provision for the appointment of curators by the Institution is omitted.

It was evidently the intention that the Board of Managers should control the national collections by virtue of the authority vested in them in their proposed control of the Smithsonian Institution.

The act to incorporate the National Institution did not receive the approval of Congress until 1842,[3] when new proposals for the organiza-

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[1]And for the transportation and arrangement of the same, the sum of $5,000 is hereby appropriated out of the Treasury of the United States, to be expended under the direction of the president and directors of the National Institution. (Senate bill, No. 245, Twenty-sixth Congress, 1839–1841, section No. 4.)

[2]Constitution, May, 1840, January, 1841:

ARTICLE XIV. The resident and corresponding members shall exert themselves to procure specimens of natural history, etc., and the said specimens shall be placed in the Cabinet under the superintendence of a Board of Curators to be appointed by the Directors. All such specimens, etc., unless deposited *specially*, shall remain in the Cabinet, and in case of the dissolution of this Institution, shall become the property of the United States.

Constitution, February, 1842:

ARTICLE XIV. The Institution shall have power to appoint Curators and others for the preservation and arrangement of its collections. The resident and corresponding members shall exert themselves to procure specimens of natural history, etc.; and the said specimens shall be placed in the Cabinet under the superintendence of a Curator or Curators. All such specimens, etc., unless deposited specially, shall remain in the Cabinet, and, in case of a dissolution of the Institution, shall become the property of the United States.

ARTICLE XVI. The various collections of the Institution shall be placed in the apartments which may be designated for that purpose by a majority of the Directors.

[3]Senator Preston, April 11, 1842, reintroduced his bill of the previous year.

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tion of the Smithsonian Institution were brought forward, very similar in many respects to those which had developed within the National Institution.

The idea of a national museum to be administered in connection with the Smithsonian organization had been suggested by no one in the five years of discussion which preceded the organization of the National Institution.

It is true that there had been plans proposed, especially those of Dunglison and Rush, which might have led up to the development of a museum, but the value of the museum as an educational agency and as an aid to research was not understood in those days. In its former aspect, it needed the teachings of the great exhibitions from 1851 to 1876, in the latter the vivifying influence of the Darwinian scientific renaissance of 1859.

The subject of the Smithsonian legacy and its proper disposition was henceforth one of those most frequently discussed by the founders of the National Institution, and for years it was the opinion of many influential men that this society should be made the custodian of the Smithson fund, and that the interests of the two establishments should be united.

A suggestive indication of the sentiment of the officers of the Institution is found in the letter of the committee of management to the Secretaries of War and the Navy in 1842, in which they remark that the object of the National Institution is "to increase and diffuse knowledge among men"—making prominent the words of the Smithsonian bequest instead of the official definition of the objects of their own society, and deliberately indicating the fact of quotation, by the customary symbols.

The influence of this society was strongly and continuously present in Congress, for the six years which followed its organization, until the Smithsonian act was finally framed, and it seems very appropriate to try to ascertain whose was the master mind which not only prevailed in finally ingrafting the development of the National Museum upon the Smithsonian project, but which directly or indirectly led to the formation of the various features of organization which have become such characteristic elements in the Smithsonian plan.

The controlling mind was evidently that of Joel R. Poinsett, of South Carolina, who was Secretary of the Navy in 1840, and at whose house the society was organized, by eight persons, among whom were, of course, Mr. Poinsett, Colonel Abert, Mr. Markoe, and Colonel Totten. Mr. Poinsett was senior director, under the first plan of organization, and occupied the chair at every meeting until, under the amended constitution, he was elected its first president in 1841. The amendment to the constitution was doubtless made in order to retain his official leadership, for he became director *ex officio* while Secretary of the Navy. With the close of Van Buren's Administration he became a private citizen, but the constitution was amended before his retirement from the Cabinet, and the position of presiding officer was never proffered to his successor.

Although, from this time on, absent from the city, he was retained in the presidency and reelected in 1841, the vice-president of the society, Colonel Peter Force, continually presiding in his absence.

Although the society elected its officers annually, Mr. Poinsett told Mr. Adams soon after his election that he should for two years come to Washington to preside over the National Institution for the Promotion of Science. He was in fact reelected to the presidency at every annual meeting until that of 1845, when, having declined candidacy, Senator Levi Woodbury was chosen president and Mr. Poinsett was unanimously elected an honorary member of the Institution.

From this period the decline of the society's prosperity was marked. It is more probable, however, that Mr. Poinsett's lack of interest was a result of the weakness of the society than that the weakness resulted from his lack of interest.

Perhaps, however, if Mr. Poinsett had been a resident of Washington rather than of South Carolina during the four years of his presidency, the result would have been different.

That Mr. Poinsett, as early as 1838, was thinking seriously about the disposition of the Smithsonian bequest is evident from an entry in the diary of John Quincy Adams, under date of December 8.[1] Mr. Adams was evidently suspicious, and believed that Mr. Poinsett did not give him his entire confidence. In April, 1839, he talked to him again, and in 1841 he wrote again in his diary: "April 14. Mr. Poinsett called upon me and now fully disclosed his project, which is to place the investment and disposal of the Smithsonian funds under the management of the American Institution for the Promotion of Literature and Science.[2] . . . He said he had at present no other occupation on hand, and would be willing to devote two years entirely to organizing this establishment and getting it into full operation."

"I know not," continued the aged statesman, "that it could be accomplished more effectively, and think I must acquiesce in this arrangement and endeavor to carry it through."

Since the bills of Messrs. Linn and Preston had been already for two months before the Senate, it seems strange that Mr. Adams should have looked upon Mr. Poinsett's communication as a revelation—still more so when it is remembered how clearly he had expressed himself in his Discourse in January.[3]

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[1] Extracts from the Memoirs of John Quincy Adams, Rhees, Documents, p. 769.

[2] Evidently meaning the National Institution.

[3] Mr. Poinsett was not only the first to publicly suggest the union of the Smithsonian with the National Institution, but was constant in his advocacy of the project. (See remarks, March 8, 1841, Proceedings of the National Institution, 2d Bull., p. 69,

Poinsett, when elected to the presidency of the National Institution, was a man sixty-two years of age, who had lived an eventful life, full of opportunities for observing the institutions of Europe, Asia, and South America. His culture was broad and sympathetic, and he was, perhaps, better fitted than any of the public men of his time to appreciate the necessity of organizing our public institutions on the most liberal and comprehensive plan.

In his interviews with those who advocated the establishment of an observatory as the first result of the Smithsonian legacy, he showed full appreciation of the value of such an institution, but seems to have kept before his own mind a much more comprehensive ideal.

Poinsett was the first to suggest the idea of a great national museum at the capital of the nation.

In his address upon The Objects and Importance of the National Institution for the Promotion of Science, delivered at the first anniversary meeting of the society, January 4, 1841, he advocated boldly the formation of a national museum as one of the most important features of a central establishment at the seat of Government, such as is maintained in every country in Europe for the advantage of those who cultivated the arts and sciences.

To one who reads this address it will become evident that it was Poinsett who put in words the definition of the objects of the National Institution—to promote science and the useful arts, and to establish a national museum of natural history.

The following is an extract from this address:

> The lovers of science, literature, and the fine arts, residing in the District, felt sensibly the absence of those resources which are found elsewhere, and are necessary for the attainment of knowledge. They were mortified to perceive that the great advantages possessed by the public authorities at Washington were neglected, and

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and letter, February 7, 1842, Idem., p. 157.) Doctor Peter S. Duponceau, president of the American Philosophical Society, in a letter to the Institution in November, 1840, remarked: "Congress can not find a better opportunity to execute the will of that beneficent testator than by laying hold of your institution, and making it its own." (Idem., 1st Bull., p. 12.) The Hon. Virgil Maxcy, chargé d'affaires at Belgium, wrote in December, 1840, that in his opinion no better use could be made of the bequest than "to place it under the direction of a Society organized for the carrying into effect identical views with those contemplated by the philanthropical and philosophical testator." (Idem., p. 46.)

See in this connection letters from Richard Rush, on the Smithsonian bequest Proceedings of the National Institution (2d Bull., 1842, pp. 201–204); from Peter S. Duponceau, on the Smithsonian bequest (Idem., 204–208); from Hon. Virgil Maxcy, chargé d'affaires of the United States to Belgium (1st Bulletin, pp. 46, 47); Opening Address by John Tyler, President of the United States, patron of the National Institute (3d Bulletin, pp. 437, 438); letter from the Hon. Levi Woodbury, United States Senate (Idem., pp. 451–453); Smithsonian bequest, by the Hon. Richard Rush (Idem., pp. 455–460); address of Hon. Mr. Preston, of the United States Senate (Idem., p. 236); letter of John Pickering, of Boston, September 1, 1841 (2d Bull., pp. 107, 110).

that, at the seat of Government of this great nation, there existed fewer means than in any other city of the Union of prosecuting those studies, which, while they impart dignity and enjoyment to existence, lead to the most useful practical results. They believed it to be their duty to arouse the attention of Government to these deficiencies, and, at all events, to address themselves to the task of supplying them, as far as could be done by their individual and combined exertions. For these purposes they have formed an association and applied themselves to collect specimens of geology and mineralogy, and other objects of natural history, and, for the short period of its existence, the efforts of the Institution have been eminently successful.

They have entered into correspondence with other learned societies, and have been encouraged to proceed by their approbation, and profited by their generous cooperation. They have invited the assistance of their fellow-citizens in the most distant States and Territories, and hope, by their aid, to collect documents and facts illustrative of the early history of our country, specimens of its geology and of its mineral and vegetable productions, and, if not to preserve the animals and plants themselves, which are passing away before the progress of settlement and cultivation, at least to perpetuate their forms, and the memory of their existence. They hope to be able to illustrate these subjects and others connected with them by a series of gratuitous lectures, and entertain a confident expectation that numbers, whose duties compel them annually to assemble here, will view with interest collections of the natural productions of America, drawn from every State and Territory in the Union, and, becoming sensible of their utility, will contribute on their return to swell their amount, and to spread throughout the country a taste for literary and scientific pursuits.

In another place in the discourses of Mr. Poinsett, we find avowals of plans and ambitious aspirations for the future of the National Museum which would satisfy the most ambitious of its supporters of to-day. He spoke thus:

Specimens of natural history are rapidly accumulating. The exploring expedition has already sent home a large collection, which remains packed away in boxes in a room belonging to the Philadelphia Museum, generously loaned by the company for that purpose; and we may anticipate from the ability and well-known zeal of the naturalists who accompanied it by order of Government that the squadron itself, shortly expected, will return richly freighted with objects of natural history. I can not believe that after all the labor, pains, and expense incurred in procuring them, these specimens are not to be brought to Washington, to be arranged and exhibited here. A geological survey of the Territory of Iowa was made a few months since, by order of the Government, and numerous valuable specimens collected by Mr. Owen. Mr. Nicolet has brought with him interesting collections made in the country he visited, and Doctor King, of Missouri, lately sent to the lead region on business connected with the ordnance office, while there collected specimens of minerals which are likewise destined for Washington. The ordnance officers who have lately returned from Europe, have brought with them numerous specimens of the iron ores used in the foundries there, and measures have been taken to procure, as objects of comparison, those of the United States.

Several individuals have transmitted donations to the Institution, while others have deposited their collections with us, from a desire to have them preserved, and, at the same time, to benefit science. We have reason to believe that this will be extensively done as soon as the Institution is firmly established. There are many of our countrymen who, like Sir Hans Sloane, the founder of the British Museum, look forward with regret to the sale and dispersion of their collections, made at great cost and pains, and desiring to have them preserved entire, would deposit them with an institution which will be as stable as the Government that protects it.

BENJAMIN SMITH BARTON.

In every country in Europe, those who cultivate the arts and sciences enjoy the advantage of finding in each capital a central establishment, such as we propose.

In London, the Royal Museum, which was commenced by the enlightened liberality of an individual, and subsequently enriched by similar bequests, and now liberally patronized by Government, possesses all that is necessary to protect and encourage literature, science, and the arts.

The Society for the Promotion of Science and the Useful Arts in Dublin, having an extensive museum of natural history, a botanic garden, and school of design, fulfills effectually the objects of its institution, and justifies the very liberal patronage of the British Government. There students in every branch of science find the means of improvement, and some of the most accomplished artists in England have been instructed in this school.

In this country, we are best acquainted with the museum, botanical and zoological gardens, and liberal course of instruction at the *Jardin des Plantes*, in Paris, where strangers resort, from every quarter of the world, to consult the collections and listen to lectures, which are open to all who choose to attend them. These courses of lectures are delivered by the ablest and most eloquent men in France, on every branch of science. In the summer botany is taught in a garden abounding in all the vegetable productions of the world; zoology in the midst of specimens of every known animal, and other branches of natural history, with the advantage of extensive collections, which are augmenting daily by an enlightened and active system of exchanges; chemistry and technology are illustrated by well-conducted experiments and admirably adapted apparatus, and every branch of natural philosophy taught with clearness and precision, and explained by the most ample means of illustration. These lectures are attended by students who have completed their academic course, and by men of science who seek to increase their knowledge.

There can be no doubt that a national institution, such as we contemplate, having at its command an observatory, a museum containing collections of all the productions of nature, a botanic and zoological garden, and the necessary apparatus for illustrating every branch of physical science, would attract together men of learning and students from every part of our country, would open new avenues of intelligence throughout the whole of its vast extent, and would contribute largely to disseminate among the people the truths of nature and the light of science.

A fortunate concurrence of circumstances offers a favorable occasion to carry all these important objects into immediate effect. A liberal and enlightened Englishman, foreseeing the benefits which would result to science throughout the world, by its successful cultivation in the vast and extensive field offered by these States and Territories, with enlarged views and praiseworthy philanthropy has bequeathed a fund to be employed for the sacred purposes of increasing and diffusing knowledge among men. This bequest will enable the Government to afford all necessary protection to the promotion of science and the useful arts, without the exercise of any doubtful power, by the application of the annual interest of this fund to the establishment of an observatory, the erection of suitable buildings to contain the collections, and for lecture rooms, the purchase of books and instruments, and the salaries of professors and curators.

Poinsett's enthusiasm was contagious, and his arguments, based as they evidently were upon careful observations and judicious reasoning, and inspired by hopeful patriotism, brought him many sympathizers. Among these the Hon. Levi Woodbury, who had been a member of the same Cabinet with Mr. Poinsett, and subsequently was in the Senate, Senator W. C. Preston, one of the directors of the Institution, Senator R. J. Walker, of Mississippi, Senator L. F. Linn, of Missouri, corresponding members, appear to have been especially friendly to the plans of Mr. Poinsett, and on various occasions promoted the interests of the National Institution on the floor of the Senate from 1841 to 1846.

In June, 1842, Mr. Poinsett was again in Washington, and on the 11th presided at a meeting at the home of Mr. Francis Markoe for the purpose of connecting the organizations of the National Institution with that of the Smithsonian Institution.

> Mr. Preston [wrote John Quincy Adams] has introduced into the Senate a bill for combining together these two institutions, and now stated to the meeting his views on the subject, embracing an appropriation of $20,000, and the occupation by law of a large portion of the Patent Office building for the preservation and arrangement of the objects of curiosity collected by the exploring expedition under Lieutenant Wilkes, now daily expected home; and he called on me to say how far my purposes may be concurrent with these suggestions.
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> I said I had the warmest disposition to favor them, and thought there was but one difficulty in the way, which might perhaps be surmounted. I had believed that the whole burden and the whole honor of the Smithsonian Institution should be exclusively confined to itself, and not entangled or commingled with any national establishment requiring appropriations of public money. I exposed the principles upon which all my movements relating to the Smithsonian bequest have been founded, as well as the bills which at four successive Congresses I have reported, first for obtaining the money, and then for disposing of the fund.
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> At the motion of Mr. Walker, of Mississippi, the president, Poinsett, was authorized to appoint a committee of five members of the Institute, to confer with Mr. Preston and me upon the means of connecting the Smithsonian Institution with the National Institute.

Nothing seems to have resulted from these deliberations.

On the 13th of June, at a stated meeting of the National Institution, Senator Preston was present, and delivered, as the records inform us, "an eloquent speech, in which he descanted at length on the history and labors of the Institute, what it had done, and what it proposed to do, its capacity to be eminently useful to the country and Congress, the advantage of uniting the Smithsonian Institution with it, etc., and appealed to Congress, and to the liberal citizens of the United States, to come forward in aid of a glorious cause, and in accomplishment of the great national objects which the Institute has in view."[1]

Senator Preston's bill for the union of the two institutions came to naught.[2]

During this session, however, the act to incorporate the National Institute, as it was henceforth to be called, passed in a much modified form, and was approved July 27, 1842,[3] and the society now seems to have felt

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[1] Proceedings of the National Institute, 3d Bull., 1845, p. 236. A copy was requested for publication (Idem., p. 241), but I can not learn that it was ever put in type.

[2] It was laid upon the table July 18, 1842, and never again taken up.

[3] See Charter of Incorporation, Constitution, and By-Laws in Appendix to this report, and in Proceedings of the National Institute, 3d Bull., pp. 388–392. See also "Bill to incorporate the National Institution," etc., reported by Senator Preston

much more secure in its project of retaining the control of the National Museum, and either of gaining eventually the management of the Smithson fund or of obtaining an appropriation from Congress.

Senator Woodbury,[1] in commenting upon the form of the charter, remarked that—

Care was taken originally to make the Institute different from all other chartered bodies, even in this District, so as to elevate it above every motive of personal gain, dedicating its labors exclusively to objects of a public character, and vesting all the property possessed for this purpose in the Government itself; and thus, by rendering it *national* in substance, as well as name, to obviate any constitutional objection which might arise against measures in its behalf.

The change of the name from Institution to Institute seems to have been made in deference to a suggestion by Doctor Duponceau in a letter written April, 1842, in which he said:

I have seen with great pleasure the bill brought into the Senate by the Hon. Mr. Preston. It fully coincides with the views that I have expressed. The object, in my opinion, is, to preserve the superiority of the National Institution over the Smithsonian, and that of the Government over both.

I would beg leave to suggest, whether it would not be advisable to make some small alteration in the name of the National Institution, so that it should not bear exactly the same name with the Smithsonian, but one expressive of some degree of superiority. I would recommend, for instance, that of Institute, which appears to me more dignified than that of institution, which is equally applicable to a school or college as to a great national establishment for the promotion of science. My idea would be to call the national establishment the "National Institute for the Promotion of Science," and the subordinate one the "Smithsonian Institution," without more.

No appropriation came, however, and the charter and changed name failed to make the society more prosperous.

At a meeting June 20,[2] 1842, a resolution was passed appointing a committee to solicit private contributions of money and property.

At another meeting, August 8, 1842, a report[3] was made by this committee in which they proposed to institute an annual scientific convention at Washington, during the session of Congress, and under the

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(S. No. 258), February 17, 1841, in Rhees, Documents, pp. 239-341. See also Memorial of the Officers of the National Institution for the Promotion of Science, January 21, 1842 (House Doc. No. 59, Twenty-seventh Congress, second session, II), submitting draft of a bill of incorporation.

[1] See remarks of Senator Woodbury in full, Proceedings of the National Institute, 3d Bull., pp. 336, 337.

[2] Evidently not June 13, though so stated in one portion of minutes. See Proceedings of the National Institute, 3d Bull., pp. 236, 241, 335.

[3] The committee appointed to devise and execute such measures as should be deemed expedient to obtain contributions and other aid to the Institute would make an informal report.

They propose making an appeal to the public, by disseminating an account of the Institute, its past efforts, its condition, and its prospects, and an exhibition of the many reasons why it should be sustained and encouraged by the citizens of the United States. In their judgment the best means of doing this will be the publicaauspices of the Institution, and also recommended an extensive system of exchange of specimens for the benefit of the museum.

At the meeting of September 12, 1842, Mr. Poinsett, the president, proposed a series of resolutions[1] intended to put the recommendation of the report into effect.

All of these resolutions and reports were issued in the form of circulars (October 15, 1842, and February 24, 1843), but the appeals "to the liberality and public spirit of our countrymen" were without avail.

Consequently a special meeting of the board of management was held December 23, 1843, at the office of the Secretary of State. That the society was regarded at that time as one of national importance is shown by the presence at the meeting of Mr. Upshur, the Secretary of State, who took an active part in the proceedings; the Hon. John Quincy Adams, who presided; Senator Levi Woodbury, late Secretary of the Treasury, who agreed to represent the meeting in Congress; the Hon. J. R. Ingersoll, who acted as secretary, and who wrote out in his preamble to the minutes of the meeting a forcible statement of the needs of the society; the Hon. C. J. Ingersoll, Senator R. J. Walker, besides Colonel Peter Force, Colonel Abert, Colonel Totten, Lieutenant Maury, and the officers of the society.

The issue of this meeting was the decision "to memorialize Congress on the subject of the condition and wants of the Institute."

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tion of the remarks addressed to the Institute by the Hon. Mr. Preston, Senator from South Carolina, on the evening of the 13th of June last.

They also propose to address circulars to prominent individuals in the different States, inviting their cooperation, particularly in receiving and transmitting contributions.

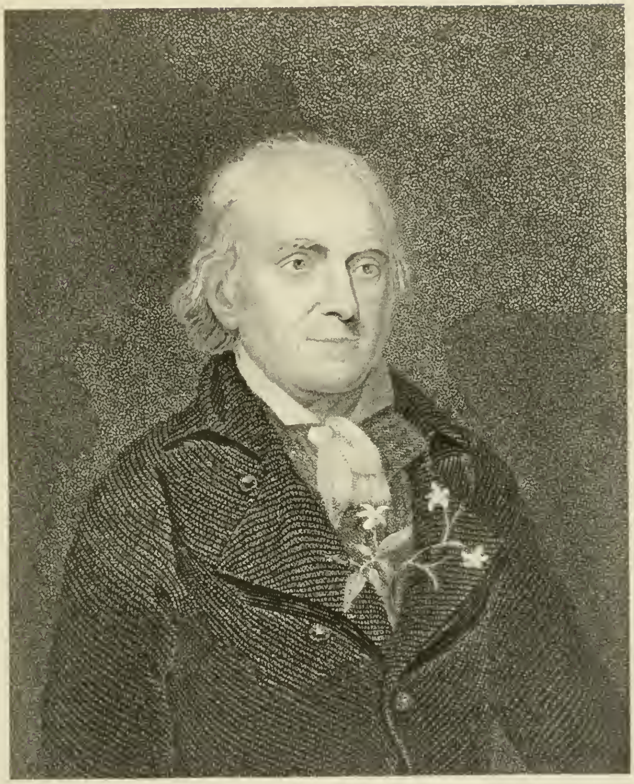
They recommend that the Institute authorize the president and secretaries to sanction their circulars by their official signatures.

They propose that a meeting of the learned men of our country, distinguished for their attainments in the different sciences, particularly in those termed physical, should be held annually at the seat of the General Government, at some early period of the session of Congress, under the auspices of the Institute, to communicate the results of their inquiries, to compare their observations, and to promote the general interests of science. It has seemed to the committee that this Institute affords an opportunity, which ought not to be neglected, of concentrating the genius and learning of our country at a common center, from which the beams of intelligence will radiate to gladden and bless the land.

They recommend that, in addition to the powers already conferred, the committee be authorized to make arrangements for such a meeting, at a day as early as may be found practicable, and to invite the attendance of those who may desire to participate in its proceedings.

They think that a system of exchanges of mineral and geological specimens, and perhaps of other articles, with the private and public collections in different parts of the Union, may be established with reciprocal advantage; and that the museum of this Institute may, by these and other means, be enabled in time to exhibit the various treasures of our different soils; and they would suggest the appointment of a committee to whom this subject should be given specially in charge. (Proceedings of the National Institute, 3d Bull., p. 335.)

[1] Proceedings of the National Institute, 3d Bull., p. 336.



Will. Bartram.

The memorial was presented in due course of time, and in June, 1844, Senator Choate presented a report upon the character and uses of the Institute, recommending that its property should be vested in the United States and an appropriation made for its benefit.

I have not been able to find a copy of this memorial, but since it was evidently prepared by Mr. J. R. Ingersoll[1] it is safe to assume that the grounds for asking aid were essentially those named in his "preamble" read to the society December 28, 1843.[2]

In the meantime, on the occasion of the first annual meeting of the National Institute (under its new name and in its capacity as a corporation), in April, 1844, the meeting of the friends of science, including, besides all the members and patrons of the National Institute, the members of the American Philosophical Society and of the Association of American Geologists and Naturalists (the predecessor of the American Association for the Advancement of Science), had been held in Washington. The occasion was a brilliantly successful one. The President of the United States presided at the first meeting and some prominent public men at each of the others.

The National Institute received its full share of encomium. President Tyler lauded it highly, held out the hope that the Government would "continue to it a fostering care," and expressed in a general way the hope that it should be identified with the future National Museum and the future Smithsonian Institution.

"Where can the Government find," said he, "a safer depository for the fruits of its expeditions, fitted out to explore distant and unknown regions, than the National Institute? What can it better do for the 'increase and diffusion of knowledge among men' than by patronizing and sustaining this magnificent undertaking?"

Senator Walker, of Mississippi, one of the directors of the Institute, delivered a very appreciative introductory address on the present condition and history of American science, ending with an appeal to scientific men to come forward and unite with the people in sustaining and advancing the National Institute.

Senator Woodbury, in a letter to the secretary of the Institution, expressed himself strongly in favor of making the society the agent of the Government in the matter of caring for collections, patents, and copyrights, and also in the execution of the Smithson trust.

John Quincy Adams closed his address in these words:

> I avail myself of this occasion to express my regret that, having taken an humble part in the establishment of this Institution from its first foundation, under the auspices of Mr. Poinsett, I have been able to contribute so little to its promotion

[1]At the meeting of May, 1844, the Hon. Joseph R. Ingersoll offered remarks upon the pecuniary embarrassments of the Institute, and expressed a hope that Congress would furnish the required aid. (Proceedings of the National Institute, 3d Bull., p. 359.)

[2]Proceedings of the National Institute, 3d Bull., p. 332.

and advantage, and to add my heartfelt satisfaction at the prosperity which, by the untiring exertions and fervid zeal of its executive officers, it has attained. I believe it eminently deserving of the fostering care and liberal patronage of the Congress of the United States, and could anticipate no happier close to my public life than to contribute, by my voice and by my vote, to record the sanction of the nation's munificence to sustain the National Institute devoted to the cause of science.

The Hon. Richard Rush, in a paper on The Smithsonian Bequest, submitted to this meeting, urged that the Smithsonian fund should be "engrafted upon the National Institute," and submitted an elaborate argument in favor of his proposal.

It was a gala week for the National Institution. The meeting was in every respect a success, and there was every reason to believe that Congress would share in the general enthusiasm and take the society under its patronage.

In the circular of invitation dated March 5, 1844, the objects of the meeting as a means of strengthening the position of the society had been boldly stated, and the committee did not hesitate to say that "should the meeting prove as successful as the hopes of the managers in relation to it are ardent, they will expect, hereafter to welcome all who may visit the Association, in apartments peculiar to itself, stored with the objects of its honest pride and worthy of the distinguished visitors."

Such a paper signed by such influential names as those of John C. Spencer, Secretary of the Treasury, R. J. Walker, W. C. Rives, Rufus Choate, of the Senate, J. R. Ingersoll and W. C. Preston, of the House of Representatives, A. D. Bache, Superintendent of the Coast Survey, and Abbot Lawrence, of Boston, was surely a powerful campaign document.

None the less weighty was the "Memorial of the Friends of Science who attended the April meeting of the National Institute," signed by nearly forty representative scientific men and college presidents from all parts of the United States, speaking in terms of high commendation of the National Institute, and particularly of the extent and value of its museum material, and expressing the hope "that the enlightened and intelligent members of Congress will distinguish the present session by the necessary appropriation of funds to an object so truly national and so truly republican."

This indorsement of the museum work of the Institute is very cordial and comprehensive, and very significant; is indicative of a decided growth in public opinion in regard to museums—a growth largely due in the first instance to the suggestions and later to the fostering care of Mr. Poinsett and his society, the National Institute.

The hopes of the promoters of the Institute were doomed to disappointment. Congress adjourned without making any provision for its needs.

On the 12th of July a new scheme was proposed for collecting money from private sources by the efforts of trustworthy agents, and in December a committee was appointed to again memorialize Congress.[1]

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[1] Proceedings of the National Institute, 3d Bull., p. 375.

The movement had received its deathblow, however. The failure of the tremendous effort of April, 1844, disheartened all its friends. At the next annual meeting Mr. Poinsett declined reelection to the presidency. The society's publications were discontinued, and even the annual address of Senator Woodbury, solicited for publication by the society, seems to have remained in manuscript unprinted.

No more meetings were held, no more bulletins printed, the magnificent list of 350 resident and 1,250 corresponding members began to grow shorter. An effort was made to revive it in 1847, and a meager report was made once afterward by the corresponding secretary. In 1855 it was brought into existence for a time as a local scientific society, and issued a new series of proceedings.[1] Its glory departed, however, with the first annual meeting in 1844, and the attention of Congress was directed toward the organization of the Smithsonian Institution.

The influence of the National Institute upon the history of science in the United States, and particularly in educating public opinion and the judgment of Congress to an application of the proper means of disposing of the Smithsonian legacy, can not well be overestimated.

If the Smithsonian had been organized before the National Institute had exerted its influences, it would have been a school, an observatory, or an agricultural experiment station.

In 1846, however, the country was prepared to expect it to be a general agency for the advancement of scientific interests of all kinds—as catholic, as unselfish, as universal as the National Institute.

The National Institute, after nearly five years of activity, suddenly ceased to be a center of public interest. The struggle over the Smithsonian bequest, however, still continued. During the Twenty-seventh Congress, 1841–1843, the Senate did nothing. The House of Representatives appointed a select committee on the subject, and Mr. Adams as its chairman reported a new bill, providing still more thoroughly for the erection of an observatory and the publication of a nautical almanac to be called the Smithsonian Almanac. Petitions continued to come in, some urging action and asking for the establishment of prizes for scientific essays, another for the establishment of an agricultural school and farm in the District of Columbia. The National Institute had perhaps fallen somewhat into disfavor with Congress—or, it may be, had become so prominent as to awaken feelings of opposition.

The Twenty-eighth Congress (1843–1845) brought their deliberations more nearly to an issue.

The astronomical observatory bill (H. R. 418, Twenty-eighth Congress) was again presented by Mr. Adams, but not acted upon. In the Senate, both in the first and second sessions, a bill for the Smithsonian Institu-

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[1] Professor Henry was for a time an officer [vice president], and endeavored to have its name changed to Metropolitan Institute.

tion was reported, June 6, 1844, by the Committee on the Library, through Senator Tappan, which, before it was finally brought to a vote, was brought into a form somewhat resembling that which finally was adopted. It provided, however, for the appointment of various professors and lecturers for a school of agricultural and mechanical arts, as well as for experimental gardens, a library of science and economics, and a museum.

The museum clause of this bill was much the same as that finally agreed to, and contained a provision that the natural-history objects and geological and mineralogical specimens belonging to the United States, "in whosesoever custody the same may be," should be transferred to the custody of the board of managers of the Smithsonian Institution.

This was evidently worded with the purpose of withdrawing from the possession of the National Institution the various collections, including those which had belonged to Smithson, which had fallen into the hands of that society between 1840 and 1845. Indeed, the National Institution seems to have already become the object of some distrust and prejudice. A proposition that two of the seven "managers" not ex-officio members of the board should be selected from the membership of the National Institution caused a vigorous debate in the Senate, in the course of which at least two Senators objected strongly to placing the administration of the Smithsonian Institution, even to so slight a degree as this, in the hands of a private corporation.

The act finally passed the Senate, but was not acted on by the House.

In connection with Mr. Tappan's bill, in January, 1845, Senator Choate, of Massachusetts, first appeared in advocacy of the establishment of a great library, and delivered his famous oration upon the influence of books. The amendment at that time proposed, together with the amendments urged by Mr. George P. Marsh, in connection with the Owen-Hough bill, brought forward in the following session, had a great influence upon the final adjustment of the plan of administration.[1]

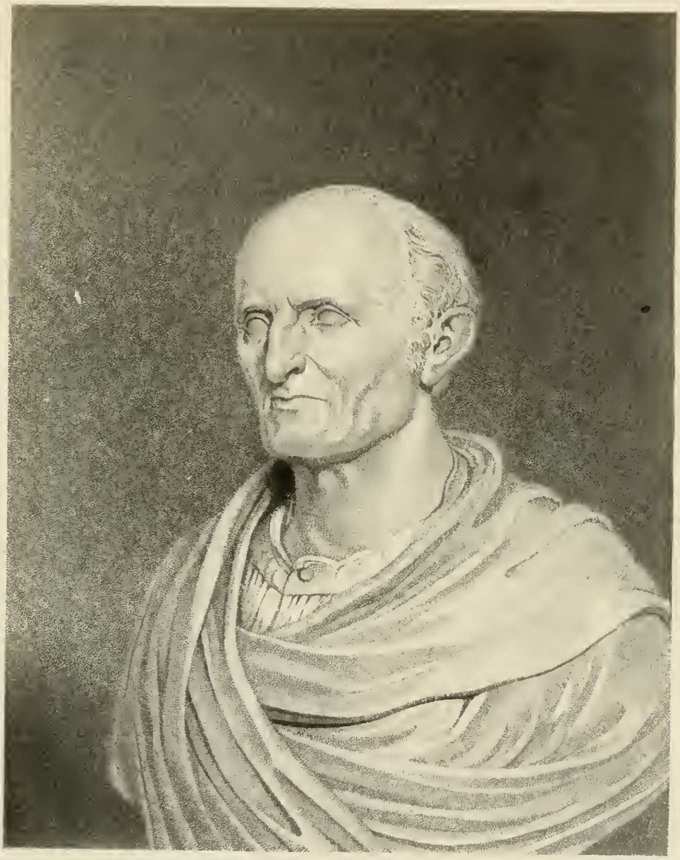
To the Twenty-ninth Congress (1845–1847) belongs the honor of finally formulating the act of incorporation by which the Smithsonian Institution was established.

This was done through Robert Dale Owen, of Indiana, who reported the bill nearly in its final form. John Quincy Adams was a member of the select committee to whom it was referred, together with Mr. Owen, chairman, Mr. Jenkins, Mr. George P. Marsh, Mr. Alexander D. Sims, Mr. Jefferson Davis, and Mr. Wilmot.

Mr. Adams was now for the first time willing to omit his advocacy of a Smithsonian Astronomical Observatory, the Naval Observatory having now been organized, and being, as Mr. Owen remarked, "at least equal in everything but the experience of its observers to the Royal Observatory at Greenwich."

It is not my purpose to describe the growth of the Smithsonian plan

[1] See report of Hon. James Meacham, 1854, pp. 10–12.



Nath^l Bowditch

of organization, except in its bearings upon the development of the museum idea.

In the bill proposed by Robert Dale Owen in 1846 the National Institute was recognized to the extent of placing two of its members on the Board of Managers, an arrangement which was continued in the Board of Regents in the Hough bill which finally passed.

An amendment to the Owen bill, proposed by Joseph R. Ingersoll, and passed, and which, had it not been superseded in the Hough bill, would have given the National Institute a strong and perhaps permanent hold upon the national collections, read as follows:

SEC. 5. *And be it further enacted*, That, in proportion as suitable arrangements can be made for their reception, all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging or hereafter to belong to the United States, which may be in the city of Washington, in whosesoever custody the same may be, shall be delivered to such persons as may be authorized by the Board of Managers to receive them, and shall be arranged in such order, and so classed, as best to facilitate the examination and study of them, in the buildings so as aforesaid to be erected for the institution; and the managers of said institution shall afterwards, as new specimens in natural history, geology, or mineralogy may be obtained for the museum of the institution, by exchanges of duplicate specimens belonging to the institution (which they are hereby authorized to make), or by donation, which they may receive, or otherwise, cause such new specimens to be also appropriately classed and arranged. And the minerals, books, manuscripts, and other property of James Smithson, which have been received by the Government of the United States, and are now placed in the Department of State, shall be removed to said institution, and shall be preserved separate and apart from the other property of the institution.

SEC. 6. *And be it further enacted*, That the managers of said institution shall appoint a Superintendent, whose duty it shall be to take charge of the ground, buildings, and property belonging to the institution, and carefully preserve the same from injury; and such Superintendent shall be the Secretary of the Board of Managers, and shall, under their direction, make a fair and accurate record of all their proceedings, to be preserved in said institution; and the said Superintendent shall also discharge the duties of librarian and of keeper of the museum, and may, with the consent of the Board of Managers, employ assistants; and the said managers shall appoint a professor of agriculture, horticulture, and rural economy; and the said professor may hire, from time to time, so many gardeners, practical agriculturists, and laborers as may be necessary to cultivate the ground and maintain a botanical garden; and he shall make, under the supervision of the board of management, such experiments as may be of general utility throughout the United States, to determine the utility and advantage of new modes and instruments of culture, to determine whether new fruits, plants, and vegetables may be cultivated to advantage in the United States; and the said officers shall receive for their services such sum as may be allowed by the Board of Managers, to be paid semiannually on the first day of January and July; and the said officers, and all other officers of the institution, shall be removable by the Board of Managers, whenever, in their judgment, the interests of the institution require any of the said officers to be changed.

In the Hough bill there was an attempt of another kind to weld together the fate of the Smithsonian Museum and the National Cabinet of Curiosities, by giving to the Board of Regents the authority to erect a building by the side of the Patent Office, so as to form a wing of that structure, and to connect it with the hall then containing the National Cabinet, so as to constitute that hall in whole or in part the depository of the cabinet of the institution.

This was discretionary, however, with the Regents, who fortunately did not look upon the plan with favor.

Reference has been made to the marked similarity between the plans of organization of the National and Smithsonian institutions. In addition to the feature of museum custody, which has already been discussed, there were others no less significant.

The National Institution, like the Smithsonian Institution, had a superior board of officers, composed of the President of the United States and the members of his Cabinet. It had also a board of directors, which included in its membership delegates from the Senate and House of Representatives, corresponding in function to the Smithsonian Board of Regents. In other respects, still more markedly than in the constitution of its governing board, the Smithsonian seems to have been organized with the plan of the National Institution in view. The objects, as defined in the Congressional act of establishment (sections 5 and 6), correspond very closely to those announced in the early publications of the National Institution.

The Institution at its foundation divided its members into eight classes, as follows:

I. Astronomy, Geography, and Natural Philosophy;
II. Natural History;
III. Geology and Mineralogy;
IV. Chemistry;
V. The Application of Science to the Useful Arts;
VI. Agriculture;
VII. American History and Antiquities;
VIII. Literature and Fine Arts;

and in all these classes, except the fourth, made plans for the collection of museum material. Ethnography was grouped by Mr. Poinsett with geography, with which he states that it is "intimately connected, and indeed forming a part of it until it was lately erected into a separate science."

It is worthy of remark that the term "manager,"[1] to designate a member of the governing board, was employed in every bill, except in

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[1] The term regent was undoubtedly suggested by the organization of the University of the State of New York, a term peculiar to Mr. Hough, the mover of the substitute, who was a Representative from that State and who in all probability had been one of the board of regents of that university.

The Hon. W. J. Hough was the first Secretary of the Institution. Having been elected to that office September 7, 1846, he served until the election of Professor Henry, on December 3. Mr. B. B. French was elected assistant secretary, and appears to have served until the election of C. C. Jewett, and at a meeting of the board in December submitted a report for the Secretary.

the substitute which was proposed only a few hours before the final action, and that when the election of the first Secretary was held, Francis Markoe, jr., who had been for six years Secretary of the National Institution and was more than anyone else perhaps identified with its interests, received four votes against seven cast for Professor Henry. Doctor Charles Pickering, the Curator of the National Institution, also received one vote.

The term "curator," as applied to an officer in charge of the national collections, then came into use for the first time.

THE NATIONAL CABINET OF CURIOSITIES.

The formation of a "national museum" was one of the professed objects of Poinsett and his associates in the National Institution, but it does not appear that they ever dignified with that name their collections, which were usually modestly referred to as constituting the "cabinet"[1] of the Institution, both in the constitution and in the proceedings of the society.

In the Hough bill for the organization of the Smithsonian Institution in 1846, the collection in the Patent Office was officially designated as the National Cabinet of Curiosities, a name which, though never in general use, is very appropriate and convenient for use in designating the assemblage of miscellaneous objects for a time exhibited in the Patent Office building.

From 1847 to 1851, however, there was no use of the term National Museum, the collections of natural history which were accumulating under the care of Professor Baird constituting for the time being the "Museum of the Smithsonian Institution."

The National Cabinet of Curiosities, carrying with it a certain official atmosphere, as well as an annual appropriation, was, however, one of the parents of the greater establishment yet to come. Of its marriage with the Smithsonian Museum, the National Museum of the United States was the offspring.

The Smithsonian cabinet of minerals and meteorites was, as we have seen, the first scientific collection which belonged to the United States, coming into the custody of Mr. Rush in June, 1838.

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[1] In 1790 a law was passed by Congress "to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." [Sec. VIII, par. VIII.]

In this was gathered a collection of models, which was sometimes by courtesy called "The American Museum of Arts," but which had no title to the name either by law or by courtesy. This was destroyed by fire December 15, 1836.

In "An act to promote the progress of the useful arts, etc.," approved July 4, 1836, provision was made for the preservation and display, under the charge of the Commissioner of Patents, not only of models, but of "specimens of compositions and of fabrics and other manufactures and works of art." [Sec. XX.]

Of all the expeditions sent out by the Government, none previous to the Wilkes exploring expedition, sent out in 1838, was instructed to bring back collections of natural history.

In the earliest days of our Republic the cabinet of the American Philosophical Society of Philadelphia was doubtless the official museum, and this was enriched by the efforts of the only naturalist President, Thomas Jefferson.

The first exploring expedition, that of Lewis and Clarke in 1803, was sent out by Jefferson, who twenty-three years before, in 1780, began to agitate the question of exploring the unknown West, and who at that time offered to raise 1,000 guineas for the purpose from private sources. Lewis and Clarke returned in 1806, bringing with them some valuable scientific material, zoological and ethnological. Some of the animals appear to have found their way to Peale's Philadelphia Museum. Godman in his American Natural History mentions a sable which had been obtained from this source and was to be seen there in 1823. I have been told that within a few years Indian garments and weapons brought back by this party were to be seen in St. Louis. Pike's expedition, in 1805, the second of the exploring enterprises, yielded little in the way of scientific material. Whatever there was went undoubtedly to the Philadelphia Museum, and in 1808 there were still on exhibition at that place two grizzly bears, which as cubs had been brought by Major Pike from the region of the Rio del Norte and presented by him to President Jefferson, who gave them to Mr. Peale for his museum. Other specimens appear to have found shelter in the University of Virginia, where two sets of antlers brought back by Captain Lewis are still preserved.

In 1820 a third expedition was sent by the General Government to explore the Northwestern Territory, especially the region around the Great Lakes and the sources of the Mississippi. This was under charge of General Lewis Cass, at that time governor of Michigan Territory. Henry R. Schoolcraft accompanied this expedition as mineralogist, and Captain D. B. Douglass, United States Army, as topographical engineer, and both of these sent home considerable collections reported upon by the specialists of the day, most of whom were at that time concentrated in Philadelphia.

The fourth and fifth expeditions were those under Major Long, in the far West; the first, or Rocky Mountain, exploration in 1819–20; the second, to the sources of the St. Peter's in 1823. In the first expedition Major Long was accompanied by Edwin James as botanist and geologist, who also wrote the narrative published in 1823. The second expedition was accompanied by William H. Keating, professor of mineralogy and chemistry in the University of Pennsylvania, who was its geologist and historiographer. Say was the zoologist of both explorations, and the results of his labors went to the Philadelphia Museum.

Mathew Carey

The sixth Government expedition was that by G. W. Featherstonhaugh, in 1834–35, to explore the geology of the elevated country beween the Missouri and Red rivers and the Wisconsin Territories. I have found no record of the disposition of his collections, but it is not improbable that he may have carried them with him to England.

The seventh expedition was that under Lieutenant Wilkes, already referred to as having been sent out in 1838, under the direction of President Van Buren, who seems to have intrusted the plans very largely to Mr. Poinsett, who was the first to urge the formation of a national museum, and to whom was doubtless due the insertion of the clause instructing the officers to preserve and bring back collections in natural history, a precaution which might easily have been overlooked, since the expedition was organized professedly in the interests of the American whale fishery.

It was, perhaps, the fact that there was no suitable depository for collections at the seat of Government that stimulated Mr. Poinsett to immediate action in 1840, when he founded the National Institution, the arrival of these collections from the Pacific being at that time expected.

The purpose of Mr. Poinsett's efforts is shown clearly in his first anniversary address:

> There are many of our countrymen [says he] who, like Sir Hans Sloane, the founder of the British Museum, look forward with regret to the sale and dispersion of their collections, and desiring to have them preserved entire, would deposit them with an institution which will be as stable as the Government that protects it. For these purposes, and especially if it [the National Institution] be intrusted, as we hope it will be, with the specimens of natural history collected by the exploring squadron, it will be necessary that measures should be early adopted to have erected on a suitable site a plain, fireproof building, where the increasing and valuable collections may be displayed, and be examined by the scientific inquirer. We cherish the hope that they will form the foundation of a National Museum, and contribute to spread the light of science over our land.
>
> The exploring expedition [he continued] has already sent home a large collection, which remains packed away in boxes in a room belonging to the Philadelphia Museum, generously loaned by the company for that purpose; and we may anticipate from the ability and well-known zeal of the naturalists who accompanied it, that the squadron itself, shortly expected, will return richly freighted with objects of natural history. I can not believe that, after all the labor, pains, and expense incurred in procuring them, these specimens are not to be brought to Washington to be arranged and exhibited here."[1]

Mr. Poinsett was at this time still Secretary of War, and had the power to effect at least the beginning of what he desired to see done, and one of his last official acts was to persuade his colleague, James K. Paulding, the Secretary of the Navy, to order these collections forwarded from Philadelphia.

In February the Institution was informed "that about one hundred and fifty boxes, the results, as far as have been received, of the Explor-

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[1] Discourse on the Objects and Importance of the National Institution, 1841, p. 50.

ing Squadron's exertions, containing a variety of interesting objects of Natural History, and destined for the cabinet of the Institution, have been shipped at Philadelphia, and are expected as soon as the navigation opens."[1]

Here, again, Mr. Poinsett's prompt action told in the interest of the future national museum. If he had waited till the navigation opened he would have been obliged to treat with the Secretary of the Navy.

The entirely unorganized condition of affairs in Washington and the lack of experience in museum administration is shown by the fact that Mr. W. McGuigan, curator of the Philadelphia Museum Company, thought it necessary to write the following amusing cautionary letter, which was printed in the bulletin of the Institution:

It would be unadvisable to break open the cases containing the articles collected by the South Sea Exploring Expedition, until such period as they are intended to be prepared for exhibition. The immense quantity of arsenic, and corrosive sublimate necessary for their preservation requires imperatively that very great caution should be observed, and that the handling and arrangements should be under either the immediate inspection or personal attention of one fully adequate to all the details connected with this subject.

In the hands of inexperienced persons death might be the result.

W. McGuigan.

Philadelphia, *February 6, 1841.*

Still another step was taken on March 3, 1841, the day before the final adjournment, which I am also disposed to attribute to the forethought and interest of Mr. Poinsett, which was the appropriation by Congress of $5,000 "for defraying the expenses of transporting to the city of Washington and of arranging the collections made by the exploring expedition."

The committee, consisting of Colonel Abert, Mr. Markoe, Mr. Dayton, and Doctor King, appointed under a resolution passed at the stated meeting of the National Institution on the 13th December, 1841, which is in the following words:

Resolved, That a committee of four members be appointed by the Chair to examine the subject of Exchanges, to propose a plan for that purpose, and to report fully thereon to the Institution for its further consideration and action, beg leave, in pursuance of the directions of the said resolution, to report—

That the duty devolved on the committee by the resolution, is, First, to examine the subject of exchanges; second, to propose a plan of exchanges; and, third, to report thereon to the Institution. In reference to the first point, viz: "the examination of the subject," the committee state that they have examined the subject, and that the result has been a full conviction of mind that a system of exchanges is of very great importance in the accomplishment of one of the primary objects for which the National Institution has been declared to be formed, viz: "the establishment of a national museum of natural history," etc. Exchanges enter essentially into the plan of every society constituted as the National Institution, and having like objects in view; and no occasion has been omitted to acquaint societies and individuals, whose correspondence has been sought by or offered to the National Institution, that

[1] Proceedings of the National Institution, 1st Bull., p. 48.

a system of general exchanges would be entered upon as soon as the Institution should be able to mature a plan for that purpose. Under this assurance, and independently of it also, it should be added, valuable collections of various kinds have already been received by the Institution, which is thus already placed in a position which makes it incumbent on us to redeem the pledge that has been given. The committee consider it superfluous to dwell upon the advantages of exchanges; but they wish the members to know that for this object they have already in hands the most abundant materials—materials which are increasing and will continue to increase every day. These materials consist of contributions made by members, by individuals who are not members, by societies and institutions at home and abroad, and by foreign governments, as well as of those accessions that have been made by the Exploring Expedition, which has already sent home an inexhaustible quantity and variety of duplicates. It is well known to the Institution that the collections received from all these sources are equally and absolutely the property of the Government, and that therefore the permission of the Government is indispensable to enable the Institution to part with the duplicates derived from all these sources. This permission, it is believed, will be cheerfully accorded. At the same time the committee, for obvious reasons, do not think it proper to ask the Government to allow the Institution to part with any of the duplicates of the Exploring Expedition, until the squadron, shall have returned.

In reference to the second point, viz; a plan of exchanges, the committee do not feel called upon or competent to enter into details. These must be left in a good degree to those whom the Institution may see fit to charge with the execution of the plan, in which of course they will be governed by the practice of other institutions, and by such regulations as it may become expedient to adopt from time to time to suit our own convenience and peculiar circumstances. Here, however, on the threshold of the plan which the committee mean to propose, they regard it of consequence to suggest for the sanction of the Institution, that in exchanges of all kinds, the natural productions of our country shall first and always have a decided preference. A great and leading design of the National Institution is to explore and develop our own resources, and to study and describe the natural history of the United States. To this end our exertions must principally be directed. It should be the pride of all connected with or interested in a *National* Institution to see every State in the Union fully represented in a National Cabinet, established at the seat of Government. This method, while it recommends itself to us and our interests, is calculated to extend benefits and encouragement to the societies and naturalists of our own country, who will thus have a central depository, from which they may enlarge and vary their own collections; and thus, also, in due time, the duplicates of the Exploring Expedition may, with the greatest advantage, be diffused throughout the land, thereby fulfilling, in the amplest manner, the intentions of those who projected, and justifying the liberality of the Government which sanctioned that noble project.

With these preliminary remarks, and under the restrictions which are embraced in them, the committee recommend—

First. That a system of exchanges be entered upon without delay.

Second. That the Curator and assistants be directed, for this purpose, to separate all duplicates, except those from the Exploring Expedition; and that they select and label such specimens as are to be sent to individuals or societies.

Third. That the first step taken be to discharge the obligations of exchange already incurred by the Institution.

Fourth. That a committee be appointed, to whom the Curator shall submit all sets of specimens thus set aside for any given exchanges, who shall decide upon the equivalency, before said specimens shall be boxed up and sent off.

Fifth. That in all cases of difficulty which may arise, reference must be made to the President or Vice-President of the Institution for decision, who will, if they conceive it necessary, submit the question to the Institution.

Sixth. That a book be kept by the Curator, subject at all times to the inspection of the committee, in which must be noted the contents of each box or package; lists of the articles for which they are the equivalents; the name and place of the society or individual to whom one set is to be sent, and from whom the other has been received.

In what the committee have now submitted, they conceive that they have done all that it was possible or necessary to do at present, in reference to the third point of the resolution, viz: "reporting fully on the subject;" although they are perfectly sensible that in their report they have presented the subject in the most general manner, believing that experience and practice alone will enable the Institution gradually to settle upon a complete system. The committee beg leave to add, that the present report is not to be regarded as final, but that it is submitted, with all due deference to the Institution, to use the concluding words of the resolution, "for its further consideration and action."

Shortly after this, on March 8, in order to provide for the reception of these collections, Doctor Henry King[1] was elected curator of the National Institution, the first in Washington to bear an official title which has since been the designation of a goodly number of worthy workers in science.

The curator, although an elective officer of the Institution, received his pay from the Congressional appropriation already referred to, an arrangement not unlike that which prevails to this day in the National Museum, where the officers, chosen by the Smithsonian Institution, are paid by the General Government.

The collections arrived some time in March, and in response to its request Mr. Badger, the newly made Secretary of the Navy, placed them under the care of the National Institution, and in April, as we learn from the unpublished letters of the curator, the taxidermists were preparing about fifteen bird skins a day, a rate of speed which quite explains the atrocious condition of the preparations which have come down to us from those days of the infancy of the National Museum. In May additional collections, brought by the ship *Suzanne* to New York and thence transshipped by the schooner *Palestine*, were received in Washington.

A new danger now threatened the integrity of the collections, which was that the curator found many of the boxes "marked in such a

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[1] Henry King, M. D., was a geologist and mining expert who had been a resident of Missouri, who had lately been employed in an exploration of the lead mines of the West, and who at this time was employed by the War Department in Washington. He was the author of a manual of Directions for making Collections in Natural History, published in 1840 by the Institution, the first part of a long series of pamphlets of scientific instructors, printed at the capital. [1840. King, Henry. Directions for making Collections in Natural History. Prepared for the National Institution for the Promotion of Science; by H. King, M. D. Washington. Printed by Gales & Seaton. 1840. 8vo., pp. 1–24.]

Doctor King was elected curator March 8, 1841, and held the office until September 12, 1842, when he was succeeded by Doctor Charles Pickering.

SAMUEL DE CHAMPLAIN.

manner as to indicate that they belong to and are claimed by private persons,'' these constituting a large part of the whole.

Here, again, Mr. Poinsett had foreseen and provided against the danger, having instructed the curator, on a previous occasion, to pay no attention to private marks on collections received from a Government expedition.

The question was submitted to the Secretary of the Navy, who at once replied that, in his opinion, ''all specimens collected by officers attached to the expedition belonged solely to the United States.''

In April, 1841, the collections and library of the Institution were installed in the new Patent Office building, where they remained until removed to the Smithsonian, in 1857.

Extensive plans were made for a system of international exchange, and a committee formulated the policy of the society in an elaborate report.

Another Government collection soon came in consisting of the minerals and geological specimens gathered by David Dale Owen, during his survey under the direction of the United States General Land Office, also a collection of ''Indian portraits and curiosities,'' transferred by the Secretary of War, and the Smithson cabinet, books and minerals, deposited by the Secretary of the Treasury, and a bill was passed by Congress, less important by reason of the appropriation of $500, which it makes, than from the fact that it justifies the Secretaries of War and of the Navy in transferring collections in their possession to the Institution.

On the 1st of January, 1842, a letter was written by a committee of the National Institution to the Secretaries of War and the Navy.

In February, 1842, another important paper was presented to the Institution by the same committee—important as marking the beginning of the system of exchanges and distribution of duplicates which had for nearly forty years been so important a feature of the work of the National Institution.[1]

With the exception of the papers already alluded to, which had reference to the relation of the society to the Government and to the Smithsonian bequest, the bulletin of proceedings from this time on contained little more than the record of the receipt of donations of specimens and of letters asking information or proffering advice. The society retained the control of the exploring expedition collections, and in June, 1842, Lieutenant Wilkes having returned to Washington, he, at three successive meetings of the Institute, gave a history of his voyage and its results. He was at first subjected to some opposition, and until after a court-martial, held in New York in August, seems to have been disposed to say very little. He, however, wrote, under date of July 16, 1842, a

[1] This is printed in Note A from the manuscript report in the archives of the National Museum.

letter[1] to Senator Preston, in which he indignantly protested against the manner in which his officers and men had been received on their return.

When he was restored to favor and influence, he at once took steps to gain control of the collections made by his squadron, provisionally under the charge of the National Institution, with results to be studied later.

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[1] This letter, now in the archives of the Museum and never published, is of so much interest historically, that after the lapse of nearly fifty years it is printed, in the certainty that its harsh significance has all vanished.

WASHINGTON CITY, *16th July, 1842.*

MY DEAR SIR: Agreeably to your desire, I hasten to give you the information relative to the remaining duties of the Expedition, and that are *absolutely* necessary to carry out the intention of Congress in passing the Act authorizing the Expedition, viz, "for the promotion of the great interests of Commerce and Navigation, and to extend the bounds of science and promote the acquisition of knowledge."

For the accomplishment of these great objects, there was required persons to attend to the different departments of science, and the following was the organization which I proposed, and was adopted by the Government, and the most economical one that could have been arranged to carry out the great views intended, and that the accommodations of the vessels would permit, viz:

The Departments of Astronomy, Hydrography, Magnetism, Meteorology, and Physics, including the Experiments with the Invariable Pendulum, was confided to myself with the officers under my command as assistants, besides the above I was charged with the History or Narrative of the Voyage.

This at once greatly reduced the Scientific Corps which had been organized, viz, from 23 to 9. I felt the Navy was justly entitled to all these departments, embraced as they were within the limits, or scope of the profession, and that they ought not to be attached to such an undertaking, to act as the "hewers of wood and drawers of water," as was the case in its original organization.

Charles Pickering and Titian R. Peale, naturalists; Horatio Hale, philologist; James D. Dana, geologist; William Rich, botanist; William Brackenridge, horticulturist and assistant botanist; Joseph Drayton and Alfred Agate, artists; J. P. Couthouy, conchologist, who was with the Expedition until the end of November, 1839, after which period his duties were divided among the rest and successfully performed. These formed the nine; to these was added a mechanic for the repair of instruments and their proper preservation.

In all the above departments much remains to be done; indeed, I view the services of the above gentlemen as necessary now, and even more so than at any other period of the cruise, nor can their services be dispensed with, or the work concentrated, without great loss to the Expedition, and the reputation of the country. For my own departments I require the services of Mr. Stewart, who was a clerk in the Expedition, but whom I have made hydrographical draughtsman, and some few of the officers, who have been my principal assistants. Mr. Stewart will be enabled also to assist me in my copying, etc. He is one of my own scholars and is now engaged in the duties assigned him.

I truly regret that anything should have occurred to dampen the ardor of those who are attached to the Expedition, and absolutely necessary to the bringing out the results. The ardor that has been felt during the cruise has been all-important to our success, and has been in every way encouraged by me, and I did hope that it would have been kept alive until all had been accomplished. The reputation of our country is at stake, and if what has been attempted and succeeded in, is not now finished

In September, 1842, Doctor Charles Pickering became curator. He had been a member of the Wilkes exploring expedition and was occupied during his connection almost entirely in the work of unpacking and arranging its collections.

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from any motive of economy, or derangement of the organization all will be ruined, and we shall become the laughingstock of Europe, and all the praise that has been lavished on our Government for its noble undertaking prove but "satire in disguise."

What will be the reputation of those who have had the ordering of things since its return, on their becoming known on the other side of the waters? For the reception of myself I can easily account; but that of the officers and crews is truly unaccountable, particularly the want of any expression of thanks from the Department to the latter on their discharge; it was felt by every officer and remarked by every man. On minor duties I have been gratified by it formerly, and I have with pleasure seen its effects upon many of the men that formed a part of the crews of this Expedition when on other service with me; I have urged it all in my power, but without effect; every day develops some new opposition to the Expedition. I am aware you think I want cause for this opinion; perhaps I am mistaken, but I can not but feel myself bound up in it; indeed it would be strange if I was not, and I must say it is heartsickening to me to hear those who have shared its dangers and troubles complaining of a want of attention and courtesy, and exhibiting the unceremonious discharges from their duties, with little or no prospect of consummating the labors in which they have been engaged for the last four years, and before they have even seen their families. Some are suffering under sickness contracted from their exposure in the service of their country. They are now suddenly cut off and destitute of support for themselves and families. These facts are well known. Such treatment is without precedent in the service of this, or any other country.

Contrast our Expedition with those of the French and English engaged in the same service, and at the same time, honor and rewards are heaped on all at and before their return. Examine our results, compare them with theirs, contrast us in every way with them you please, or with Expeditions that have gone before us, and then ask if we have not reason to feel mortified.

Do not misunderstand me. I ask nothing for myself at present, and will not as long as this mist hanging over me exists, but which any fair and candid examinations into my actions and conduct would have long since dissipated; neither do I ask impossibilities or undeserved praise; no greater punishment can be inflicted on the head of one who receives it. But I would ask: Is it not fully apparent and placed beyond cant that the men of the Expedition have done their duty, and did deserve the thanks of the Department before they were disbanded? It was openly complained of when they were paid off.

I have greatly to complain of the course the Department has pursued towards myself, but I forbear to touch on this subject at present.

In conclusion, my dear sir, I beg you will excuse this long letter and its tone. Whenever these subjects are brought to my mind I feel it acutely. All I do hope is that, for the credit of the Expedition, the honor and reputation of the country, you will not lose sight of what ought to be done. Fully confident I am that there is no subject in which the reputation of our country is so much at stake as the development of the results of the Exploring Expedition and on which its conduct will be so closely scrutinized abroad. I have the honor to be, with great respect,

Yours, most truly,

CHARLES WILKES.

Hon. WM. C. PRESTON, *Senator, U. S., Washington.*

In the meantime, in February, 1842, Doctor J. P. Couthouy, one of the naturalists of the expedition, having been detached from duty by Captain Wilkes, was employed by the committee of the Institution to aid in the work upon their collections, and in September Mr. W. D. Brackenridge, horticulturist of the expedition, was also taken upon the Museum staff and given charge of the plants,[1] and a little later Professor James D. Dana seems to have been given charge of the arrangement of the geological and mineralogical collections, not only of the exploring expedition, but of the Institution cabinet, including the Smithson, Owen, Locke, and Totten collections, and Horatio Hale was performing a similar work upon the ethnographical collections of the Institution, which he reported upon as "chiefly from the exploring expedition."

The force at this time engaged upon the national collections, under the direction of the National Institution, consisted of Doctor Charles Pickering, principal curator; J. P. Couthouy, J. D. Dana, Horatio Hale, and W. D. Brackenridge, curators and assistants, and J. K. Townsend and John Varden, assistants. Thomas Nuttall, the well-known botanist, had in 1841 been engaged upon the herbarium, but had now gone away.

Here, then, in 1842, we find a strong Museum force at work on the collections, a force fully as effective thirty years later, in 1873, when the writer first became acquainted with the operations of the Smithsonian Institution.

The report prepared by them at the end of the year 1842 was essentially the second official report upon the national collections, and since it has never been published, it is printed in Note B, at the end of this memoir.

At the meeting of September 12 a resolution was passed in these words:

Resolved, That a committee be appointed to wait upon the Secretary of the Navy, and upon the joint committee of the Library of Congress, and to proffer to them the cooperation of the Institute in carrying into effect the intentions of the law lately passed by Congress, for the arrangement and preservation of the collections made by the Exploring Squadron, and for the publication of the results of that Expedition; and that this committee be authorized to act in the name and behalf of the Institute in all matters relating to this subject.

In reply to the letter transmitting this resolution, the following letter was received:

NAVY DEPARTMENT, *September 17, 1842.*

SIR: I have received your letter of the 15th instant, transmitting a copy of the resolutions of the National Institute passed on the 12th instant, in relation to the arrangement and preservation of the collections made by the exploring squadron, and informing me that Doctor C. Pickering had been unanimously elected curator of the Institute.

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[1] Mr. Brackenridge, on the return of the expedition in 1842, brought the live plants and seeds to Washington, and there being no place for their reception hired a greenhouse and cared for them, apparently on his own responsibility, for several months. Eventually they were provided for at the Botanic Garden about 1859, after having been for many years kept in greenhouses in the rear of the Patent Office.

PIERRE FRANÇOIS XAVIER DE CHARLEVOIX.

I shall be happy to receive the suggestions of the committee as to the proper course of proceeding.

I am, respectfully, your obedient servant,

A. P. Upshur.

Garrett R. Barry, Esq.,
Recording Secretary National Institute, Washington.

In the meantime a change in the status of the Government collections had been effected by the passage of an act of Congress, August 27, 1842, providing for the publication, under the supervision of the Joint Library Committee, of an account of the discovery made by the exploring expedition, the third section of which was as follows:

That until other provisions be made by law for the safe-keeping and arrangement of such objects of natural history as may be in the possession of the Government, the same shall be deposited and arranged in the upper room of the Patent Office, under the care of such persons as may be appointed by the Joint Committee of the Library.

By act of August 4, 1842 (Stat. V., 501), the sum of $20,000 had already been appropriated for the transportation, preservation, and arrangement of these collections.

In the charter of the National Institute, passed a month before, there was a provision that all trusts "are vested and confirmed to the said corporation," and the supporters of the Institute were disposed to urge that this was applicable to the collections of the "exploring squadron," at that time in the custody of the Institution. The question did not come up in a troublesome way at this time, for the Library Committee, at that time unfriendly, simply confirmed the choice of curator made by the National Institute, and appointed Doctor Pickering to the position, Doctor Pickering being thenceforth subject to the Congressional committee, and only by courtesy acting for the National Institute.

Trouble was brewing, however, for it was evident that the links binding together the interests of the National Institute and the exploring expedition were not very tenacious. There was in fact no legal authority for the agency of supervision which the Institution was now exercising, the whole being the outgrowth of a very informal understanding between two or three successive Secretaries of the Navy and a committee of the Institution "appointed to correspond with the Departments of Government."[1]

This committee, composed of two of the most active directors and the corresponding secretary, soon began to perform the functions of a general executive committee—no doubt with the sanction of the society, but without direct authority.

The recent acts of Congress had taken the control of the collections away from the Navy Department, by whose act alone they had been placed in charge of the Institute. The committee of the Institute still believed itself responsible in an advisory way for the disbursement of the appro-

[1] Proceedings of the National Institution, 2d Bull., p. 71.

priation, but soon found expeditions in progress of which they had no knowledge. The committee filed a protest with Mr. Poinsett, their president, who seems to have at once taken steps to secure the only possible relief from the embarrassment—that of special legislation.

The following bill was accordingly introduced in the Senate by the Hon. Robert J. Walker:

A BILL for the preservation of the collections of natural curiosities furnished by the exploring squadron, and from other sources.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the board of management of the National Institute be, and is hereby, invested with the custody of the specimens of natural history, and other curiosities, which have been received, or which may have been received, or which may hereafter be received, from the exploring squadron, and from other sources, with authority to make all necessary arrangements to preserve and exhibit the same, to regulate the number and compensation of persons employed on said duty, and to superintend the disbursements relating thereto.

And be it further enacted, That the said board is hereby authorized to exchange any of the duplicates of said collections with other institutions, or with State authorities, or with individuals.

At the request of Senator Walker two of the members of the committee had drawn up a statement of the relations which they deemed it desirable to have established between the Institution and the General Government in respect to the national collections. This statement was submitted by Senator Walker, not as an official document emanating from the Institute, but with the heading "Remarks submitted by Mr. Markoe and Colonel Abert to the Hon. Mr. Walker." This was certainly an unfortunate form of introduction to Congress, and the opponents of the National Institute made the most of it. The bill with the accompanying statement was referred to the Joint Committee on the Library, and on the 28th of February was made the subject of a report presented by Senator Tappan,[1] in which he ridiculed the idea of placing the results of a great Government expedition in the hands of a "private corporation," and advised members of the National Institute to disabuse themselves of the idea that regular appropriations would ever be made for its benefit. "The case presents," he remarked, "two officers of the Government, one the head of a bureau, the other a clerk in one of the public offices, who ask as a matter of right that they should have the supervision of a very important literary and scientific work, the publication of which Congress has thought proper to intrust to one of its regular committees." The recommendation of the committee was that the responsibility of this work remain in the hands of the Joint Committee on the Library, where it had originally been placed by law. Senator Tappan's attack was evidently based upon a partial misunderstanding of the views of the members of the National Institute, who simply asked the custody of the collections and the authority to supervise their arrangement. Colonel Abert and Mr. Markoe were indignant at the injustice,

[1] Senate Document 233, see note D to this paper.

and addressed to Senator Walker a letter in further explanation of their views.

This letter, with the comments upon it by Senator Walker and Senator Preston, is printed in a note appended to this memoir,[1] accompanied by a hitherto-unpublished letter from Senator Woodbridge, of Michigan, who, as a member of the committee, was able to explain the real significance of its action.

All of these papers are given in a pamphlet[2] published at the time, which is, however, now exceedingly rare and almost forgotten.

The versions of the papers here given are for the most part from the originals or verified copies in the archives of the National Museum.

Senator Tappan's speech and the subsequent action of Congress did much to undermine the foundation of the Institute, which was evidently scarcely solid enough to sustain the structure which it had been proposed to rear upon them.

After this it was inevitable that there should arise conflicts of authority, and they were not slow in coming.

It is possible that they were precipitated by Captain Wilkes, who naturally may have felt some irritation at the manner in which the control of the collections made by his expedition were taken out of his control, while he himself was for a time under charges.

The Commissioner of Patents, too, seems to have been irritated by the occupation of a hall in the Patent Office controlled by alien authority.

In July, 1843, Doctor Pickering resigned his curatorship, and the Library Committee, now hostile and acting in the spirit of their report, made use of the authority vested in them by the act of August 26, 1842, and appointed to the custodianship of the Government collections the Commissioner of Patents, Mr. Ellsworth, and in August placed Captain Wilkes in special charge of the gatherings of the exploring expedition.

The action of the committee does not appear to have been known to the officers of the Institute except by rumor, but they were left to find out the change of policy by an unpleasant series of experiences.

The first serious friction was in connection with Captain Wilkes. Its character is shown by the following correspondence, which is here printed on account of the new light it throws upon the condition of the National Cabinet of Curiosities in the years 1843–44 and upon the otherwise inexplicable circumstances which led to the collapse of the National Institute shortly afterwards:

LETTER FROM COLONEL ABERT TO CAPTAIN WILKES, SEPTEMBER 5, 1843.

DEAR SIR: Reports of a painful character, involved in the questions of the inclosed letter, have reached the ears of many of us, and I have been urged as chairman of the committee having charge of these matters to bring them before the

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[1] Note E, I, II, III, IV.

[2] 1843. [Abert, John J., and Francis Markoe, jr.] Reply | of | Colonel Abert and Mr. Markoe | to the | Hon. Mr. Tappan | of the | United States Senate. —— Washington, —, Wm. Q. Force, printer. | 1843. | 8 vo. pp. 1–18.

Directors. But I refused, on the ground that I would not be the medium of bringing forward misunderstood or exaggerated facts, for discussion or action, preferring the course of the inclosed letter, as it will procure the desired information from the best authority and under its true aspect. It seems to me that the Institute is the last which should receive unkindness from anyone whose fame is connected with the results of the exploring squadron, for without the interference of the Institute where would these results have been; and without its future care what will become of them, for what other body in whose care they can be placed has a permanent domicile at Washington.

J. J. ABERT.

Capt. WILKES.

LETTER FROM COLONEL ABERT TO CAPTAIN WILKES, SEPTEMBER 5, 1843.

SIR: It is contemplated soon to have a meeting of the Directors of the National Institute, at which matters of much interest to the Institute will be brought up. Understanding that you have been placed in charge of the room in which both Institute and ex. [ploring] expedition curiosities are deposited, and anxious that at our meeting the Directors should be fully and correctly informed, allow us to beg of you the favor of an early answer to the following queries:

1. Have directions been given to remove the property of the Institute and that under its care, except exploring expedition specimens, from the room in which they now are or from the cases in which they have been deposited, or are such directions contemplated?

2. Are the persons employed at the room and paid by the U. S. prohibited from bestowing any attention upon any other than ex. [ploring] exp. [edition] specimens, from opening the boxes of presents sent to the Institute, cleaning, arranging, and attending to the same?

3. Will any of the persons employed at the room and paid by the U. S. be allowed to bestow any of their time and talents upon the preservation and arrangement of the collections, except those of the ex. [ploring] squadron?

4. Can the Institute count with sufficient certainty upon the services of any person so employed so as to invest him or them as curators or assistants with the requisite authority from the Institute?

You will readily perceive the importance of these questions to the Institute, and how eminently they invoke the security and preservation of the valuable and extensive collection under its care; you will, therefore I hope, pardon us in the request of an early answer.

J. J. ABERT.

Capt. CHARLES WILKES,
U. S. Navy, Washington.

LETTER FROM CAPTAIN WILKES TO COLONEL ABERT, SEPTEMBER 16, 1843.

WASHINGTON CITY, 16 *Sept., 1843.*

MY DEAR SIR: Your friendly letter was received on my return to the city after a short absence, which will account for your not having an earlier reply.

I can not acknowledge any right in a committee of the Nat. [ional] Ins. [titute] to call upon me for any explanations whatever relative to my official duties or actions, particularly when such a call is based upon (as you inform me) "painful reports" of which I have no knowledge and little regard, and can not help expressing my astonishment that any members of a scientific society should have given credence to them, to have authorized an action on the part of one of their committees before they had ascertained that they were true.

DeWitt Clinton

I can not but admire your course in refusing to act, or be the medium of bringing them forward for discussion or action before an appeal was made to the best authority. I therefore feel much pleasure in answering the questions as coming from yourself, and do it particularly with a view that you may communicate it to any of the gentlemen, your associates, who may have been instrumental in getting up and giving currency to the reports which you inform me are in circulation.

1st. The law places the collections of the United States Exploring Expedition in the upper hall of the Patent Office building and under the care of the Joint Library Committee of Congress for the purpose of arranging the whole for description, publication, and exhibition. The Library Com[mitt]ee have appointed me to superintend them to this end. In pursuance of my duties the whole is undergoing arrangement. When I took charge on the 1st of August a few specimens and articles were pointed out to me as belonging to the Nat[ional] Inst[itute]; those have not been disturbed further than became necessary in the arrangements, and an equal care has been bestowed upon them that others have received.

2d. All the persons employed and paid by the Government are required to devote themselves entirely to the Government work; when there is no longer employment for them, or they do not give satisfaction, they will be discharged. It is believed that their time is now fully employed, and that their duties require all their time and talents to be devoted to the collection of the Expedition in order to perform them to the satisfaction of the Library Committee and myself. They are under the same system as if employed elsewhere by the Government. From this it follows that their time and services for which the Gov[ernmen]t pays can not be devoted to or divided with any incorporated association.

Although believing that the above embraces an answer to all the enquiries made of me I will go further and assure you that there is every disposition on the part of the Library Com[mitt]ee of Congress and myself to have the few things belonging to the Nat[ional] Inst[itute] that are now in the hall taken care of, and due notice will be given to the Institute should the little room they occupy be required for collection of the Exp[loring] Exp[e]d[ition], which it is now confidently believed will entirely fill the hall when they are fully arranged. I will now close with a few words respecting the last clause of your letter relative to my feeling any "unkindness" towards the Nat[ional] Inst[itute]. It is rather improbable that any unkindness or hostility should exist on my part considering that the labour of the Expedition, combined with the exertion of your gifted president (Mr. Poinsett), were the origin of it, and that in all probability it may one day become the depository of the large and valuable collection of the Exp[lorin]g Expedition, therefore I can not but feel deeply interested in its welfare—everything compatible with the performance of my public duties will always be done to accommodate and assist its rise and progress.

Believe me, with great respect, your obt. svt.,

CHARLES WILKES.

Col. J. J. ABERT,
U. S. Corps Top. Engrs.

LETTER FROM COLONEL ABERT TO CAPTAIN WILKES, SEPTEMBER, 1843.

DEAR SIR: Your letter has been duly received. As well for our own justification and for your satisfaction, I will go into some length in a reply.

Abstractly speaking, there may be no right in the Institute to enquire into the course of your official action, but if under any circumstances this action be hazardous to the property of the Institute, or to that deposited and placed under its care, there can be no doubt, I think, that the Institute has a right to enquire if such be the case and why.

You can, if you choose, give us a very short reply—that what you have done was in the execution of your official duties, for which you can account only to your official superiors. Yet, nevertheless, the Institute would have the right to make the enquiry and to expect an answer of some kind. But allow me to call your attention to the reflection that it is in your civil relation of an agent of the Library Committee in which you are now temporarily acting, and it is only in that capacity that any accountability can attach to you, or that any was supposed by the committee of the Institute to exist.

As an officer of the Navy you can not now be acting; your course is not by virtue of your commission or rank in the Navy, or orders from your constitutional or legal superiors, or of any duties connected with your profession. No official responsibility can exist between Capt. Wilkes, of the Navy, and the Library Committee, or official penalties be incurred by a neglect of its directions. Your position, if I understand it correctly, is by virtue of the authority in the Library Committee to place the collection under the care of such persons as they may appoint. The executive or the constitutional superior of the Army, as well as Navy, were it to assign you to a ship to-morrow, you would have to go and abandon the care assigned to you by the Library Committee, which shows, I think, that it is not the official relations of the offices which are involved in your present position. Dr. King once had the place, then Dr. Pickering, to whom you succeeded. Both of these gentlemen were civilians, and as you succeeded them in your present place it is clear, I think, that it is not in any official relation which Capt. Wilkes can claim, or to which he can be assigned, that he is now acting, but in the civil relation of a person appointed by the Joint Library Committee to take charge of matters the publication of which has been made a duty of that committee. I make these explanations of our views that you may feel relieved from the supposition that we had the most remote idea of encroaching upon your official rights, for which I assure you, as well as for your well-established professional abilities, we all entertain the greatest respect.

The specimens of the Exploring Squadron are to be deposited and arranged in the upper room of the Patent Office. This, however, does not, we think, give the exclusive possession of that room for that purpose unless such exclusive possession be necessary. Whether it be or not, I am willing to admit, is the right of the Library Committee to decide, and if they so decide others must give way. The sign lately put over the door would seem to indicate that such decision was in contemplation. The Institute has also possession of part of that room, of the eastern half, by direction of the Secretary of State, under whose care the whole building was then placed. The Institute has property there of great amount and, in our judgment, of great value, and if it has to move its property, by virtue of a decision by the Library Committee, the courtesy of notice from the agent of that committee is not, I think, too much to expect, and our right to enquire if we shall have to move should be viewed as a duty on our part as the curator of so much property. I assure you the enquiry was made with these impressions only. Your assurance that notice will be given if we should have to move leaves us satisfied in this respect.

All that belongs to the Exploring Squadron is under the care of the Library Committee or its agent. But the Institute is a legal body, regularly chartered with defined rights over its property, gifts, and deposits. (See law of 27 July, 1842.) Now, what is this property? Gifts and deposits from members, from foreign governments, from distinguished foreigners, from our diplomatic agents, from foreign societies, from domestic societies, from departments of our own Government, from our own citizens. In a word, all the property in the room, except that of the Exploring Squadron and that of the Patent Office, which (Institute) property, unless I am very much mistaken, far exceeds the impression you have of it, and judging from some remark about the few things of the Institute.

Now, this property requires care, watching, and cleaning.

I have at this time in my office twenty-four cases of the most valuable specimens sent from Asia and Mexico to the Institute which we have not sent up, because we were informed they would probably not be received, and would certainly not be allowed to be opened and exhibited, as some 60 boxes or more of Institute specimens are now in the room unopened and unattended to. Surely it was proper that such matters should be inquired into if only for the future government of the course of the Institute. We can not be without anxiety for our valuable collection nor unmindful of our obligations to preserve it.

I feel satisfied you will see with me only matter of lamentation in such a state of things. Science and national pride must bitterly regret any seeming necessity for it. All the labor, all the contributions, from whatever branch of service, civil, diplomatic, navy, military, are for the scientific reputation of our common country, and a hearty union of all is necessary to form a good collection. Deprive it of the charm of being National, deprive it of that halo of interest with which the name National has already covered it, and it will soon cease to increase, will be no longer worthy of a thought, and will rapidly degenerate to the insignificance of a local collection.

Such are at least my views, and such were also the views which brought the National Institute into existence, when about eight of us had our first meetings at Mr. Poinsett's. We then digested a scheme in which we thought all persons could unite, because it was National; which all parties could befriend, because it was National; to which all conditions and branches of service could contribute, because it was National; to which the Government might extend its patronizing hand, because it was National, because it aided and elevated the National character, and because it would furnish a broad platform of National feeling, upon which all parties, all sects, all conditions of life could, on principles cherished by all, meet and unite in erecting a temple to National fame. And how charmingly have we gone on; look at our great accumulations for so short a time, and yet it is all but a good beginning; look at the feeling which exists throughout our country and throughout the world in our favor, evidenced by contributions and letters from all quarters, and then ask the question whether to aid or to embarrass a design so glorious and so free from objections will give the most individual fame?

But we must know our condition, and what we have to depend upon. It is essential that we should, and you, as the agent of the Library Committee, are the only person from whom we can obtain the desired information. Therefore, of necessity, we had to address ourselves to you, and if I understand your answer correctly it is: That you do not consider yourself at liberty to allow any of the persons receiving pay from the United States to give any of their time or attention to the affairs of the Institute, to overhaul or arrange or look after its specimens.

Both of your predecessors, Dr. King and Dr. Pickering, were also, with the approbation of the executive, Curators to the Institute, and gave some attention to its affairs. We did not, of course, expect that you would take a similar trouble upon yourself, and one question in my previous letter was to ascertain if you would allow any of those under you to attend to the Institute collection and property. I understand you also as thinking this beyond your power. Under these circumstances the Institute must act, and promptly, or its valuable collection will be injured. The board of management will soon meet and the matter will be brought before them.

If in anything I have misunderstood you, I beg that you will not delay to correct me, for be assured that I have no desire to put anyone in the wrong, and least of all the eminent commander of the Exploring Expedition.

J. J. A.

Soon afterwards a more serious conflict of authority began—this time with the Commissioner of Patents, who was actually the official guardian, not only of a portion of the collections, but of the hall in which the entire cabinets, both of the society and the Government, were lodged.

The correspondence referred to in Mr. Ellsworth's first letter evidently related to the great mass of native copper of the Ontonagon (still a prominent feature in the National Museum), which the Secretary of War had placed in the custody of the Institute at its meeting in October previous. Mr. Ellsworth was evidently bent upon dislodging the National Institute from the Patent Office. To effect this he pursued the not altogether ingenuous course of belittling the Institute, its work, and the extent of its cabinet, and laying claim to the official possession of more important collections of models, fabrics, manufactures, which, in accordance with the act of 1836, reorganizing the Patent Office, he designates as the "National Gallery," a name which he also applied to the great hall in which all the collections were deposited.

The Commissioner of Patents was evidently legally in the right, and the Institute found itself bereft not only of its command of Government collections, but also of its hall.

The correspondence is here printed.

LETTER FROM THE COMMISSIONER OF PATENTS TO THE SECRETARY OF WAR, DECEMBER 7, 1842.

PATENT OFFICE,
Washington, December 7th, 1842.

SIR: I have the honor to acknowledge the receipt of a letter from the Secretary of War of the 2d inst., communicating the information that my letter to his Department of 1st inst. had been referred to a committee of the National Institute for answer.

Permit me to enclose a copy of the correspondence with said committee. I have ventured to say in my reply that I did not believe their letter to myself had met your approval.

The Hon. Sec'y will imagine my surprise at the letter of the committee when he is informed that the Commissioner of Patents has the custody of the Patent Office building; that he holds a special appointment under the Joint Committee of the Library to take charge of all the property of Government mentioned in the act of August 26, 1842, and more especially as the National Institute has omitted to appoint a Curator to protect the other articles received from the War and Navy Departments, or even their own effects in this building since July last, and hence the care has devolved upon myself as an act of courtesy if not of duty.

Under these circumstances, and having interested myself in the exhibition of the copper rock at the seat of Government, I offered to take charge of it, under the direction of the Secretary of War, if he desired it.

The disappointment expressed by many members of Congress at not finding this beautiful specimen in the National Gallery prompted me, at the date of my letter, to make, as I hoped, a respectful offer to the Hon. Secretary of my services. Nor would I have replied to the committee had I not supposed that silence might seem to admit that I had been guilty of great presumption.

Let me add that I am a member of the Institute and cherish its welfare.

I remain, with highest respect, your's, obediently,

H. L. ELLSWORTH.

HON. J. M. PORTER,
Secy. of War.

Geo. H. Cook

LETTER FROM COLONEL ABERT TO THE COMMISSIONER OF PATENTS, DECEMBER 5, 1843.

WASHINGTON, *Dec. 5, 1843.*

SIR: The honorable Secretary of War has referred to the committee of the National Institute your letter of the 1st inst.

Being uninformed by any law or regulation of the existence of a "National Gallery" or of any other collection under your care than the Models of the Patent Office, you will pardon me if I do not fully appreciate the views or reasoning of your letter.

At one period, by order of the Executive, the upper room of the Patent Office was made the place of deposit for the effects of the "National Institute," a society known to our laws and regularly chartered by Congress. This room thus became the Hall of the Institute. In this room the Institute has deposited the collections from the exploring squadron, and those from all other sources which were placed under its care by order of the Executive. But from a supposed necessity, Congress vested the care of the deposit from the exploring squadron for the purpose of preparing an account of it, in such person as the Joint Library Committee should appoint. This committee appointed Capt. Wilkes, of the Navy, for that purpose, who is now exercising the functions of his office, and who may with propriety be considered as in the regular official possession of the room.

In all this one sees nothing of the Patent Office or of any "National Gallery" or of any charge direct or indirect of the Patent Office over the deposits referred to. If therefore by "National Gallery" is intended to designate the room in which are now placed the deposits of the Institute and of the exploring squadron, it is not a room over which the head of the Patent Office can exercise control.

By a law of the 20th July, 1840, the Secretaries of the War and Navy Departments were placed in charge of the specimens of Natural History, received and to be received by them, and funds were appropriated for their preservation. These officers have deposited such articles as were then in their possession, and such as have since been received in the care of the National Institute, as that law and the practice under it are considered as prescribing the course on these subjects, and in the 2d section of the law of July 27, 1842, all these deposits and the principle upon which they were made were confirmed and legalized. When therefore the copper rock arrived, to which your letter refers, the honorable Secretary of War, in conformity of law and usage, placed it under the care of the National Institute.

As it was understood to be rather an inconvenience to Capt. Wilkes from the want of space to receive any more articles of the Institute in the Hall under his care, and as the Institute has at present no Curator there, those boxes and articles which have come to hand within the last few months have been temporarily deposited elsewhere, and among others the copper rock. The Committee of the Institute which received this rock had it deposited in the War Office yard, where it is accessible without impediment to all who are disposed to examine it, and where it is under the efficient protection of the guard of the War and Navy Department buildings.

Very respectfully, your obt. svt.,

J. J. ABERT,
Ch. Com. Nat. Inst.

H. L. ELLSWORTH, Esqr.,
Commr. of Patents, Washington.

LETTER FROM THE COMMISSIONER OF PATENTS TO COLONEL ABERT, DECEMBER 7, 1843.

PATENT OFFICE, *December 7, 1843.*

SIR: I have to acknowledge the receipt of yours of the 5th inst.

The Hon. Sec'y of War has, it seems, referred to the Chairman of the Committee of the National Institute the answer of my letter to his Department, offering to receive for exhibition at the National Gallery the "copper rock."

I can not withhold my surprise or the expression of my regret that the committee of the Institute on the reference of my letter deemed it necessary to declare their unwillingness to recognize any such place as the "National Gallery" under my care and to question the right of the Commissioner of Patents to the use of the large Hall in the Patent Office building, and still more at *their* claim of right to use that Hall when their accommodations were only enjoyed at the *convenience* of the Commissioner of Patents. To this unexpected reply to my letter I can not believe the Hon. Secretary of War has given his approval.

Permit me to refer the Committee to the Act of July, '36, reorganizing the Patent Office. The first section gives the Commissioner of Patents the care of the models of Patents, records, books, &c., &c.

The 20th section establishes a "National Gallery," in which the Commissioner of Patents is bound to exhibit not only models but fabrics, manufactures, &c.

To carry out the design of this law cases have been erected at great expense and many articles collected, while additions are daily made.

It is true that the National Institute did seek to obtain the entire control of the large room in the Patent Office. A refusal was given because the Patent Office building was by law placed under the care of the Commissioner of Patents and because the room was needed, at least in part, by the office.

The law of August 26th, '42, to which you refer, simply enacts:

"That until other provisions be made by law for the safe keeping and arrangement of such objects of natural history as may be in possession of Government, the same shall be deposited and arranged in the upper room of the Patent Office under the care of such person as may be appointed by the Joint Committee of the Library." The act evidently did not contemplate the exclusive control of the room, but a supervision of the articles entrusted to the care of said Library Committee.

This Committee on advisement with the War and Navy Department appointed Dr. C. Pickering, who enjoyed the use of the Hall in common with the Patent Office in a manner I had supposed entirely satisfactory to all concerned.

To relieve this Bureau from care and responsibility I proposed to the Hon. Secretary of State to transfer to Dr. Pickering the custody of the archives, jewels, etc., received from the Department, but the Secretary declined, observing the Commissioner of Patents was a branch of the State Department, and he could not consent to place the articles confided to him under care of a corporation or a stranger over whom he had no control.

In July last Dr. Pickering resigned his trust. The Joint Committee of the Library, upon whom alone devolved the right of filling the vacancy, entirely unexpectedly to myself, conferred the appointment on the Commissioner of Patents. Of course the Commissioner of Patents has now by law the custody of the large Hall, which in all official correspondence has been called the "National Gallery."

I will remark that the Hon. Secretary of State expressed a wish in the letter giving directions as to the large Hall that the National Institute might be permitted to occupy any "empty cases" so long as this could be done without inconvenience to the Patent Office. In this request I most heartily acquiesced, and have permitted the Institute to enjoy from time to time a very considerable portion of the upper and lower stories. And while the Commissioner of Patents has the sole custody of the building, the Institute may be assured that the articles deposited by them will receive the same care and watchfulness as those belonging to the Patent Office or those received from the Government.

It has given me pleasure to try to accommodate all parties, hoping that Congress would make further provisions as appeared to be necessary. The time has now arrived when the wants of the Patent Office imperiously require more of the large Hall, and it remains for the National Legislature to determine who shall be accommodated when there is not room for all.

I regret your correspondence has compelled me to say thus much in defense of the position I have the honor to hold.

Yours, respectfully,

H. L. ELLSWORTH.

Col. J. J. ABERT,
Chn. Com. Nat. Inst.

Still another blow was in reserve. Statements were made in public to the effect that the collections of the Institute were of very trifling value, and one which appears to have been printed, though I can gain no information as to its nature, made certain charges in connection with the portraits in the possession of the Institute, intended to show that the Institute was "unworthy of the patronage of the Government."

This happened apparently during the great meeting of the friends of the Institute in April, 1844, evidently with the intention of counteracting any effect which the assemblage might produce upon Congress.

Mr. George P. Marsh, M. C., at this time (April 4) addressed a letter to the corresponding secretary of the Institute, stating that its memorial had been referred to him as a member of the Library Committee of Congress, and asking for information to enable him to meet objections made by persons unfriendly to the Institution. The information given in the following letter in fact constitutes a third report upon the national collection, a little more than a year subsequent to the date of those already quoted:

LETTER FROM MESSRS. MARKOE AND ABERT TO THE HON. GEORGE P. MARSH, APRIL 8, 1844.

WASH'N, *8 April, 1844.*

To Mr. MARSH, H. Reps.

DEAR SIR: Your letter of the 4 inst. has been received. It found me occupied by numerous & pressing engagements, and left so short a space of time for reply that I have been compelled to call for aid upon a friend, Col. Abert, with whom I was for a long time associated a member of an important committee of the Institute, whose business it was to understand its affairs.

It is to be deplored that there are persons so unfriendly to the Institute, as to state "that its collections are of very trifling extent and value, and that for this and other reasons not necessary now to be specified, the Institute is unworthy the patronage of the Government." Some consolation, however, is derived from the assurance, that you do not entertain these opinions, and from the opportunity which is now offered of correcting at least one of these erroneous opinions the only one that has been presented with sufficient distinctness to be met, namely, that which refers to the extent and value of the Institute's collections. We should have rejoiced if "the other reasons" had been as candidly and specifically made, so that they might be as promptly and explicitly met. We seize this occasion to assure you of our readiness, our anxious desire, to meet any unfounded report or misrepresentation which may have led to the assertion, that the Institute is unworthy the patronage of the Government. We are the more anxious as the assertion seems to have grown out of other considerations than the supposed trifling extent and value of the collections of the Institute.

The property of the Institute is of two kinds: That which it owns, the result of donations & purchases, and that which it holds by Deposit. The latter kind, by our Charter cannot be withdrawn, even by depositors, till after due notice has been given. The statement which follows, made by Col. Abert & wh. embraces a very inadequate description of the property, embraces gifts, purchases & deposits is taken from the records of the Institute, and it may be verified at any time by reference to the records, an attentive examination of wh. would show that the property of the Institute is of immense value, & of great American as well as general interest; & that it is increasing every day in a wonderful manner—a perusal of the two Bulletins of the proceedings of the Institute wh. have been published will give you the details for two years of these accumulated & accumulating materials, & the unpublished Records wh. go back for two years will supply the rest—Mr. Markoe begs leave to add that the MS. matter wh. accompanied the memorial to Congress, & wh. has happily been placed in your hands, embraces a very condensed view, wh. he prepared with great care & toil of all the contributions, donations & deposits which have been made to the Inst. since its foundation in May 1840, up to March 1844, & of the names of the contributors, donors, & depositors. For a refutation of such misstatements we refer you to these exact details, & sincerely hope that Congress will publish them for its own information as well as for the information of the world & as an act of justice to the Institute.

The collections referred to are in the great hall of the Patent office, at the Treasury, War & State Depts., at Col. Abert's office & at the house of the Secretary of the Inst. Besides wh. letters have lately been rec'd. announcing the approach of great quantities of boxes of books, specimens of natural history, & other miscellaneous presents, from for. Govts. Ministers & Consuls of the U. S., from officers of the Army & Navy, & from many Societies & individuals both at home & abroad.

In conclusion, while we invite scrutiny in any shape, we take the liberty of suggesting our earnest & anxious wish to meet a committee wh. whenever appointed will find us prepared to explain the character & merits of the Inst. & effectually to defeat unfounded & irresponsible surmises.

With true regards, Yr. obt. humble svts.

Francis Markoe, jr.
J. J. Abert.

Imperfect & hasty statement of the collections & specimens, being either the absolute property of the Institute, or specially deposited under its care. It is believed, that the greater part of these, will eventually become the property of the Institute; many of them having already become so.

Minerals—1st. About 6000 miscellaneous specimens from all quarters.

2d. A complete collection of about 10,000 specimens.

3d. In addition there are about 190 boxes or collections, not examined or opened. They are spoken of as "boxes" or "collections," because the donors used these terms in their letters presenting them and they are accordingly so entered upon the Journals of the Institute.

4th. There are also 4 boxes of splendid minerals of Mexico, presented by His Exc. Mr. Tonsel the Minister of War & Marines of Mexico, and one box Mex. Antiquities.

Fossils.—Upwards of 30 boxes and seven or 8 thousand miscellaneous specimens & casts of rare fossils.

D. N. Couch.

Birds.—1st, 1368 separate specimens; 2d. nine large boxes, one of which contains 27 dozen skins of rare birds from Brazil.

Quadrupeds.—Between 4 and 500 specimens. Insects 74100 specimens, and more than a dozen boxes besides not opened. Most of these in a deplorable condition for want of funds to preserve & arrange them.

Shells.—1638 specimens, & more than 20 boxes and one barrel.

An immense number of fishes, reptiles mollusca, et cetera. One donor, Lt. Gedney, U. S. N., gave upwards of 600 specimens & a large & rare collection of reptiles, fishes &c. which composed a part of the munificent gift of Prince Momfanoi, of Spain.

Coins, medals & medallions, antique & modern, embracing very many extremely rare & valuable series, gold, silver & copper &c. 1st. 573 specimens; 2d. seven boxes.

Maps and atlasses in great numbers; books & pamphlets, between 4 & 5000, many very rare, sent by the Russian, French, Belgian, Brazilian & other governments, & from Societies in various countries. About 1000 engravings, many extremely choice, by the first Artists in the world, and several large boxes of books & engravings not opened.

Specimens of woods, marbles, domestic manufactures, fossil teeth, megatherium bones, Ancient vases & vessels, electrotype pictures, mosaics, Egyptian & South Sea idols, large collections of human quadruped & bird crania, antique masks, rare collection of Indian dresses &c., daguerreotype pictures, corals & coralines, large collection of dried plants from all parts of the world. Specimens of art implements &c., and an infinite diversity of contributions of every description too complicated & various to enumerate.

The Columbian Institute's collection consisting of a large number of books, works of art, specimens of Nat. Hist., all which are now the property of the Nat. Institute. Models of monuments, & of works of art etc. etc. Several hundred Indian Portraits, and other paintings, many very rare & valuable & some the production of the best masters.

Skeletons, Antlers, Horns, Teeth, Bones & casts of various quadrupeds & other animals.

Indian Musical & other Instruments & implements & Lithographic portraits & drawings in great numbers.

Large collection of objects of Natural History, idols, fabrics, antique works of art &c. from Egypt and Africa, many of great curiosity & rarity, from various persons, &c.

Collection of Statuary, busts & casts.

Large collection of trilobites & rare fossils.

Dr. Franklin's printing press.

A collection of Bedouine war instruments, & a variety of oriental curiosities.

A series of fine Electrotype medals, embracing the British & French Sovereigns, from William the Conqueror to Victoria, and from Pharamond to Louis Philippe.

It is scarcely possible, in reply to your note wh. calls for an immediate answer to enumerate further, but we don't depend on so scant a list, given in terms necessarily somewhat vague. We call special attention to the minute & exact detail given in the abstract of the proceedings of the Inst. prepared by Mr. Markoe, & wh. accompanies the memorial to Congress, where every thing will be found exhibited & described. We believe that if the collections of the Inst. are not already as great in value as those brought home by the Exploring Expedition, they will become far more so in a very short time. In American interest the Institute's collections far transcend the other.

In answer, apparently to a subsequent inquiry from Mr. Marsh, as to the amount of the subsidy desired by the Institute, the following schedule seems to have been prepared. There is nothing, however, to indicate that it was ever submitted to Congress. It is of interest as showing the state of expenditures contemplated for the National Museum nearly half a century ago:

[Memorandum in Colonel Abert's hand.]

DEAR SIR: In answer to your inquiry of this morning as to the probable amount and the division of it which will be requisite to preserve and arrange the various articles of natural history belonging to the National Institute, I have the honor to submit the following views to your consideration:

One taxidermist, who should also be a scientific ornithologist and well versed in natural history generally, per year	$1,400
One assistant	600
One entomologist, who should also be capable of arranging and naming the reptilia	1,200
One assistant	600
One mineralogist	1,000
One assistant	500
One person in special charge of the articles, to watch over them, exhibit them, etc., who should also be a mechanic	600
Two laborers—these should be men of some intelligence and some ability in using tools, $1 per day for each	730
Tools, implements, preserving liquors and ingredients, apparatus cases, and other fixtures	2,500
Freight, postage, stationery, and other contingencies	1,200
Arrearages due for freight, postage, printing, etc	1,500
	11,830

Hon. Mr. MARSH, May 18, 1844,
House of Representatives.

Notwithstanding the extraordinary efforts at this time made and the favorable report of Senator Choate, Congress adjourned in the spring of 1844 without making any provision for the care of the collections of the Institute.

Another effort was made in 1845. Senator Levi Woodbury, president of the Institute, in the annual address delivered by him on January 15 in the Hall of the House of Representatives, made a most impressive appeal to Congress. After urging prompt action in the matter of the Smithson trust—"a trust so sacred and imperative that a longer delay to execute it might prove not a little derogatory to our national honor"—he continued:

Should the plan for this not be speedily matured, including the use of the Institute or its officers, then a grant at once of enough to defray the expenses attendant on the good preservation and collection of the public materials in our charge seems indispensable, and is believed also to be free from every doubt connected either with expediency or the Constitution, as many of the collections now belong to the Government and all of them are vested in it when the charter expires, and may be forthwith if desirable. What small sum then is granted for this object by the Government is granted for taking care of its own property, the title of which is public, the one public, the whole end and aim public; and that act of duty done, we hope, by the further help of our own contributions, with those of liberal friends of science elsewhere, by the continued and generous assistance of the officers of the Army and Navy, of our foreign ministers and consuls, as well as the members of Congress and many in private life, I think it may be safely said we hope to advance still farther and faster, till we render the Institute, in many respects, worthy its unrivaled position and the growing country to which it belongs.[1]

This was followed up by a memorial to Congress, which, having never before been published, is here presented,[2] and which was favorably acted upon by the Library Committee, who adopted the report submitted by Senator Choate concerning the similar memorial of 1844. No action was, however, taken.

Still another appeal was made[3] to the Twenty-ninth Congress, which was presented to the Senate by Lewis Cass, and to the House of Representatives by John Quincy Adams. This, too, was fruitless.

In 1846 also, as we have seen, Mr. Ingersoll, always a faithful friend of the society, endeavored to establish a connection between it and the Smithsonian Institution in the administration of a National Museum, but the effort failed at the last moment, and the Regents of the Institution were not inclined to take advantage of the privilege of putting this building as a wing to the Patent Office, as they might have done.

In the organization of the Smithsonian Institution the National Institute was practically left out of account and the hopes of many years were blasted. What was still more discouraging was that power had been given to the new corporation to take possession of all Government collections in the custody of the Institute, on the possession of which its chief claim to a subsidy was founded, and in connection with which a considerable debt had been contracted,[4] as is indicated by Mr. Rush's letter of July, 1846.

In the "Notice to the members of the National Institute" which served as an introduction to its fourth bulletin, dated November 25, 1846, a pitiful statement of the condition of the society is given:

More than a thousand boxes, barrels, trunks, etc., embracing collections of value, variety, and rarity in literature, in the arts, and in natural history, remain on hand unopened—the liberal contributions of members at home and abroad—of Governments, of learned and scientific societies and institutions of foreign countries and of our own—and of munificent friends and patrons in every part of the world. For the preservation, reception, and display of these, the Institute has neither funds nor a suitable depository.[5]

This was a fatal condition of affairs, for the formation of a museum was the one object which, out of the many specified, seemed to have finally absorbed the energies and the limited income of the National Institute.

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[1] Annual address, pp. 33, 34. [2] Note E. [3] Note F.

[4] Colonel Abert estimated the amount in 1844 at $1,500 and it was now doubtless greater.

[5] Proceedings of the National Institute, 4th Bull., p. 481.

It had evidently been the belief of its chief promoters that if a museum under the patronage of the Government and under the control of their society could be firmly established in Washington, all the other ends sought by them would follow in necessary sequence.

In accordance with this policy circulars had been sent out to the officers of the Army at distant ports asking their aid and pointing out the manner in which they might be useful in carrying out the objects of the Institution, "and others to the governors of States and to the diplomatic and consular representatives of the United States in foreign countries, announcing that they had been made corresponding members, and inviting their aid in the promotion of the objects of the Institution," and to each member of Congress, with a request that he bring specimens of the natural productions of his district on his return to Washington.[1]

WASHINGTON, *February 9, 1841.*

SIR: The National Institution for the Promotion of Science and the Useful Arts, established at the seat of Government, is desirous of procuring specimens of the natural productions of every portion of the United States, and for that purpose respectfully asks your aid and cooperation. The district you represent doubtless possesses many important minerals and vegetable productions, which might prove of great value to the arts if they were generally made known. Specimens of such productions being brought to Washington will not only advance the objects of the Institution, but will prove advantageous to the country whence they come. They will be described by the scientific members of the Institution, and their uses and advantages pointed out, and the specimens exhibited to the public in its museum.

You are respectfully requested to bring with you, on your return, such specimens as you may collect during the ensuing recess. Even a single specimen from each member will be of great advantage to the Institution, and be thankfully received as a tribute to science.

We have the honor to be, sir, you most obedient servants,

J. R. POINSETT,
J. K. PAULDING,
Directors.

To the Hon. ———.

The assumption by a society of the important duty of organizing and conducting a national museum would seem at the present time somwhat strange, but it should be remembered that from the beginning it was announced that all the collections made were the property of the General Government, and that in the incorporation of the society by Congress all the property of the corporation at the time of the expiration of its charter, limited to twenty years, should belong to and devolve upon the United States. Still more important a factor in the influence of the society was the character of its membership, which included most of the leading men in political, scientific, and literary circles, and had upon its list of officers and directors such names as that of John Tyler, President of the United States, and his Cabinet, an ex-Secretary of War, two leading Senators,

[1] Circular letter to members of Congress.

CHARLES PATRICK DALY.

Levi Woodbury, Peter Force, Colonel J. J. Abert, Colonel J. G. Totten, and Lieutenant M. F. Maury, Rufus Choate, Abbott Lawrence, and A. D. Bache. Our Government functions were less centralized at that time, and the policy of allowing more scope to private effort in public matters was similar in this instance at least to that which prevails in Great Britain at the present time. It was not to have been expected, however, that its authority should have remained long unquestioned, and in the end its lot was that which very frequently befalls those who out of disinterestedness undertake, unasked, to forward the interest of others. Thus, as Rush aptly put it, the merit of the Institute was turned to its misfortune, and its "voluntary zeal" was thought totally unworthy of recognition.

The various invitations to members of Congress, army and navy officers, consuls, and citizens to collect and send in materials had, however, begun to bring in great quantities of material, and the inability to care for these properly was the cause of the appeals for Government aid, which, as time went on, grew more frequent and urgent till 1846, when discouragement took the place of anticipation, and the society fell into a condition of inactivity and apathy.

The real cause of the decline of the National Institute was simple enough. Failing to secure grants of money from Congress, the society was overwhelmed by the deluge of museum materials which, in response to its enthusiastic and widely circulated appeals, came to it from all quarters of the world. The annual receipts from the assessment of members were insufficient to pay for the care of the collections, and although by virtue of the long term of its charter the collections were kept together until 1861, there was little science and little energy manifested in this administration.

In the archives of the National Museum there are a number of unpublished papers which are of value as constituting a partial history of the collections during this period, and some of which appear to be worthy of permanent preservation are here presented.

One of them possesses a melancholy interest of its own. It is a list of the active members of the National Institute in arrears for dues up to December 12, 1843. The delinquents were 168 in number, including nearly one-half of the names on the membership roll, and the total arrearage amounted to $1,300. No wonder that the managers were discouraged, for this sum represented a like deficit in the assets of the society, its only income being derived from membership fees.

From this time on, as we have already seen, the society languished. In 1848 its cabinet was almost the only evidence of its existence. At that time, however, an effort was made to resuscitate it, which seems to have been partially successful. The coming in of a new Administration was in some degree beneficial, the President, Taylor, having accepted the position of patron of the society, and some members of the Cabinet proving to be friendly.

About this time the society seems to have regained its control of the hall in the Patent Office, an apartment which now came to be known properly as The National Institute—a name which it retained until the hall was finally dismantled.

A visitor to Washington at the time of the inauguration of Taylor, in 1849, has left a record of his impressions of the capital city—at that time still very crude and unfinished. "All that meets the gaze in Washington, except the Capitol and the Departments, seems temporary," he wrote. "The city appears like the site of an encampment, as if it were more adapted for a bivouac than a home," and then he goes on to describe some of the principal characteristics of the city:

> In the National Institution, like nearly all of our scientific and literary establishments, as yet in embryo, sea quadrupeds from the Arctic zone, birds of rare plumage, the coat in which Jackson fought at New Orleans, the rifle of an Indian chief, plants, fossils, shells and corals, mummies, trophies, busts, and relics, typify inadequately natural science and bold adventure. . . . The foundation of the long-delayed monument to him of whom it has been so admirably said that "Providence made him childless that his country might call him father," the slowly rising walls of the Smithsonian Institution, the vacant panels of the rotunda, the sculptured deformities on the eastern front of the Capitol, and the very coin, freshly minted from California gold, awaken that painful sense of the incomplete, or that almost perplexing consciousness of the new, the progressive, and the unattained which is peculiar to our country.[1]

President Taylor placed in the custody of the Institute the Washington relics, and some other hopeful things occurred. The members gained courage and proceeded to revise its constitution and by-laws, to vote to print a quarto volume annually to be entitled "The Transactions of the National Institute,"[2] and to memorialize Congress for financial aid, and to offer its services to the Government "as a referee in matters which involve scientific knowledge and investigation."

In 1850, at the request of the Secretary of State, the Institute undertook the appointment of the "Central Authority," a committee of 21 members to pass upon articles proposed to be sent to the World's Fair of 1851 in London.

The needs of the Institute in 1850, as summed up in the Secretary's report, were not extravagant—a medium of publication, a curator and librarian, who were to be paid sufficient salaries to enable them to give a considerable portion of their time to the work, new bindings for the books, and more room for library and meetings.[3]

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[1] 1849. Tuckerman, H. T. The Inauguration. The Southern Literary Messenger, XV, pp. 236–240. Richmond, April, 1849.

[2] This series was never begun.

[3] None of these, however, were realized, save for a short time the publication of Proceedings in octavo in 1855–1857.

At this time there were twenty-seven paying members of the society, and its income was less than $150 yearly.[1]

Mr. C. F. Stansbury, the Secretary of the Institute, acted as its agent for the World's Fair, and obtained there some specimens for its museum, and in 1856 others were received from the New York Exhibition.

It would appear from the records of this time that there was still a Gallery of Curiosities in the Patent Office not in the custody of the National Institute.[2]

In 1854 the Commissioner of Patents, for many years vested with a measure of authority by the Library Committee, was given by Congress[3] the administration of the collections and authorized to employ keepers, and a trifling appropriation was made, to be expended under the Department of the Interior—an arrangement which continued for three subsequent years.

In 1857, the Smithsonian Institution having definitely accepted the responsibility of caring for the national collections, all the articles deposited with the National Institute were removed. In addition to these there were numerous objects directly under the control of the National Institute which the officers would not permit to be removed. There was evidently still a lingering hope that Congress would make provision for the care of the collections. In this same year, 1858, another memorial was sent to Congress, asking for an appropriation for preserving the collections of objects of natural history intrusted to their care. This was unfavorably reported upon by the Senate committee (see Bibliography, under Brown) and in the House was referred to the Committee on the District of Columbia, whose report showed that "the collections are now in the Smithsonian Institution." [4]

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[1] The following letter will serve to explain the nature of the ties by which a part at least of the members were held to the organization:

SMITHSONIAN INSTITUTION, *January 5, 1852.*

MY DEAR SIR: I beg leave through you to thank the members of the National Institute for the honor they conferred upon me by my election as one of the vice-presidents, and to request that I may not be considered a candidate for reelection.

I shall continue to be a member and hold myself responsible for my portion of the debt unavoidably incurred by the executive committee. It is my opinion that under its present organization the Institution can not advance the cause of American science, and that it may be productive of much evil.

I remain, very truly, your friend and servant,

JOSEPH HENRY.

PETER FORCE, Esq.

P. S.—I think it would be best to appoint a committee to inquire into the state of the Institution, and to advise as to what is to be done, and how the debts which have been incurred are to be paid.

J. H.

[2] Proceedings of the National Institute, new series, I, pp. 47, 48.

[3] Act of August 4, Statutes, X, 552.

[4] Rhees, Documents, p. 653.

Some of these were, it is true, but there was still a miscellaneous collection, including many valuable objects, in the hall of the Patent Office, and known as "the National Institute." Of these a catalogue was published by Alfred Hunter in 1859.[1]

They were afterwards placed in some old cases in a passageway in the Patent Office, and many valuable specimens and books were destroyed or stolen, there being no one responsible for their safety.[2]

Professor Baird told the writer that the books and specimens were placed on top of some file cases in a basement corridor, near an outer door, and that a person with a cane could at any time dislodge an armful and carry them away without impediment.

In 1861, shortly before the charter finally expired by limitation, the birds and insects were almost completely destroyed and the library reduced to broken sets of periodicals and transactions. Such as they were, they were delivered by the Secretary of the Interior to the Smithsonian Institution.[3]

This was the end of the National Institute and its efforts to found a national museum, the end of the National Cabinet of Curiosities, and of the National Gallery, except so far as it continued in the possession of the Washington relics and the Franklin press, exhibited in one of the halls of the Patent Office.

THE SMITHSONIAN INSTITUTION AND THE NATIONAL CABINET OF CURIOSITIES.

After ten years of discussion, a bill to incorporate the Smithsonian Institution received the approval of Congress and the President. The charter, in its final form, does not appear to have represented fairly the views of any one party, except that which favored the library and incidentally the museum. Several special provisions, not from our present point of view harmonious with the spirit of Smithson's bequest, were eliminated, and the act as finally passed, while broad enough to admit upon the foundation almost any work for intellectual advancement, was fortunately expressed in such general terms as to allow a large share of liberty to the trustees or regents.

The Smithsonian Institution has had upon its governing board many of the noblest and wisest of the men of the nation, and the Regents, to whom, during the first four years of its corporate existence, the decision of its policy and its future tendencies was intrusted, were chosen from among the very best of those at that time in public life.

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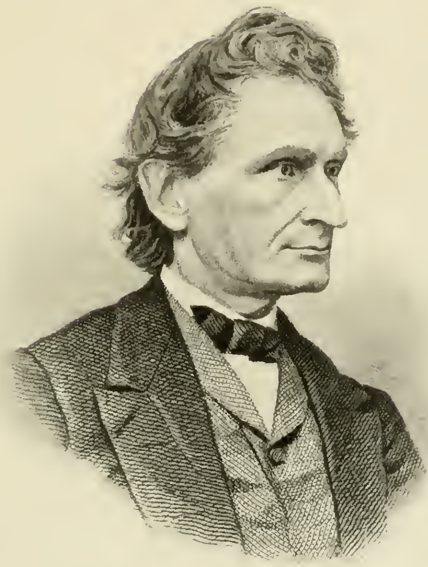
[1] Hunter's Bibliography.

[2] It is said that some enlightened Commissioner of Patents, in power between 1850 and 1860, was annoyed by the presence of a collection of fossil vertebrates in one of the rooms in his building, and without consulting anyone sent them to a bone mill in Georgetown, where they were transformed into commercial fertilizers—once for thought, they now became food for the farmers' crops.

[3] Smithsonian Report, 1862, p. 16.



James D. Dana

Among them were George M. Dallas, the first chancellor, at that time Vice-President of the United States; Chief Justice Taney; Rufus Choate, of Massachusetts; Robert Dale Owen, of Indiana; George P. Marsh, of Vermont; Lewis Cass, of Michigan; Jefferson Davis, of Mississippi; James A. Pearce, of Montana; James M. Mason and William Winston Seaton, of Virginia; John McPherson Berrien, of Georgia; William C. Preston, of South Carolina; William J. Hough, of New York; Alexander Dallas Bache, Superintendent of the Coast Survey, and General Joseph G. Totten.

The Regents soon realized that in order to carry out efficiently the trust which had devolved upon them, it would be necessary to decide upon a definite course of policy, and to settle for themselves the interpretation of certain of the provisions in the act of incorporation.

A committee was appointed at once to digest a plan to carry out the provisions of the "Act to establish the Smithsonian Institution," and on January 25, 1847, this report was made, signed by Robert Dale Owen, Henry W. Hilliard, Rufus Choate, and Alexander Dallas Bache, after having made a preliminary report December 1, which was recommitted to the committee December 21.

These dates are mentioned in order to afford opportunity for the remark that in the interval between December 1 and December 21, Professor Joseph Henry had been elected to and accepted the secretaryship of the Institution, and that previous to his election he had submitted to the Regents a sketch of a proposed plan of organization, which appears to have been acceptable to the majority of the Board, and that in this sketch were printed opinions which had from that time on a most powerful, and in time a controlling, influence upon the policy of the Institution.[1]

The election of Professor Henry was in accordance with the view held by the Regents, and expressed in the report of the committee, and even more forcibly in the resolutions of the Board, that the Secretary must of necessity become the chief executive officer of the Institution, and "that upon the choice of this single officer, more probably than on any one other act of the Board, will depend the future good name and success and usefulness of the Smithsonian Institution."[2]

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[1] At a meeting of the Joint Committee on Public Buildings and Grounds in February, 1865, Professor Henry said: "I have been from the first, now eighteen years, the secretary or executive officer of the Smithsonian Institution. . . . Before my election I was requested by one of the Regents to give a sketch of what, in accordance with the will of Smithson, I considered should be the plan of organization, and after due consideration of the subject there was not the least shadow of a doubt in my mind that the intention of the donor was to found a cosmopolitan institution, the effects of which should not be confined to one city, or even to one country, but should be extended to the whole civilized world." (Rep. Com., No. 129, Thirty-eighth Congress, second session.)

[2] Report of the Organization Committee of the Smithsonian Institution, etc. Washington, 1847, pp. 18, 19. [Rhees, Documents, p. 941.]

The choice of Professor Henry was by no means the unanimous act of the Regents, and since in respect to personal qualifications he undoubtedly fulfilled the requirements of the resolution passed by the Board previous to the election of a Secretary, it is clear that some of the Regents did not look with favor upon his plan of organization.

Of the 12 votes cast at the election December 3, 1846, 7 were in favor of Professor Henry, and 5 for persons who had been officers of the old National Institute, and closely associated with its policy.

A bare majority—for the change of one vote would have made a tie—then placed itself on the side of the Henry policy. In its report the committee on organization speaks plainly of "two great conflicting opinions" in the Board, for the harmonizing of which the "compromise" so often referred to during the struggle of the following six years.

One party was in favor of devoting the larger part of the income to the library and museum.

The other party favored rather the publication of scientific memoirs, grants for the promotion of original researches, and the maintenance of a lecture system.[1]

The "compromise" consisted in the division of the annual income into two nearly equal parts, to be applied to the two classes of expenditures, $15,000 to library and museum and the remainder ($15,910) to publication, research, and lectures.[2]

On one subject, however, the Regents seem to have been unanimous, and to have given their opinion in the following resolution:

> *Resolved*, That it is the intention of the act of Congress and in accordance with the design of Mr. Smithson, as expressed in his will, that one of the principal modes of executing the act and the trust is the accumulation of collections of specimens and objects of natural history[3] and of elegant art, and the gradual formation of a library of valuable works pertaining to all departments of human knowledge, to the end that a copious storehouse of materials of science, literature, and art, may be provided, which shall excite and diffuse the love of learning among men, and shall assist the original investigations and efforts of those who may devote themselves to the pursuit of any branch of knowledge.[4]

The great building which, by the terms of this charter, the Smithsonian Regents were requested to erect and pay for was to be "of sufficient size and with suitable rooms or halls for the reception and arrangement upon a liberal scale of objects of natural history, including a

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[1] To the library and museum party belonged, without doubt, Senator Choate, Mr. Owen, and probably Mr. Rush and General Totten, who were both devoted to the interests of the National Institute. Mr. Bache was, I suppose, the leader of the opposition.

[2] Report of Committee on Organization, p. 21. [Documents, p. 942.]

[3] In this resolution for the first time the term "natural history" is given its proper scope, as including not only zoology and botany, but geology, mineralogy, and ethnology, although in the report of the committee a distinction seems to have been made, probably for the purpose of better definition.

[4] Report of Committee on Organization, p. 20. [Documents, p. 942.]

geological and mineralogical cabinet, a chemical laboratory, a library, a gallery of art, and the necessary lecture rooms;" and this was coupled with the accompanying provision, that, "in proportion as suitable arrangements can be made for their reception," all objects suitable for a museum or gallery of art which the United States at any time might possess shall be delivered to the Regents and shall be arranged in the building.

The national collections then existing and those afterwards to accumulate were thus transferred to the governing board of the Smithsonian Institution as a contribution from the United States to the resources of the Institution, and were evidently intended in a certain way to counterbalance the gift of James Smithson for the same purpose.

The intention of Congress is evident, and the law was almost mandatory in character. There was one phrase in the law, however, which gave opportunity for adjustment of terms.

The provision that the delivery of these objects should take place "in proportion as suitable arrangements could be made for their reception," was, it may be, intended to give the Institution time for careful and thorough preparation. This placed no limit upon the time for completing the buildings, and indeed gave to the Board of Regents the right to indicate the time when "suitable arrangements" could be made.

It was undoubtedly the wish of the members of the Twenty-ninth Congress that the expense and responsibility of organizing and maintaining a national museum should be transferred forever to the Smithsonian Institution, and it was quite far from their intention that the public Treasury should ever be called upon for aid.

Not only the National Museum, the National Library, and a national chemical laboratory were thus assigned, but also the expense of keeping up the previously neglected public park in which the Smithsonian buildings were to be erected. It was only by accident that a national observatory and an institution corresponding to the present Department of Agriculture were not added to the burden.

That was the day of small beginnings. The theory of our form of government had not been settled in the minds of our public men, and every new project brought up for discussion in Congress became the subject of long and tortuous discussions. There were Congressmen who ten years after the acceptance of the Smithson legacy were in favor of returning the money to England to be given to any one who could legally take it, while Andrew Johnson, of Tennessee, in 1845, endeavored to overthrow what had already been established and to substitute a "Washington University for the benefit of the indigent children of the District of Columbia, in memory of and out of respect to George Washington, the Father of his Country."[1]

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[1] Rhees, Documents, p. 489.

The will of the Twenty-ninth Congress was not necessarily that of the Thirtieth. Mr. Hilliard, of Alabama, made a bold and successful stroke for the independence of the Board of Regents, and defeated a motion to appoint a regular Congressional committee to supervise and report upon their proceedings. This was a step toward securing the recognition of the right of the Regents to interpret for themselves the true meaning of the charter.

The next Congress was still less disposed to exercise a minute system of control, and the Regents, through Senator Jefferson Davis, boldly asserted that it was "improper for Congress to interfere with the administration of a fund which it has confided to a Board of Regents not entirely formed of members of Congress and not responsible to it."[1]

The attitude of Professor Henry from the beginning to the end of the thirty-one years of his secretaryship was singularly independent and outspoken. Having before his election submitted to the Board of Regents a plan of organization which met with their approbation, he was elected with the understanding that he was to carry this plan into effect.

He was from the beginning in a certain way the authorized interpreter of the Smithsonian bequest, and, as everyone knows who has studied the history of the Institution, his earnest and steadfast policy and the wonderful clearness and force with which he explained his views, supported by his scientific eminence and his grandeur of character, gave him a wonderful influence with the successive bodies of men who acted as regents.

His influence from the very start was on the side of publication and original research and in opposition to constant expenditure of what in time he began to designate as "local objects."

His attitude toward museum and library, especially the former, was at first a noncommital one. He proceeded slowly, evidently not from lack of courage, but with the methods of a man of science, studying the results of different courses of policy, and, when he expressed an opinion, speaking from the standpoint of experience.

The history of the National Institution and its fate, hopelessly involved and crushed to death by the weight of the collections and books which had been given or lent to it, was constantly brought to his mind, for the Institution was expected to take up this burden, with the prospect of unlimited additions to its weight, and to bear it alone and perhaps forever.

To him, and to the Regents also, it must have been evident that this burden once assumed, the fate of the Smithsonian Institution would eventually be similar to that of the National Institute.

More directly threatening was the evil of the immediate absorption of a large part of the income, to the detriment of the plans which seemed to him more likely to accomplish the wishes of the Institution.

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[1] Rhees, Documents, p. 509.

CHARLES HENRY DAVIS.

The wisdom of Professor Henry's policy has been almost universally conceded, and the success with which for thirty-one years he directed the resources of the Institution toward the increase and diffusion of knowledge compels the admiration of everyone who studies the history of his life in connection with that of the Institution, and had done so for many years before his death.

It is now evident that but for his conservative policy the history of the Institution would have been comparatively insignificant.

In the light of subsequent events, it is safe to assert that in all probability had the Smithsonian Institution taken charge of the "National Museum" in the manner proposed in 1846, the result would have been even more detrimental to the Museum than to the Institution.

It did not seem so at the time, however, and for ten years the course of the Institution was under the subject of criticism of a very serious kind.

It is of course not essential to review at length the discussions which took place within the first ten years between the officers of the Institution, in the meetings of the Regents, in Congress, and in the public journals as to the authority of the Board of Regents and the Secretary to deviate from a strict interpretation of the act of incorporation, which was presumed to embody the will of Congress. There was a party who was of the opinion that a large part of the income should be devoted to the accumulation of a great general library and who fought boldly in defense of this project. The conflict culminated in 1856 with the dismissal of the librarian by Professor Henry, a Congressional investigation, and the resignation of two of the most active Regents. The Board upheld the Secretary, and successfully maintained, both in House and Senate, the position that they as trustees of the Smithson bequest were not amenable to the advice or instructions of Congress and were the only authorities qualified to interpret the meaning of the act of incorporation and the intention of Smithson, the founder.

The immediate cause of this final outbreak was the repeal, in 1855, of the resolution passed in 1846 dividing the income of the Institution into two nearly equal parts for two specific objects, the advocates of a great library being of the opinion that the spirit of this resolution had not been regarded.

The resignation of Senator Choate and Mr. Meacham and the unqualified indorsement of the Secretary by the other members of the Board greatly strengthened his position and enabled him to cope more successfully with the question of the admission of the Government museum to the Smithsonian buildings, for the transfer provided for in 1846 had not up to 1856 been definitely arranged for.

The history of the treatment of this matter is very important, since it leads up to the origin of the present relationship existing between the Government, the National Museum, and the Smithsonian Institution.

The delay in the completion of the Smithsonian buildings afforded to the Regents an opportunity for a gradual development of the plan of organization. Until the building should have been furnished the resolution giving half of the income to library and museum was not obligatory, nor was it possible for the custody of the Government museum to be finally transferred.

The corner stone was laid May 1, 1847, but the work was in progress until 1855. The delay was evidently intentional, for in [September 27] 1848 Professor Henry, in an exposition of Smithson's bequest before the New Jersey Historical Society, spoke as follows:

He regretted that in order to make provision for the accommodation of the Museum of the Exploring Expedition, as directed by the act of Congress, so large an amount of money was required for the erection of the buildings. The evil, however, which would result from this is in a measure obviated by the plan proposed by Professor Bache, and adopted by the Regents, viz, that of deferring the time of completing the building, so that it might be erected in considerable part by means of the interest of $240,000, which had accrued in interest on the original fund, previous to the year 1846.[1]

As early as 1847 Professor Henry seems to have entertained the hope of escape from the full acceptance of the terms of the charter, for in his first plans, as finally submitted to the Regents, he expressed the hope "that in due time other means may be found of establishing and supporting a general collection of objects of nature and art at the seat of the general government, with funds not derived from the Smithsonian bequest."[2]

In the report for the year 1849, presented in 1850, Professor Henry gave the result of his later observations and reflections, and for the first time took his stand in opposition to the transfer, advancing the theory that it was not obligatory on the Regents to take charge of the Government collections. He wrote:

This law evidently gives to the Smithsonian Institution the museum in the Patent Office, the conservatory of plants, and all specimens of nature and art to be found in the several offices and departments of the Government. The act, however, can not be construed as rendering it obligatory on the Regents to take charge of these articles, if, in their opinion, it is not for the best interests of the Institution that they should do so. Though one of the reasons urged upon the Regents for the immediate erection of so large a building was the necessity of providing accommodation for this museum, I have been, from the first, of the opinion that it was inexpedient to accept it.

This museum was collected at the expense of the Government, and should be preserved as a memento of the science and energy of our Navy, and as a means of illustrating and verifying the magnificent volumes which comprise the history of that expedition. If the Regents accept this museum, it must be merged in the Smithsonian collections. It could not be the intention of Congress that an Institution founded by the liberality of a foreigner, and to which he has affixed his own name, should be charged with the keeping of a separate museum, the property of

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[1] Henry, Smithson's Bequest, p. 8.

[2] Second Report for 1847, p. 184 [reprinted as First Report in Report for 1853, p. 139]; Rhees, Documents, p. 958.

the United States. Besides this, the extensive museum of the Patent Office would immediately fill the space allotted for collections of this kind in the Smithsonian edifice, and in a short time another appropriation would be required for the erection of another building. Moreover, all the objects of interest of this collection have been described and figured in the volumes of the expedition, and the small portion of our funds which can be devoted to a museum may be better employed in collecting new objects, such as have not yet been studied, than in preserving those from which the harvest of discovery has already been fully gathered.

The answer made to some of these objections has usually been, that the Government would grant an annual appropriation for the support of the museum of the Exploring Expedition. But this would be equally objectionable; since it would annually bring the Institution before Congress as a supplicant for Government patronage, and ultimately subject it to political influence and control.

After an experience of three years, I am fully convinced that the true policy of the Institution is to ask nothing from Congress except the safe-keeping of its funds, to mingle its operations as little as possible with those of the General Government, and to adhere in all cases to its own distinct organization, while it cooperates with other institutions in the way of promoting knowledge; and on the other hand, that it is desirable that Congress should place as few restrictions on the Institution as possible consistent with a judicious expenditure of the income, and that this be judged of by a proper estimate of the results produced.

The Regents and their Secretary were in harmony.

In the Senate, April 15, 1850, the discussion of the bill for the completion of the Patent Office building elicited the following statement from Senator Jefferson Davis:

What the wants of the Patent Office are now is one thing, and what those wants will be in a few years is another, and an entirely different thing. Not only from the report of the last Commissioner of Patents, but from inspection, if anyone choose to make it, and see the condition of things in that department, I think it may be denied that there is room enough in the present building for the wants of the department. If I understand the report of the present Commissioner of Patents or the Secretary of the Interior, the argument against the want of further room by the Patent Department is based upon the supposition that all which now belongs to the National Institute, all connected with the exploring expedition which now fills the museum of the Patent Office, is to be transferred to the Smithsonian Institution. That seems to be the basis of the conclusion. Now, sir, I wish to state to the Senate that Congress has no power to impose upon that Institution the duty of taking charge of this collection of the exploring expedition—we may infer from their act—nor did they ever intend to do so. They gave to that Institution the right to take all such curiosities brought home by the exploring expedition, as might be desired for that Institution, and I will inform the Senate that it is not the intention of the present Board of Regents of the Smithsonian Institution to take charge of the museum of the Patent Office, and the room appropriated to these curiosities will be required hereafter as now.[1]

By its action in directing at this time the enlargement of the Patent Office, Congress appears to have accepted the ideas of Senator Davis, or, as Professor Henry expressed it, "concurred in the opinions expressed in the Senate by the Hon. Jefferson Davis, that it was a gift which ought not to be pressed upon the Institution."[2]

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[1] Rhees, Documents, p. 505.

[2] The National Museum, although the designation proposed in Mr. Ingersoll's amendment to the Owen bill for the Smithsonian Institution was never legally sanc-

In his report for 1851, Professor Henry, sure of his position, spoke still more boldly. "It is to be regretted," said he, "that Congress did not leave the entire choice of the plan of organization to those who were to be intrusted with the management of the bequest."

These plain words were called forth by the fact that the building was still unfinished, and that a large additional appropriation from the fund was required to make it ready for occupation.

It is worth while to remember that his previous impressions of museums, or at least of recent years, had doubtless been founded upon the cabinet in the National Institute, which, before Professor Henry came to Washington, had become completely torpid. Its collections, housed in a hall not under its control, belonged to it only in name. The miscellaneous assemblage of specimens in the hall of the Patent Office had been well described in the Smithsonian charter by the name "National Cabinet of Curiosities," for it did not deserve to be called a museum.

Professor Henry evidently had that in mind in protesting against "a promiscuous collection," but for the first time explains that he does not underrate "the (scientific) importance of collections in themselves."

The following quotation will show, however, that he was not so averse to the museum idea as he had formerly been, although very doubtful as to the advisability of accepting aid from Congress:

> The museum is to consist, according to the law of Congress, and the terms of the compromise, of "objects of art, of foreign and curious research, and of natural history, of plants and geological and mineralogical specimens." It would, however, be unwise in the Institution to attempt the formation of full collections of all these objects, or, in other words, to form an establishment similar to that of the British Museum. The whole income devoted to this object would be entirely inadequate. The portion of the main building appropriated to the museum consists of a single room, two hundred feet long by fifty feet wide. This space may be entirely filled in the course of three years, without the purchase of a single article, if the means be adopted which present themselves at the seat of government for making collections. But when this space is filled, the accumulation of specimens must cease, or an addition be made to the building, which, to harmonize with the present edifice, would involve a large expenditure. The question then arises, from what source is this money to be obtained? It can not be derived from the annual income of the capital, for this would cripple the more important operations. It may be said that Congress will furnish the means; but this is relying on a very uncertain source, and the policy of applying to Congress for any aid is doubtful.

Having said this much, it was easy to continue by expressing the opinion that the Regents had been in error in supposing it necessary to put up a building for the reception of the great museum of the exploring expedition presented by Congress.

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tioned, was understood to be under the charge of the Smithsonian from the time of its incorporation. The museum clauses of the charter were so understood by the first Regents and by Professor Henry, who, in his first programme of organization, in 1847, wrote: "When the building is completed, and when, in accordance with the act of Congress, the charge of the National Museum is given to the Smithsonian Institution, other assistants will be required."

EDWIN HAMILTON DAVIS.

The next year made some change in the views of Professor Henry. The presence of his new assistant secretary, Professor Baird, and the evidence of the collection that was now growing up under his own eyes, that museums may be made important agencies for scientific discovery, had perhaps increased his personal interest in such matters.

And again:

Though the formation of a general collection is neither within the means nor province of the Institution, it is an object which ought to engage the attention of Congress. A general museum appears to be a necessary establishment at the seat of government of every civilized nation. . . . Indeed the government has already formed the nucleus of such a museum in the collections now in the Patent Office.

An establishment of this kind can only be supported by government; and the proposition ought never to be encouraged of putting this duty on the limited, though liberal bequest of a foreigner.

The Smithsonian Institution will readily take the supervision of an establishment of this kind, and give plans for its organization and arrangement, provided it be requested to do so, and the means for effecting the object be liberally supplied.[1]

In the report for the year 1852 Professor Henry definitely stated that the Regents had concluded that it was not advisable to take charge of the great museum of the exploring expedition,[2] and also expressed the hopeful opinion that "there can be but little doubt, that in due time, ample provision will be made for a library and museum at the capital of this Union worthy of a Government whose perpetuity depends upon the virtue and intelligence of the people."[3]

In the report for the year 1853, presented January 14–March 11, 1854, another step toward the transfer of the museum is chronicled. The Secretary wrote:

I have been informed by the Commissioner of Patents that the space now occupied in the building of the Patent Office by the National Museum, is imperatively required for the display of models; and he suggests that a part or the whole of the Smithsonian building shall be purchased for the deposit of this collection. If Congress will entirely relieve the Smithsonian fund from the expense of collecting and maintaining a museum, a large portion of the present building would be unnecessary, and the proposition to purchase a part or the whole of it might properly be entertained. The Smithsonian Institution, if required, would take the supervision of a government museum, and would turn over to it all the specimens collected after they had been examined and described. The importance of a collection at the seat of government to illustrate the physical geography, natural history, and ethnology of the United States, can not be too highly estimated. But the support of such a collection ought not to be a burthen upon the Smithsonian fund.[4]

The year 1854 was the stirring one in the history of the Institution, and little was done toward the transfer of the museum. The great lower hall, having been completed, was lying idle. The Smithsonian collections were rapidly increasing under the management of Professor Baird,

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[1] Report for 1851, p. 25. [Reprinted in Report for 1853, p. 227.]

[2] Sixth Annual Report, p. 252.

[3] Idem, p. 253.

[4] Eighth Annual Report, p. 11.

of whose work in this direction more will be said later, and a considerable number of Government collections had come directly into the custody of the Institution—in bulk and value more extensive than those in the Patent Office, those of the exploring expedition excepted.

In this year, too, the custody of the Patent Office collection was transferred to the Commissioner of Patents, and an appropriation made for their support.

In 1855, in his report, presented March 1, 1856, the Secretary said:

> The lower story of the main building consists of one large hall to be appropriated to a museum or library. It is at present unoccupied, but will be brought into use as soon as the means are provided for furnishing it with proper cases for containing the objects to which it may be appropriated.[1]

In another place he expressed the hope that Congress would in due time relieve the Institution from the support of the building, and ultimately appropriate the greater part of it to a national museum.[2]

This was the first time that the term National Museum was publicly used by Professor Henry or in the reports of the Smithsonian Institution—a significant fact, and one which shows a step in the progress of the museum idea and a revival of the plan promoted by the National Institute from 1840 to 1846.

The fact that the Smithsonian museum, in itself, could now claim to be the best general collection of natural history so far as North America was concerned probably stimulated the Secretary's enthusiasm, for he announced the fact in the report with evident pride.

In March, 1856, the subject of the removal of the collections from the Patent Office was presented to the Regents by the Secretary, but the minutes contain no record of their decision.

In the Secretary's report for 1856, presented to the Regents January 26–28, 1857, the matter came up again for remark, and Professor Henry, as was his custom, spoke of the obstacles to the progress of the Institution caused by the restriction of the charter, and recurring to the museum, said:

> The adverse effects of the early and consequently imperfect legislation ought, therefore, as far as possible, to be obviated; and this could readily be done, if Congress would relieve the Institution from the care of a large collection of specimens principally belonging to the government, and purchase the building to be used as a depository of all the objects of natural history and the fine arts belonging to the nation. If this were done, a few rooms would be sufficient for transacting the business of the Institution, and a large portion of the income would be free to be applied to the more immediate objects of the bequest. Indeed, it would be a gain to science could the Institution give away the building for no other consideration than that of being relieved from the costly charge of the collections; and, for the present, it may be well to adopt the plan suggested in a late report of the Commissioner of Patents, namely, to remove the museum of the Exploring Expedition, which now fills a large and valuable room in the Patent Office, wanted for the exhibition of models, to the spacious hall of the Institution, at present unoccupied, and to continue under the

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[1] Smithsonian Report, 1855, p. 15. [2] Idem, p. 16.

direction of the Regents, the appropriation now annually made for the preservation and display of the collections.

Although the Regents, a few years ago, declined to accept this museum as a gift, yet, since experience has shown that the building will ultimately be filled with objects of natural history belonging to the general government, which, for the good of science, it will be necessary to preserve, it may be a question whether, in consideration of this fact, it would not be well to offer the use of the large room immediately for a national museum, of which the Smithsonian Institution would be the mere curator, and the expense of maintaining which should be paid by the general government. The cost of keeping the museum of the Exploring Expedition, now in the Patent Office, including heating, pay of watchmen, etc., is about $5,000, and if the plan proposed is adopted, the Institution and the Patent Office will both be benefited. The burden which is now thrown on the Institution, of preserving the specimens which have been collected by the different expeditions instituted by government during the last ten years, will be at least in part removed, and the Patent Office will acquire the occupancy of one of the largest rooms in its building for the legitimate purposes of its establishment. It is believed that the benefit from this plan is so obvious that no objection to it would be made in Congress, and that it would meet the approbation of the public generally.[1]

I can find no record in the minutes of the Regents, but have been informed by Mr. W. J. Rhees, of the Smithsonian Institution, that an urgent request for the use of the hall was made by the Commissioner of Patents and the Secretary of the Interior, and that the Board decided to grant this request on the condition that Congress should appropriate money for the construction of the cases and the transfer of the collections, and that the Secretary of the Interior should provide for the expenses of the care of the collections after their transfer in the same manner as before.

The question of the legality of the transfer of the collections was submitted by the Secretary of the Interior to the Attorney-General, by whom it was held that the provision in the eighth section of the act of August 4, 1854 (10 Stats., 572), placing the collections under the control of the Commissioner of Patents, and authorizing the employment by him of keepers therefor, was designed to be temporary only, and that the act establishing the Smithsonian Institution, as well as that making the appropriation in 1857, were to be regarded as indicating the purpose of Congress respecting permanent provision for these collections.[2]

The appropriation of 1857, referred to by the Attorney-General, was one giving $15,000 for the construction of cases and $2,000 for the removal of the collections. (March 3, 1857; 11 Stats., 219.)

In commenting upon this action, Professor Henry, in his report for 1857, remarked:

At the last session of Congress an appropriation was made for the construction and erection of cases to receive the collections of the United States Exploring Expedition and others in Washington, and also for the transfer and arrangement of the

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[1] Smithsonian Report, 1856, pp. 21, 22.

[2] Letter of Hon. William F. Vilas, Secretary of the Interior, to the Secretary of the Smithsonian Institution.

specimens. This appropriation was granted in accordance with the recommendation of the late Secretary of the Interior and the Commissioner of Patents, in order that the large room in the Patent Office occupied by the museum might be used for the more legitimate purposes of that establishment. We presume that the other part of the recommendation will also be carried out, namely, that the annual appropriation be continued which has heretofore been made for the care of this portion of the Government property. While, on the one hand, no appropriation should be made which would serve to lessen the distinctive character of Smithson's bequest, on the other it is evident that the government should not impose any burdens upon the Institution which would impair its usefulness or divert its funds from their legitimate purpose.[1]

In 1853, by the act of June 2 (11 Stats., 301), an appropriation of $4,000, "for the preservation of the collection of the exploring and surveying expeditions of the Government," was made as a contingent expense in the office of the Secretary of the Interior.

The management of this appropriation and of all which followed it from year to year was always placed entirely in the hands of the Secretary of the Smithsonian Institution.

In the report for 1858 Professor Henry gave the following concise history of the relations of the Smithsonian Institution to the national collections:

It will be recollected that by the law of Congress incorporating this Institution "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging to or hereafter to belong to the United States which may be in the city of Washington, in whosesoever custody the same may be, shall be delivered to such persons as may be authorized by the Board of Regents to receive them."

The law thus giving to the Smithsonian Institution all specimens illustrative of nature and art to be found in the several offices and departments of government was not construed as rendering it obligatory on the Regents to accept these objects if they considered it expedient to do so. Inasmuch, then, as this collection was neither essential to the plan of organization nor directly subservient to the comprehensive purpose of the donor in regard to a world-wide benefit, it was the ultimate decision of a majority of the Board that it ought not to be accepted and that no part of the donation ought to be expended in the care of property belonging to the government of the United States.

Previous to the discussion of this question it had been assumed that the Regents were under an obligation to take charge of the museum, and, on this account principally, a large and expensive building had been thought necessary. After it was settled, however, that the Regents were not bound to accept this trust, the work of construction was carried on more slowly, with a view at once to secure certain advantages to the building itself, and to increase the principal by funding the interest of the money which would be absorbed by its completion.

In the meantime a very large amount of specimens of natural history had accumulated at the Institution from numerous exploring parties sent out by the general government; and as these collections had been made under the direction of the Institution, and their preservation was of the highest importance to the natural history of the country, it was finally concluded that if Congress would make an appropriation for the transfer and new arrangement of the articles then in the Patent Office, and continue the annual appropriation previously made for their care and

[1] Smithsonian Report, 1857, p. 14.

JOHN WILLIAM DRAPER.

exhibition while in charge of the Commissioner of Patents, the Institution would, under these conditions, become the curator of the national collections. This proposition was agreed to by the government, and the contemplated transfer has accordingly been made.

It is believed that this arrangement will be mutually beneficial to the Patent Office and the Institution, since the former will be relieved from a duty scarcely compatible with the design of its establishment, and will gain possession of one of the largest rooms in the city for the exhibition of a class of models to which the public have not previously had ready access; while the Smithsonian Institution will be able to present to the strangers who visit Washington a greater number of objects of interest, and appropriate that portion of the large building not required for its own most important operations to a useful purpose.

The cost of keeping the collections at the Patent Office, including fuel, was about $4,000 annually, but the Regents might with justice have asked for an additional amount sufficient to pay the interest on the cost of that portion of the edifice occupied by the museum. It was, however, thought more prudent to restrict the application to the sum above mentioned, and to request that the appropriation might be continued under the charge of the Secretary of the Interior, thus obviating the necessity of an annual application to Congress by the Institution itself.

The cases at present required for the accommodation of the collections have been constructed at a cost within the appropriation made for that purpose; and the Institution is indebted to Hon. J. Thompson, Secretary of the Interior, and Hon. J. Holt, Commissioner of Patents, for the use of glass sash and shelving no longer needed in the room which formerly contained the museum in the Patent Office, but which have been applied to good purpose in supplying deficiencies in the Smithsonian building. The Regents are also indebted to Thomas U. Walter, esq., architect of the United States Capitol extension, for the beautiful design of the cases, and to Edward Clark, esq., architect of the Interior Department, for the inspection of the work during its progress and the examination of the accounts presented by the contractor.

In order to increase the capacity of the large room appropriated to the collection, the cases have been arranged in two stories, forming a series of alcoves, and a gallery on each side. By the adoption of this plan space can be provided for double the number of specimens which were exhibited at the Patent Office.

A considerable portion of the collections has been arranged, and a taxidermist employed to repair the specimens of zoology which have been damaged, and to prepare for exhibition others which have not previously been mounted. The museum will soon be an object of continued and increasing interest to the inhabitants of the city and to strangers who visit the capital of the United States.

An assent to the arrangement above stated for taking charge of the government collections is by no means inconsistent with the regret expressed in previous reports that the law of Congress directed provision to be made from the Smithsonian fund for a public museum and library. It must be evident to any one who attentively studies the past history of the operations of the Institution that the interest of the money expended on the building intended for this purpose would have been much more efficiently applied in the development and publication of new truths. But, in all cases where many views are to be consulted, the question is not merely what *ought* to be, but what *can* be accomplished. From the first there has existed a clear conception of the means by which the idea of the donor could be best realized, and the aim of the majority of the Regents has constantly been to approximate, as nearly as the restrictions of Congress would allow, to the plan originally proposed. The policy has been invariably the same, and the present reputation and generally acknowledged success of the Institution are the result of this undeviating course.[1]

[1] Smithsonian Report, 1858, pp. 13–16.

The portion of the Smithsonian income which can be devoted to a museum, and the $4,000 per annum appropriated by Congress, would not together be sufficient to establish and sustain a general collection of specimens of the natural history of the world. It will, therefore, be the policy of the Institution, unless other means are provided, to confine the collections principally to illustrations of the products of the North American continent. For this purpose efforts have been made, principally through the various exploring expeditions, to obtain a large number of specimens of all the species of the different kingdoms of nature found in North America; and at this time the collection under charge of the Institution is more extensive in number and variety than any other which has ever before been made relative to this portion of the globe. It is not in accordance with the general organization of the Institution to form a museum of single specimens, interesting only for their rareness, but to collect a large number of specimens of each species, particularly of such as have not been described, and to distribute these among the several naturalists who may have the industry, ability, and the desire to study them; the primary object of the Institution, namely, the increase of the existing sum of knowledge in this case, as in all others, being kept prominently in view.

The Institution has now become the curator of the collections of natural history and ethnology of the government, and by law is empowered, as it appears to me, to make the same disposition of the materials contained in these collections as it does of those procured at its own expense; the design will be to render the specimens in the greatest degree serviceable to the advance of knowledge. The museum now consists of the following collections, of which, according to Professor Baird, about one-fifth were brought from the Patent Office:

First, those of the naval expeditions; second, those of the United States geological surveys; third, those of the boundary surveys; fourth, those of surveys for railroad routes to the Pacific; fifth, of miscellaneous expeditions under the War and Navy Departments; sixth, those of miscellaneous collections presented or deposited by societies and individuals; and, lastly, of an extensive series of the results of explorations prosecuted by the Institution itself. By far the greater portion of the whole has been made under the stimulus and immediate direction of the Smithsonian Institution. A number of the special collections are still in the hands of those to whom they were intrusted for scientific investigation and description. The arrangement of the cases and the disposition of the articles intended for public exhibition has been a subject requiring considerable thought and experiment. It was not only desirable to obtain the largest amount of space for the accommodation of the articles, but, also, to arrange the whole so as to harmonize with the architectural embellishment of the large hall and thus to produce a proper æsthetical effect.[1]

In 1859, the Guide Book, unofficial yet issued by an official of the staff, was published with the words "Guide to the Smithsonian Institution and National Museum" on its cover, and about this time the words "National Museum of the United States" were painted over the door of the exhibition hall.

Congress did not, however, give legal sanction to the use of this name until nearly twenty years later, when providing for the erection of the new building to receive the collections given to the Smithsonian Institution at the close of the Centennial of 1876.

WASHINGTON, *February, 1891.*

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[1] Smithsonian Report, 1858, pp. 40, 41.

NOTE A.

JANUARY 1, 1842.

To the Honorable J. C. SPENCER and
The Honorable A. P. UPSHUR.

GENTLEMEN: The undersigned, a committee on behalf of the National Institution for the promotion of science, have the honor to submit to your consideration the following facts and remarks.

In a law of the 20th July, 1841, there is a provision in these words: "For the purpose of enabling the Secretaries of the War and Navy Departments to place in a state of safe preservation the specimens of natural history which are now deposited in their respective offices, or which may be brought there resulting from surveys of the unexplored regions of our own country, or from the exploring expedition now in the South Seas, by the authority and at the expense of the United States or otherwise, a sum not to exceed five hundred dollars."

And in a law of March 3, 1841, there is another appropriation "for defraying the expense of transporting to the City of Washington and of arranging the collections made by the Exploring expedition, five thousand dollars."

These laws are considered as having determined the principles which should govern in such cases.

First, that the expenditures should be made under the direction of the Secretaries of the War and the Navy Departments, and

Second, that the collections should be brought to Washington and be arranged there.

In the discharge of these duties, the Secretaries of the two Departments named, directed the collections referred to, to be delivered to the care of the National Institution, for the purpose of being arranged under its supervision.

On these accounts, as well as because of your position of Directors of the Institution, we have now the honor of addressing you.

The first appropriation of $500 was expended under the personal superintendence of the Secretary of War, he approving all accounts. The second, under that of the Secretary of the Navy. But in the course of the business this duty assumed the following form:

The society appointed a committee to supervise the arranging of the collections. It was the duty of this committee to suggest the expenditures and employments which it considered necessary, to examine into the accounts, and if it found the same to be correct, to recommend them to the approval of the Secretary. Under this system the appropriations have been expended, and the Institution is now without further means.

It is proper to remark that the entire collections of the Institution, as well in books as in specimens of natural history and of the arts, and as well those deposited by the Government, as those given by individuals and other Institutions and from foreign governments, will in the end belong to the United States, there being a provision to that effect in the constitution of the Institution. The whole can, therefore, with propriety be considered as public property.

With this brief exposition we shall now lay before you the state of the affairs of the Institution in reference to the collections, deposits, gifts, and expenditures.

The entire collection is deposited in the upper rooms of the Patent Office; it consists of—

Donations from foreign governments.

Donations from other institutions, foreign and domestic.

Donations from ministers and consuls abroad, and from officers of our army and navy.

Donations from individuals and from members of the Institution.

The Iowa collection of mineralogical and geological specimens, made by R. D. Owen, Esq., under the direction of the Treasury Department.

The collection of mineralogical and geological specimens which had been in deposit in the Bureau of the Corps of Topographical Engineers.

The collection of portraits of distinguished Indians, and the collection of Indian curiosities which had been on deposit in the War Department.

The minerals, books, papers, and personal effects of the Smithsonian bequest.

The two shipments which have been received from the Exploring Squadron, consisting of minerals, specimens of natural history, works of art, implements of war, and curiosities.

The books, minerals, and works of art belonging to the late Columbian Institute.

The books, papers, and proceedings of the late American Historical Society.

Cabinets and specimens, deposited by members in trust, for public use.

It can not be said that these materials are now arranged. The space which has been appropriated to the temporary use of the Institution—the eastern half of the upper room of the Patent Office—is entirely insufficient for such a purpose, as well as the means and time which have been devoted to them. But as more just conceptions in those respects, as well as the value of the collections, will be derived from an exhibition in detail of the latter, it will now be laid before you.

About 1,000 volumes of books and numbers of pamphlets.

About 50 maps and charts.

About 500 castings in plaster, medals, and seals.

Ten pieces of statuary, marble, or plaster.

One hundred and sixty-eight paintings.

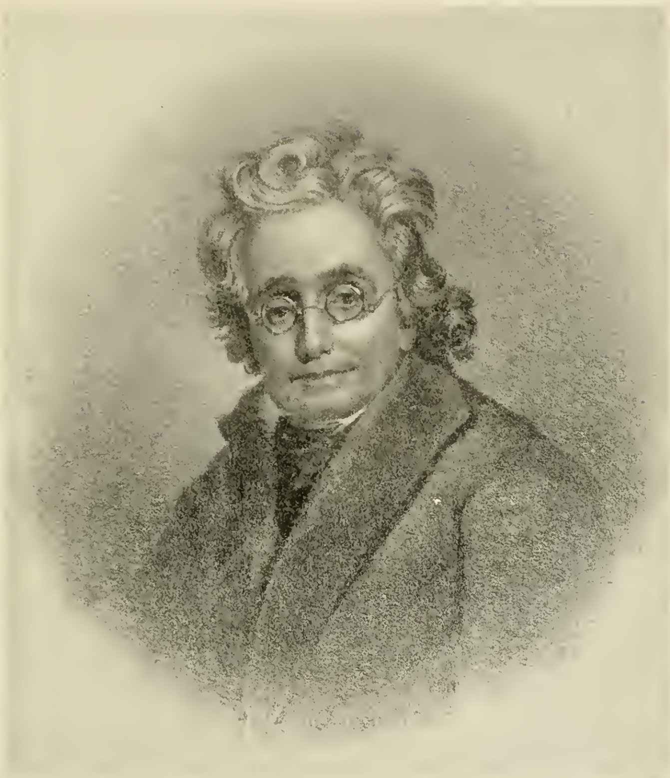
About 1,600 bird skins, of which rather more than 400 have been cleaned, stuffed, and mounted, and deposited in cases, but which yet require eyes and to have labels properly written and affixed. They also require to be scientifically arranged, the first labor being necessarily limited to the preparing of the skins and putting them under the protection of cases. It may be proper to remark that to clean, stuff, and put in position six bird skins a day, is the greatest result from the labors of an expert and experienced taxidermist, and that so much can be done only with skins in good order and of moderate-sized birds. Much less is the most that can be done with skins that have been twisted and for a long time closely packed, or with skins of large birds or of quadrupeds, a single skin of a large bird often requiring from one to two days.

About 160 skins of quadrupeds, about 50 of which have been stuffed, set up, and put in cases.

About 200 glass jars have been filled with mollusca, fishes, and reptiles, but these yet require to be divided into more jars and to be arranged, classified, and named; and there yet remains 2 barrels and 10 kegs of wet and soft specimens, which have not been opened, except to replenish, when necessary, the preservative material.

There are about 50,000 botanical specimens, embracing many that are extremely rare and entirely new. An able botanist, Mr. Nuttall, who has had the examination of this collection, pronounced it equal, if not superior, to any in the world, of the kind and from the same regions. He was for a short time employed to aid in the arranging of the specimens, and assigned them to orders and genera, but they yet require the greater labor of specific distinctions.

There are about 3,000 specimens of insects, the greater part of which have been arranged in genera, but yet require the further and more laborious arrangement into species. A large collection of insects, said to be one of the finest of Europe, has lately arrived in New York, to be placed in deposit in the Institution for the benefit of the public. It is from that well-known and eminent naturalist, C. F. Castleneau, Esq., a member of the Institution. We have also notice of a collection of minerals being on its way from the School of Mines of Paris, as a present to the Institution.



Peter S. Du Ponceau

There are probably several hundred thousand shells, constituting a mass of from 30 to 40 bushels, all valuable and many of them very rare, entirely new, and extremely beautiful. With these nothing has yet been done but to open the boxes and clean a few of them. Many conchologists have pronounced this the finest collection in the United States. It will require much labor and time to arrange it.

About 500 coralines have been cleaned and partially arranged. About 300 starfish, echini, radiati, etc., have received a like attention; also, about 100 sponges and about 2,000 crustacea. And there are yet many more specimens of these, several hundred, which have not been examined.

About 50 fish skins. These are yet in the same condition as when received.

About 7,000 specimens of minerals are placed under the protection of cases, but require a great amount of labor to arrange and label. There are also upwards of 50 boxes of mineralogical and geological specimens which have not been opened.

Accessions are daily made to the collections of the Institution in the form of donations, and we are now looking with some anxiety for additional shipments from the Exploring Squadron. Nor can it be doubted that when the Squadron returns, it will be freighted in value and number of specimens equal to all it may have sent home during its long and interesting voyage.

Already the specimens which have been placed in cases, nearly fill the space, one-half of the upper room of the Patent Office, which the liberality of the Secretary of State assigned temporarily to the use of the Institution; but these specimens are of necessity in a crowded state of imperfect arrangement. And the specimens now on hand, when put up and properly displayed, will fill the whole of the room. We already, therefore, and with much reason, anticipate being straitened for space.

The occupation of our present place is also merely temporary. The room will in a few years be required for the purposes for which it was erected. This consideration necessarily affects the character of the labors of the Institution in reference to the collection, which can not fail to partake of the character of its occupation of the room, and in consequence its labors are limited to such as are necessary and preliminary to a permanent and scientific arrangement.

The same consideration has influenced the employment which has been authorized. The committee to which this matter was intrusted by the Institution, did not feel authorized to recommend to the department having charge of the appropriation any system which should involve the Government in a liability for one day beyond the enduring of the appropriation.

The appropriation has become exhausted, but the persons employed have continued their labors under the hope that the great work upon which they have been engaged and which has progressed with such flattering activity, will not now be abandoned. These persons are:

H. King, Esq., Curator of the Institution, who has the general care of the collections which have been intrusted to the Institution, and who is held responsible to the Institution for their safekeeping. His particular attention has been devoted to the minerals, mollusca, echini, radiati, spongia, and crustacea, and to the construction of the cases, procuring of the glassware, and other requisite materials. His compensation was fixed at first at $3 per day, but afterwards, in consequence of his being at much expense for trips he had to make to Philadelphia, New York, and Boston, and being liable to such trips in the execution of his duties, it was raised to $5 per day.

I. R. Townsend, Esq., taxidermist. His duty is to dress, stuff, prepare, and arrange the skins. His compensation is $3 per day.

Mr. Nuttall, who was employed on the botanical specimens at $3 per day. He is not at present in employ, having other engagements.

One assistant, Mr. Pollard, at $1.50 per day.

One other assistant, who is also a good mechanic and arranger, Mr. Vardin, at $1.50 per day.

One messenger and laborer, at $1 per day.

The occasional employ of laborers and mechanics.

All of the appropriations not required for these employments have been expended for cases, glassware, and other necessary contingencies to such an establishment, the accounts and vouchers for which have been duly rendered.

As before remarked, these arrangements are but temporary, nor are they commensurate to the mass of labor which has to be done, or to the just expectations which are entertained in reference to it. More force must be employed and more varied talent than the means appropriated have enabled the Institution to command. With the experience which has been acquired, the committee will, if desired, under the correcting hand of the Institution, submit to your consideration their views in reference to the expenditure of any future appropriation.

The funds of the Institution are of two kinds.

First, the amount derived from the annual tax upon members.

Second, the amounts appropriated by Congress.

The first is necessarily small, from the few members liable to the tax, and the amount of it, for each, $5 per annum; and it is expended for rare and necessary books, necessary printing, cases, and other contingencies.

The second has as yet been no more than $5,500, and has been expended in the manner and for the purposes before indicated. We are now, however, without means, and were it not that the individuals employed continue at the labor in the hope that the government will continue its patronage to its own property, the work of preparation and arrangement would be suspended, as the most the Institution could do from its own funds, would be to employ some one to take care of the collection.

The object of the Institution is to "increase and to diffuse knowledge among men." Its time and whatever talent it possesses are faithfully devoted to it. But its members have occupations, private and public, which can not be neglected, and they have not the wealth for voluntary contributions. We are therefore obliged to look to the Government for aid in funds. In other countries, where, although public spirit may not be, individual wealth is so much greater, no institution of the kind has ever succeeded without government patronage. How much more necessary, then, is such patronage with us. And the more justifiable and necessary will this patronage appear, when the reflection is made, that the greater part of the property under our care already belongs to the government, and that all donations, collections, and purchases by the funds of the Institution, must by our constitution eventually take the same course. The Institution is but a curator for the government, voluntarily bestowing its time and talents to objects which can not fail to increase national fame, to elevate national character, and to promote the design of the great philanthropist to "increase and to diffuse knowledge among men."

We therefore respectfully but confidently address you as Directors of the Institution and as heads of the Departments under which former appropriations were expended and solicit your efforts to obtain further government aid.

There are two points to which we are anxious to draw your particular attention. One is an appropriation from Congress for preparing and arranging the government collection; the other for additional space. The first is absolutely necessary, for as before remarked, former appropriations are exhausted, and the work must be abandoned, if more is not granted. We consider that about $20,000 is required for the active and correct prosecution of the work during the year 1842. More labor must be applied, and more varied talent be employed; and we believe it will not be expected that these requisites are to be obtained without a proper consideration. The committee pledge themselves to a faithful superintendence of the expenditures, and to a faithful account of it.

The second is equally necessary. We want space properly to exhibit the specimens. We acknowledge that our occupation of the half of the room assigned to the

Institution is but temporary, and that we must look forward to the period when the whole room will be required for other purposes; and while our occupation is of this character, we are also, and everyone must be, impressed with the conviction that our arrangements can not assume that scientific and permanent character which will be their ultimate condition. Our present labors must therefore be preliminary to a permanent and scientific arrangement, labors, however, not lost as they would be necessarily under any circumstances. But to execute these properly more space is required, and also the uncontrolled occupation of the whole room. This space is the more necessary from the very preliminary character of present labors, as the room has to be a workshop as well as an exhibition room. We make this request from a thorough conviction of its necessity, and from the belief that if granted it would not incommode the Patent Office. And to prevent misapprehension, we will take this opportunity to state that from the superintendent of that office, the Institution has received those accommodations and facilities which might justly be anticipated from a gentleman of his known urbanity and intelligence.

J. J. ABERT,
A. O. DAYTON,
FRANCIS MARKOE, Jr.,
Committee.

NOTE B.

REPORT UPON THE MATERIALS IN THE INSTITUTE.

By Doctor PICKERING, Doctor DANA, Doctor HALE, and Mr. BRACKENRIDGE.

On the 12th of September last I received the charge of the collections of the National Institute; and the Hall was soon after placed at my disposal by an order from the State Department. My time has since been chiefly occupied in general plans of arrangement and accommodation, in reviewing the collections of the Exploring Expedition that had been already opened, opening those recently received and ticketing and taking an account of them. The larger portion has now been gone through with, and deposited in the allotted cases, but not yet rendered intelligible by means of labeling and arrangement. I should expect, however, some branches of the zoological collections, not yet unpacked, and a portion of the botanical yet to arrive. I am not prepared at present to make a full report on the proceeds of the Exploring Expedition, but have only to offer a few remarks relating generally to the objects under my charge.

The interior arrangement of the Hall is not altogether such as I should have originally recommended; but the cases being already completed, it remains only to conform to the plan, as far as practicable. By lining the walls with cases, there will be sufficient accommodation for the present collections of the Institute, including those of the Exploring Expedition, and the specimens of American manufactures already within the walls. At the same time there is no provision for future increase in any department, much less for any new objects that may be contemplated. There is no room for a geological series of the United States, for a library, a gallery of the fine arts, etc.

The persons at present employed are:

Mr. Varden, having the immediate supervision of the Hall and fixtures.

Mr. Dana, having charge of mineralogy and geology, and also of corals and crustacea.

Mr. Brackenridge, having charge of the greenhouse and all botanical collections.

Messrs. Townsend and Pollard, taxidermists, also having charge of the ornithological department.

Mr. Falconer, carpenter; constantly occupied, etc.

Mr. Campbell, messenger and general assistant.

All have thus far given entire satisfaction.

I am not aware that any increase of force is necessary. There is, however, one Department on which, from the destructible nature of the objects, we are unable to bestow the requisite attention. I allude to that of entomology. We have on deposit the extensive and valuable collection of Count Castleneau, and should be ashamed to allow it to perish in our hands. The collections, too, of the Expedition, though not so extensive as was perhaps expected of us, and in part lost with the *Peacock*, yet it is believed, include materials that in competent hands, might be the means of eliciting facts worth preservation; and having a wider bearing than may be supposed by those who have not duly weighed the relationship of the different parts of creation. Our gatherings in this branch derive a further consequence from our being able to connect them with the vegetable products of the widely separated islets of the mid-ocean and other unfrequented regions it has been our rare fortune to visit.

The collections in conchology have only in part been opened (viz, up to the time of our leaving the Fiji Islands), and no portion properly arranged and exhibited; neither at the present moment can any space be allotted for this purpose. When fully displayed, it is believed that those interested in this branch of science will not be disappointed as to their extent and value.

For the ornithological department, and the dried skins of other animals, I must refer to the accompanying list; promising, however, that there are besides many interesting specimens in osteology, both of man and the inferior animals.

Of specimens in spirits brought by the Expedition, we number 208 jars, containing insects and minor objects in zoology, not less in all, than 4,000 different species; and 895 envelopes of larger specimens. These last include about 900 different species of fishes and 200 of reptiles, making a total of 5,100 species in spirits, exclusive of the Crustacea noted by Mr. Dana.

For the botanical department I must refer to the accompanying extract from a report by Mr. Brackenridge. I inclose also reports on the drawings made during the cruise of the Ex[ploring] Squadron, by Mr. Drayton and Agate; on the mineralogical and geological collections, from Mr. Dana; and a paper on the philological department, I obtained from Mr. Hale, who happened accidentally to be in town. As Mr. Hale has not enumerated the collections in this latter branch, I will here specify them more particularly. The Institute now possesses, exclusive of—

Thirty-six volumes and pamphlets, and a large bundle of newspaper files; historical documents, all printed at Lima and Chile, which may not properly come under this head.

Grammar of the Quichua language, which is still the vernacular in the mining towns of the Peruvian Andes.

Ten tracts in the language of the Society Islands, printed in part at Tahiti.

Eleven tracts in the Samoan language, from the Mission Press at those islands.

Printed specimens also of the Fiji and New Zealand languages, including New Zealand Testament.

Sixty-three volumes and pamphlets in the language of the Sandwich Islands, including the entire translation of the Bible, printed at those islands by the American Mission Press; accompanied also with specimens of engraving by native artists, one of which in particular, viz, a general map of the islands, would do no discredit to the state of the arts at home.

A Japanese book (apparently a religious work) and other writings, believed to be entirely unique in this country.

The original Tagala grammar, printed two centuries ago at the Philippines, and giving an account of that alphabet, now extinct; the more interesting, as this is one of the most remote points to which the invention of letters appears to have penetrated—before, at least, the modern improvements in navigation.

TIMOTHY DWIGHT.

Nineteen volumes of Malay manuscripts; in all probability the finest collection in existence.

Eleven volumes of Bugis manuscripts. (A note says: "The only font of Bugis type in existence belongs to the American board of Missions at Singapore.") The Bugis are very proud of their literature, and are now the most prominent people in the East Indian Archipelago; for the peculiar geographical features of that vast region would seem to preclude the division into nations, which obtains in other parts of the globe.

A Bali grammar. (What follows is derived from other sources than the Expedition.)

Leaves from a Bali book, presented by Mr. Thomas H. Gillis.

A Siamese book.

Several slabs of hieroglyphics from Central America, by Mr. Rupel, United States consul, La Guayra.

Coptic books, by Mr. [George R.] Gliddon, late consul at Cairo, and

Egyptian antiquities and hieroglyphics, by the same; which are specially worthy of notice, and give a juster idea of the style of the works of that wonderful people than could be acquired from plates. Some of these fragments have long been wanted in this country, and will be looked at with the more interest as the extraordinary and authentic annals disclosed by them become more generally known.

I will not now enter into an account of the implements, arts, and manufactures of the various people we have visited. We flatter ourselves, however, that these will prove not the least important part of the collections. I will refer now only to the interest with which we should look upon some such relics of the tribes who once inhabited our Eastern waters; whose race has disappeared ere its history was written. When posterity shall demand of the present generation, as men of intelligence, some account of these people, what will be forthcoming? It is generally to be feared only that which is written in imperishable stone—a few stone hatchets and arrowheads.

With regard to our Western tribes, better things are to be hoped for, although they have already lost some of their arts and native ingenuity from intercourse with civilized man. The collection of implements, already within the walls, is quite respectable, and the extensive series of their portraits from the War Department may well deserve the term of a National Monument.

Some national depository has long been wanted where individuals could place, under the care of Government, any object they may happen to possess, in nature or art, that is rare or instructive, calculated to improve and elevate the mind, or furnish materials for new deductions.

The same observations would apply to a national library. Individuals would hardly think of making donations to the Congressional Library; neither would foreign societies. Yet two of the finest libraries of our country—indeed, so far as their sphere extends, I would term them of a higher grade than the rest—have been got together exclusively by donations. I would not by any means be understood to undervalue the Congressional Library, and the very judicious selections that have been made for it of late years. But shall we always be content with the love of mere England, herself by no means in the first rank in every branch of knowledge? We look in vain in any part of our country for a full assemblage of French, German, Italian, Swedish, Danish, Spanish, Portuguese, Oriental, or hardly classical literature.

I have omitted to mention that the property of the Institute is at present very much exposed to depredation. From 6 to 9 a. m., and also after 5 p. m., the Hall is left entirely unguarded, and might be entered with the utmost ease. I would propose that a day watch be set over the Hall and building, as about other public edifices.

Respectfully submitted.

CHARLES PICKERING,
Curator of the National Institute.

WASHINGTON, *November 22, 1842.*

BOTANICAL DEPARTMENT.

Among the various branches of science which it is the object of the National Institute to encourage, disseminate, and exhibit for the benefit and improvement of mankind, perhaps none claims its attention so much as botany. By the study of this science we learn the uses of trees, shrubs, and plants, whether medicinal, nutritious as food, or useful in the arts. The beneficial effects its study produces on society, or on those who pursue it, by softening down the asperities of our nature, and leading the mind to contemplate objects of a higher order than the mere gratification of ordinary amusements—which appears to have been the view taken of it by all civilized nations.

The National Institute through the Ex[ploring] Expedition, possesses one of the most extensive and varied botanical collections, from the numerous places which the Expedition touched at, that is yet known to have been accumulated during any voyage of similar character. This collection has not yet been arranged or set up according to any particular system, whereby it can be referred to conveniently, but rests in the Institute in mass. Whenever a set of specimens of the whole is classified and arranged systematically, there will still remain a great number of duplicates to dispose of to institutions of a similar character, either in exchange or otherwise, as the Institute may think fit.

There is also another point connected with botany to which the scientific world has of late years turned their attention, viz, the geographical distribution of plants over the surface of the globe; also the altitude or the heights at which certain tribes appear and disappear. On this point the collection could furnish the best information, as many of the specimens were found at a height of 16,000 feet above the level of the ocean. The herbarium it is proposed to put up in neat bands and arranged in cases after the manner of a library.

The Institute has also come into possession of a collection of rare and highly interesting living plants, brought home also by the Expedition, which has since received several additions in return for seeds distributed from the same source; also a few donations of other plants from various quarters. For their preservation, a greenhouse, 50 feet long, and partitioned into two apartments, has been erected on the lot behind the Patent Office. The number of species in cultivation amounts to 500, and with duplicates of the same, there are about 1,100 plants in pots, over and above those now coming up from seeds. As it is expected that donations will frequently be made, and as the plants we now have will be increasing in size, the present house by another year will hardly suffice to contain them. The propriety also of having a lot of ground fenced in where these plants could be set out during the summer months, and which could also be used for the raising of ornamental trees, shrubs, and other hardy plants, which may come into the possession of the Institute, is strongly urged. The meagerness of our parterres and shrubberies evidently shows that additions are wanting for ornamental gardening.

It would also be a receptacle for proving all samples of fruits, flowers, and esculents that may from time to time be presented to the Institute, there being, so far as I am aware, no public establishment of the kind in existence in the Union. Officers of our Navy and consuls residing in foreign countries might do a great deal in introducing fruits, vegetables, and flowers; and whenever it is known that such an establishment exists, there is every reason to anticipate donations, where the country in general is to be benefited by such an enlightened and commendable scheme. A nucleus once formed, with a gradual accumulation of stock, and a steady perseverance in its support and furtherance, we might, at some not very distant day, vie with the most celebrated establishments of the same kind in Europe. The progress of the benefit to be expected must be, like the undertaking, slow but sure, and the effects will soon become evident to every enlightened citizen.

The following is a list of plants, or number of species in the herbarium, collected at the various places visited by the Expedition:

Madeira	300	Low Coral Islands (in all)	27
Cape de Verde Islands	60	Sandwich Islands	883
Brazil	980	Oregon country	1,218
Patagonia (Rio Negro)	150	California	519
Terra del Fuego	220	Manila	381
Chile and Chilean Andes	442	Singapore	80
Peru and Peruvian Andes	820	Mindanao	102
Tahiti	288	Tulu Islands	58
Samoa, or Navigator Islands	457	Mangsi Islands	80
New Holland	789	Cape of Good Hope	330
New Zealand	398	St. Helena	20
Lord Auckland Island	50		
Tongatabu	236	Total number of species	9,674
Fiji Islands	786		

The number of seeds brought and sent home by the Expedition amounted to 684 species, the most of which have been sent all over the country. Several cases of live plants were also sent home, of the existence of which there are no traces. The live plants brought home by the squadron amounted to 254 species, and these now form part of the greenhouse collection.

WM. D. BRACKENRIDGE.

NOVEMBER, 1842.

REPORT OF MR. DANA.

The inadequacy of the space in the Hall of the Patent Office at present allotted for the departments of geology and mineralogy, becomes daily more obvious, as the extent of our collections is better known. The spacious hall is a noble one for the purpose to which it is devoted; but so many distinct sciences claim a share of the room, that only a small area can be set apart for any one of them. The collections of the Exploring Expedition swell out beyond our expectations, and when fully arranged there will be room for little else.

The packages of mineral and geological specimens already opened occupy three of the cases in the Hall, and there are yet seven or eight boxes untouched. These Expedition collections include suites of specimens from the following countries and islands:

1. Brazil, illustrating especially the deposits of gold and gems in the great mining district of Minas Geraes; also the structure of the country about Rio Janeiro.

2. Rio Negro, Patagonia, where the extensive pampas of La Plata, and the Tertiary deposits upon which they rest, afforded us a series of interesting specimens, exhibiting the character of these great prairies of the south, and the salt lakes that abound over them.

3. Orange Bay, Terra del Fuego, where terminates the great chain of the Andes. A species of fossil and the nature of the rock deposits, appear to afford sufficient evidence of the similar and consentaneous origin of this portion of the chain with the Andes of Chile and Peru.

4. Chile and the Chilean Andes. The mountains were twice ascended by parties from the Expedition, and specimens obtained, in addition to the rocks of the coast, and ores from copper mines.

5. Lima and the Peruvian Andes, affording us gold and silver ores. The summit of the Andes was passed by a party of officers, and among their collections is a fossil Ammonite, a large extinct species of shell, obtained at a height of 16,000 feet.

6. Oregon. The collections illustrate the rock formations of Northwest America, including the lignite or coal deposits of the Cowlitz and Fraser River, the sandstones and clay slide occurring at intervals from Puget Sound into California, affording numerous organic remains of shells, echini, fish, etc., and the granites, basaltic rocks, limestones, ores, etc., of the Territory.

7. Upper California.

8. The Sandwich Islands. A region of volcanoes of various ages from the great gulf of Lua Pele, where lakes of liquid fire still boil, to the lofty mountains of the western islands of the group, which in the lapse of time have been so shattered by convulsions and worn by an abrading sea, rains, and running water, that no distinct trace remains of the vent or vents that ejected the successive layers of basaltic rock. On account of this difference of age in the several parts of the group, we have not only complete collections of modern lavas, but others illustrating the operations of these fires for ages back. The late eruption of June, 1841, is well illustrated by numerous specimens from its lavas or scoria, and from the sand hills and new beach formed as the lavas entered the sea. The tops of the high mountains of Hawaii, each about 14,000 feet in elevation, have also contributed to the collections, through the exertion of the officers of the *Vincennes*, who were long engaged in explorations on this island.

9. Navigator or Samoan Islands, a region of ancient basaltic mountains and extinct craters, some of whose twisted lavas and scoria seemed to be of quite recent origin.

10. Society Islands, of similar structure, but with fewer evidences of modern volcanic action.

11. Fiji Islands, also basaltic and containing some boiling springs.

12. New Zealand, combining the craters, active and extinct, boiling springs, and volcanic products of the other Polynesian islands, with granite rocks, sandstones, and shales, and deposits of coal.

13. New Holland, the collections from the coal region, including the fossil vegetation, and from the subjacent rocks which abound in organic remains, is probably the most extensive that ever left the country.

14. Philippine Islands, a region of granite and talcose rocks, sandstone, shales, and limestone, with mines of gold, copper, lead, and coal, besides containing one of the largest active volcanoes of the East Indies, and many extinct craters, boiling springs, etc.

15. Sooloo Sea, a region of numberless extinct craters or volcanic mountains and abounding in coral reefs.

16. Singapore.

17. Cape of Good Hope.

18. St. Helena.

19. Cape Verde.

20. Island of Madeira, mostly consisting of basaltic rocks, tufas, or lavas, and remarkable for the grandeur of its mountain scenery, and the richness of its vegetation.

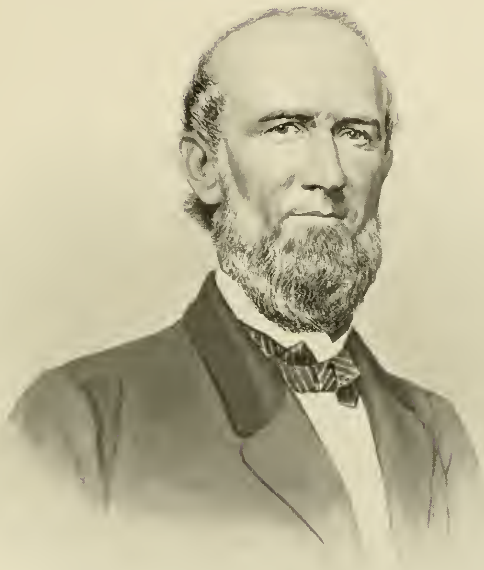
21. The South Shetlands, which afforded large masses of sal ammoniac.

22. Rocks and earth from the Antarctic land, taken from icebergs in its vicinity—principally granite, basalt, and a red, compact, quartz rock or sandstone.

To these should be added the collections from numerous coral islands, which include not only specimens of dead coral rock, the material of the islands, but also various living corals now growing about their shores. We leave the corals for the present, as they require separate remark.

The above will give some idea of the interest that attaches to the Expedition collection.

Besides the three cases in the Hall, to which I have alluded, two others are all that, with due regard to the other departments, can be set apart for the sciences of geology and mineralogy. There are already large collections of minerals waiting to



Jas. B. Eads

be arranged, to which Colonel Totten has generously added his entire cabinet. The extensive collection which accompanied the Smithsonian bequest has been often noticed, and we pass it by without further remark at present than to testify to the beauty and interest of its specimens. In addition, there are 27 boxes from the Iowa Territory, enclosing specimens from the lead and copper mines, and others elucidating its general geological structure, collected by the able geologist of that region, Mr. D. D. Owen. A fine suite of Ohio fossils has been received from Mr. Locke, of Cincinnati, comprising numerous species of trilobites. A rare collection of bones of mammoth size, the remains of a megatherium, an extinct animal, was lately obtained at Skiddaway Isle, Georgia, and y the liberty of Doctor Screven, of Savannah, are now in the Hall. Other packages have been received from M. C. Buck, William A. Irvin, Robert Brown, Captain R. Latimore, D. A. Buckley, of Jacksonville, Illinois; Fr. Markoe, jr., of Washington; J. M. Allen, of Albany; M. Strong, of Vermont; Martin Johnston, Mr. Ziegler, Joseph Willett, of Maryland; J. I. Greenough, Professor U. Parsons, Mr. Mecklin, of Maryland; G. R. Gliddon, consul in Egypt; W. L. Ames, of New Jersey; Doctor J. H. Caustin, C. D. Barton, of New York City; William M. Mitchell, of Virginia; Doctor Lewis Sayinsch, and O. Root, esq., of Syracuse, New York. Specimens are constantly arriving, and now, after the late circulars issued by the several Departments of Government to our military and naval officers and consuls, they may be expected in still greater numbers.

After arranging the expedition specimens, there will be one case and a part of another for all the mineral collection, the Iowa geological specimens, and the many others in our possession. With the exception of the minerals, for which there is scant room, the whole must remain closed.

The importance of these sciences, and the interest of the country in its mineral resources, make it desirable that some plan like the following should be adopted, and as soon as may be carried into execution: There should be a complete collection of minerals, systematically arranged, comprising specimens from all countries, and illustrating fully every branch of the science. For geology—in the collections of which are included rock specimens, fossils, soils, and whatever may illustrate the formation of our globe, the changes in its progress, its present condition, and mineral or agricultural resources—I would suggest that, in addition to cases for foreign geology, there be a special case set aside for each State in the Union, to contain specimens of all its productions, mineralogical and geological. This plan carried out, a single walk through the Hall would convey the information of years of travel; the mineral wealth of each State would be open for inspection, and the nature of their productions and their comparative value might at once be read off. Those interested in coal explorations would find here the series of rocks which, in other States or regions, are associated with this mineral and indicate its presence; and near by those rocks also which by some resemblance have so often led to fruitless explorations; the true and the false might be readily compared, and, with the definite information contained, treatises on this subject, before scarcely intelligible, could be read with profit. The same with the ores of iron, copper, lead, gold, silver, etc., and the various materials used in building, soils, etc.

Such an arrangement, embracing within its plan every part of our country, will enlist exertions as widely extended; and we may confidently believe that the titles New York, Pennsylvania, Virginia, etc., inscribed on the respective cases, would not long stand over empty shelves. Indeed, for some States, a second and a third case might soon be required. The Iowa case could now be filled and a commencement might be made with the case for New York, also that for Ohio, Virginia, Maryland, Pennsylvania, Rhode Island, and New Jersey. As geological surveys are in progress in many States, or have been completed, there will be little difficulty in general in obtaining complete suites for the National Institute. The corals in the Hall, with few exceptions, were received from the Exploring Expedition. The collection is extensive and possesses peculiar interest inasmuch as the species are mostly from seas that have seldom contributed to the cabinets of this or any country. The various cruises of the vessels among the numerous Pacific islands afforded unusual opportunities for the collection and examination of these singular forms of animal life, and much that is novel has been brought to light with regard to the structure of coral islands, the growth of corals, the nature and forms of the animals that deposit them (of which a large collection of drawings has been made), besides discovering many new species and correcting some errors in former descriptions. The number of species brought home is not less than 250, and if to this be added the smaller corallines it will amount to above 350, besides 50 species of still inferior grade of organization, the sponges. The corals now occupy two cases, which are barely sufficient to receive them. A separate case of West India corals might soon be filled, as we may expect large collections through the exertions of the officers of the Navy cruising in those seas. It would be quite important that these productions from the opposite sides of our globe, the East and West Indies, be kept separate.

The beauty of these collections is sufficient of itself, as is believed, to engage the attention and more than a passing glance or hasty word of admiration. But their interest is greatly enhanced when it is considered that thousands of square miles of land have been added to our globe by the labors of the minute coral builder, and that seas have been studded with islands that otherwise would have remained a waste of waters.

Before closing this communication I may add a word on the crustacea in the Hall, which department fell into my hands in the expedition and comes under my charge also at the Institute. The collection now arranged includes about 650 species, nearly all of which are from the Exploring Expedition. The whole number of species collected and examined during our cruise is not far from 1,000, more than half as many as the whole number known. Of these, 500 and upwards, have been figured; and not less than 450 out of the 500 are new species, besides many others in the collection not yet particularly examined. About 250 species are oceanic and belong to genera of which not over 30 species are known, affording, as is thus seen, a great number of novelties to be brought out in the publications of the Expedition. The most of these oceanic species are microscopic, generally less than a tenth of an inch in length. Although so minute, they sometimes swarm in such numbers as to give a red tinge to the ocean over large areas. While at Valparaiso, the sea for miles to the southward appeared as if tinged with blood, owing to the myriads of these minute crustacea. Some species are so transparent that, under the microscope, all the processes of vital action, the motion of every wheel in the complex organization of animal life is open to view, exhibiting many novel facts, curious and important to the physiologist.

The arrangement of the Expedition specimens may be completed in the space that we now occupy, but the addition of such American and foreign specimens as will gradually collect around this nucleus will finally extend the collection over double its present area.

Very respectfully,

JAMES D. DANA.

NOVEMBER, 1842.

DEPARTMENT OF PHILOLOGY AND ETHNOGRAPHY.

One of the sciences which have of late years attracted an increasing attention, and one which from its subject would seem to claim a peculiar regard, is what may be termed the Natural History of the Human Race, or, as some have named it, anthropology. It divides itself naturally into various branches, possessing distinct names of interest, and requiring different methods of study. One of them, and that, perhaps, to which the Institute will be able to contribute most largely, treats of the manners and customs of the various nations and tribes of mankind, as indicating the character and the grade of civilization which is to be ascribed to them. Travelers in Egypt inform us that, from the representations of objects and views pictured on the monuments of that country, one may obtain a clear and probably accurate idea of the mode of life of the ancient inhabitants, and can thence form a better conception of their national characteristics than from all the works of historians. The natives of most countries, particularly those less advanced in civilization, possess no monuments of this kind, which may be copied or transported into our midst, like those of Egypt. But one may have the very implements and manufactures which those pictures would represent, the canoe and net of the fisherman, the bow and javelin of the hunter, the spear and club, the helmet and buckler with which the warrior went out to meet his enemy; we may have the clothing, the domestic utensils, the ornaments for the dance—in short, enough to show the state of the arts, the daily habits, and the ideas of comfort and prosperity existing among particular people. Among the collections of the Exploring Expedition deposited with the Institute will be found nearly all the articles of native manufacture in use among two tribes of distinct race, the New Hollanders and the Fijians; those of the former number about a dozen, while the latter yield several hundreds. A single glance at the two collections will give a clearer idea of the wide difference existing between these tribes than any description.

In tracing the migrations of a people and the connections of distant branches, the comparison of arts and social habits may, if pursued with caution, be an important guide. A person knowing nothing of our language or history, who should visit the United States, after having traveled in Europe, would have little doubt from which country of the latter our ancestors proceeded. The islands of the Pacific are peopled by two distinct races, the one having a yellowish brown complexion, with flowing hair; the other a dusky skin, frizzled or wooly hair, and features approaching the African type. There is not in the climate or nature of the islands which they respectively inhabit any reason why their habits and mental characteristics should differ. Yet we find that the art of pottery and the use of the bow are common to all the islanders of the latter or dark-skinned race, without exception, while they are entirely unknown to the former, except where they have been acquired in late times from the other. We must, therefore, presume that these arts were brought by the dusky tribes who possess them from the original seat whence they have emigrated. These observations will show that the articles of this description preserved by the Institute are not to be regarded merely as amusing toys or as objects of idle curiosity, but possess an important scientific value.

Another department of this study relates to the physical varieties of the human race. In stature, in complexion, in the nature of the hair, and the shape of the cranium the differences that prevail between various tribes are very striking. Some have supposed it possible to classify all these varieties under these principal divisions or races, while others have believed them to be so numerous and to fade into one another by such insensible gradations as to set all classification at defiance. Still there can be no doubt that every distinct people possesses a peculiar cast of countenance and style of complexion and feature, what is commonly called a national physiognomy, and that separate tribes and nations, descended from the same stock, preserve in their physical characteristics the traces of their common origin.

Knowing, as we do, that the influence of climate and manner of life is powerful in modifying the constitution and personal appearance of those subjected to it, a question of the highest importance arises as to the extent to which this modifying power may be effective. Some have supposed that all the peculiarities which distinguish the varieties of mankind have had their origin in this influence of climate and social habits, while others have considered the power much more limited, and maintain that these peculiarities have existed unchanged as they were originally stamped on the progenitors of the different races. These opposite views are supported at the present day by writers of the highest authority, and as the question is evidently one to be settled not by reasoning so much as by observation, every fact bearing on this point merits to be recorded. The Institute possesses a small collection of crania, obtained by the Exp[loring] Expedition, which will afford some useful results, and the series of Indian portraits due to the War Department may be considered, in this respect, invaluable.

A third division of this study is comparative philology or the science of languages. Speech has been called the first and highest development of human reason; it is also the clue by which we trace more evenly than by any other means, the affiliation of tribes and the relationship which exists between different nations. By the comparison of languages we can prove that nearly all the nations of Europe—whether of Celtic, or Latin, or German, or Sclavonic origin—are not only closely allied one to another, but belong to the same stock with the inhabitants of Persia and Hindustan. By the same means we ascertain that a race of Malay origin has peopled all the islands of Polynesia. Modern philologists have discovered that the natives of America, from the arctic sea to Cape Horn, speak languages which, though dissimilar in words, possess a striking grammatical resemblance—like different metals cast in the same mould.

In the pursuit of this interesting study, the importance of obtaining vocabularies of the languages spoken by secluded or newly discovered tribes is easily seen. Manuscript works in language of which little is known are also of great value for the investigation of their grammatical structures, and the collection of East Indian manuscripts brought home by the Exploring Expedition may be signaled as possessing unusual interest. The Institute is not less indebted to Mr. Stephens for the monumental slabs from Central America, covered with those remarkable hieroglyphics, which are now awaiting the appearance of some new Champollin to unfold their mysterious purport.

In search of these departments of ethnographical science, all persons whose pursuits bring them in contact with many varieties of one kind, and in particular the officers of the navy in foreign stations, have an opportunity, by obtaining and transmitting articles of native workmanship—crania or mummies of particular tribes, and vocabularies or manuscripts of languages little known—to add materials to the general stock, which may hereafter be of invaluable service to the scientific investigator.

H. HALE.

NOVEMBER, 1842.

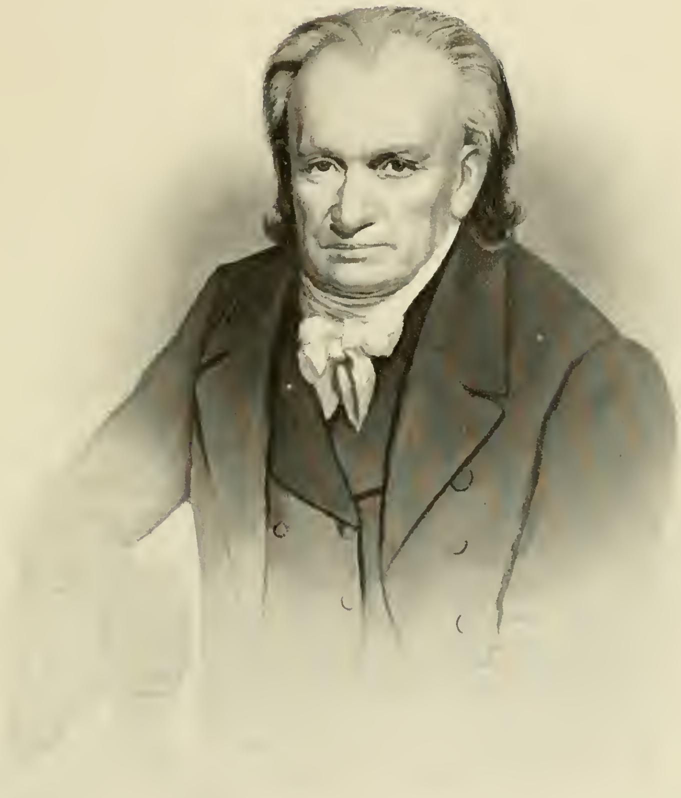
OUTLINES OF THE ETHNOGRAPHICAL COLLECTIONS, CHIEFLY FROM THE EXPLORING EXPEDITION.

NEW HOLLAND.

Buckles, or small narrow shields.
Boomerangs, the singular missile, often described.
Waddies or clubs.
The throwing stick, adjutant for throwing javelins.
Beads or wampum, made of the stem of a grass, etc.

FIJI ISLANDS.

War clubs of various patterns, and the small war clubs used as a missile.
Bows and arrows, slings.
Spears, both for war and fishing.
Wooden idols, oracles, headdress of priest, sacred cava cup, etc.
Wigs, combs, turbans, etc.



Amos Eaton

Pateras or cava bowls, dishes, etc.

Matting, and baskets of various patterns.

Pottery—water vessels and for cooking.

Musical instruments, consisting of Pandean pipes, nose flutes, war conch, and drum.

Mosquito nets, fans, fly brushes, wooden pillows.

Stone adzes.

Fishing nets and lines, cordage, etc.

Dresses for females, of various and some brilliant colors.

Armlets and necklaces in great variety, neck ornaments, headbands.

Tapa, or cloth, also of great variety of patterns in the stained figures.

SAMOA ISLANDS AND TONGATABU.

These islands, in common with the other Polynesians, have evidently derived their arts mostly from the Fijis. Their implements as we recede become less numerous, with often much diversity in the model. I note only—

Arrows for catching pigeons, of the Samoa Islands.

Models of the single canoe.

Models, large, double Tonga canoe, used for distant sea voyages.

Rasps of shark's skin, for working wood, common to many Polynesian islands.

TAHITI.

We obtained very few things at Tahiti, where native implements are becoming rare. We saw no weapons of the original stamps.

SANDWICH ISLANDS.

The same remarks apply in a good measure to this group. Native ingenuity disappears when brought in contact with civilized man, and with a knowledge of money the bark-beaten cloth of the South Seas gives place to calico at 10 cents a yard. We obtain here, however, more extensive collections. I mention only—

The large calabashes, used as baskets to carry burdens, and found so convenient by all travelers.

Tapa, in imitation of European patterns.

Models of canoe.

Feather ornaments—the yellow is the favorite color here.

MARQUESAS ISLANDS.

Specimens of the ingenious carving of these islanders, procured many years ago, were presented by Mr. Demester.

LOW OR POMOTEE ARCHIPELAGO.

These lonely coral reefs present attractions only for this amphibious race of people. Implements of the same pattern with other Polynesian, but much ruder. There is no longer any stone for hatchets, and a piece of shell is substituted, while a crooked root serves for a handle. There is no bark suitable for making cloth or tapa, and their clothing consists exclusively of matting.

PENRHYNS ISLAND.

The same remarks will apply to Penrhyns Island, with its wild and impetuous inhabitants; but, being covered with cocoanut trees, it is much more populous, and the implements obtained show neater workmanship.

NEW ZEALAND.

Still Polynesian, but much variation in the style of their manufactures and ornamental carving. Their cloaks, made of New Zealand flax, a beautiful article.

Neck ornaments of green-colored stone or jade. The thin, slender club, or wooden sword (used with both hands), almost their only weapon prior to the introduction of firearms, etc.

KINGSMILL ISLANDS.

A remarkable change in most things from the Polynesians. Long-pronged spears set with sharks' teeth; as likewise swords of different lengths. Woven coats of mail and cuirasses for protection. A porcupine fish for a cap. Natural fishhooks of crooked roots, etc. A very large and interesting collection of the implements of these coral islands was lost in the *Peacock*.

EAST INDIES.

Models of Malay proas.

Krisses or scymetars, spears and shield, battle-axes, musical instruments.

TERRA DEL FUEGO.

The collection is nearly complete, though the articles are so few in number.

Bows and arrows, the latter, singularly enough, the most beautiful we have met with—flint head.

Bone-headed fish spears, likewise bearing a strong analogy to those of our northern Indians.

Seal-skin quivers, slings, paddles, and necklaces.

PERU.

Our collection of antiquities is quite respectable; pottery, cloth, nets, plastering, etc., from the ancient graves. I must also particularize the headdress of "the last of the Incas," presented by Mr. Sweetzer.

OREGON AND NORTHWESTERN COAST.

Our collections here were full.

Paddles, models of canoes, etc., some of former ornamented with different colors.

Carved combs, the conical, woven, and painted hat (the same pattern is used throughout East India).

Bows and arrows, the heads of bone, flint, and now iron; almost their only weapon, except now knives.

Various grotesque wooden masks.

Dice, made of beaver's teeth, wooden decoy-duck.

Model of cradle showing the mode of flattening the cranium, for which the Chinooks are so famous.

Model of fastening a child to a board and carrying on horseback.

Pipes of wood and bone, imitating steamboat, houses, and other fashions of civilization.

Stone pipes, representing grotesque figures of original pattern.

Carved stone saucers, some well worthy the attention of those who think genius only the offspring of civilization.

Ornaments of dentalium shells; snowshoes.

Blankets and belts, of native weaving.

Feather blankets.

Cloaks of vegetable fiber; much after the New Zealand pattern.

Leather or buckskin dresses, moccasins, belts, etc.

Beautiful membrane cloaks, and baidare (covered skin canoes) of farther north.

CALIFORNIA.

A race of different origin is seen in the different style of manufactures, ornaments, and woven baskets for carrying water and cooking; others richly ornamented with feathers, plumes, ear ornaments, beadwork.

Bows and arrows of the usual American pattern; war spears headed with bone.

Feather dress for a sort of priest or devil.

The arrow-proof cuirass and hemispherical cap of the Shasta Indians.

C. PICKERING.

NOVEMBER, 1842.

REPORT UPON THE DRAWINGS MADE BY MESSRS. DRAYTON AND AGATE.

Through the labors of the artists, Messrs. Drayton and Agate, in connection with the literary and scientific duties of the other officers, the journals of the Expedition are of two kinds—the written and the pictorial, and, although the former is necessarily the more complete, yet the latter in consequence of the industry of those gentlemen and the large number and faithfulness of the sketches made, would of itself give a very thorough account of the islands and races we have seen; and in many respects far more detailed and satisfactory descriptions than is possible with the pen. The scenery of the islands, their mountains and forests, their villages, with interior and exterior views of the huts or houses of both chiefs and common people, spirit houses or temples, war implements, fortifications, household utensils, tools, canoes, the natives sitting in council, dressed and painted for war, the domestic scenes of the villages, costumes, tattooing, modes of cooking, eating, drinking cava, taking and curing fish, swimming, gambling, and other amusements, war dances, club dances, jugglery, and numerous other particulars illustrating the modes of life, habits, and customs of the various tribes inhabiting the islands or countries visited, have been sketched with fidelity. Indeed, nothing escaped their pencil when time was allowed, and the series of sketches when finished—for many were necessarily left in outline—will be more instructive and interesting than the highest literary abilities could render the journal of the voyage. One picture by Mr. Agate, representing a temple on a newly discovered island, and the cocoanut grove about it, containing on one side, three or four half-naked savages starting in affright from an officer who is just beginning to puff a cigar, and is pouring the volumes of smoke from his mouth, the impression of such a scene can not be conveyed in words, nor the idea it gives of the ignorance and superstition of the savage. The portraits are numerous, and are not merely general sketches, but accurate likenesses of particular individuals—so faithful, indeed, although but the work of a few minutes in the hands of our skillful artists, that the natives would cry out with surprise the name of the individual when a sketch was shown them.

Besides historical and ethnographical drawings, the sketches of objects in natural history are very numerous; and they embrace all departments of natural science, including some geological sketches. The variety and beauty of marine animals in the coral seas of the Pacific are beyond description. Like birds in our forests, fish of rich colors and strange forms sport among the coral groves; and various mollusca—animals low in the scale of organization—cover the bottom with living flowers. A new world of beings is here opened to an inhabitant of our cold climate, and many of these productions are so unlike the ordinary forms of life that, but for our eyes, we could scarcely believe in their existence. Many of them are among the most brilliant and beautiful objects drawn and colored by Mr. Drayton. Among the geological sketches by Mr. Drayton the representations of the great crater of Lua Pele, especially the night scenes of its boiling lakes of lava, are highly valuable. There is probably no volcano in the world where the processes of volcanic action are more laid open to view, and on this account these sketches are very unlike the ordinary pictures of a burning mountain, and far more interesting to the geologists. Scarcely less interesting than these volcanic scenes are the views taken among the Andes of Peru and Chile.

The following list gives more particularly the number of drawings in the several departments. The whole number of distinct objects or scenes delineated is 2,100. Of these 200 are portraits, 180 plants, 75 reptiles, 260 fish, 850 mollusca, and over 500 landscapes and historical sketches. The drawings of crustacea, corals, birds, and quadrupeds were mostly by the naturalists in charge of these departments, and are not here enumerated.

The sketches, to which we have referred, have been made in the following different regions, and they have been the more or less complete according to the length of time spent at these places. It should be observed that the several groups of islands in the Pacific, although not far distant from one another, have each marked peculiarities in the physiognomy, dress, domestic manners, etc., of their inhabitants.

(1) Madeira, (2) Cape Verde, (3) Rio de Janeiro, (4) Rio Negro, Patagonia, (5) Terra del Fuego, (6) Chile, (7) Peru, (8) several islands of the Low Archipelago, (9) Society Islands, (10) Navigator Islands, (11) New Zealand, (12) New Holland, (13) Tongatabu, (14) Fiji Islands, (15) Kingsmill Islands, (16) Sandwich Islands, (17) Oregon Territory, (18) Philippine Islands, (19) Sooloo Sea, (20) Singapore, (21) Cape Town, (22) St. Helena; besides some small scattered islands in the Pacific unnoticed in this enumeration. Of these places, the pictorial account of the Fiji and Sandwich islands and Oregon Territory is the most full.

The drawings, as has been remarked, are not finished. To complete them on the spot would have been impracticable where so many things equally important were demanding immediate attention, and had it been attempted the sketches could not have exceeded one-fourth their present number. They are so far complete, however, that they might in a short time be finished up by the artists.

In addition to sketching, Mr. Drayton has written down the music of the natives at many of the islands, and the note or tones which the different nations employ in speaking.

On nearing land the artists were besides employed in drawing headlands, and of them there are nearly 500 in addition to the other sketches.

DRIED PREPARATIONS IN NATIONAL INSTITUTE, NOVEMBER 18, 1842.

Catalogue showing the number of birds, quadrupeds, reptiles, fishes, etc., prepared in the rooms of the National Institute.

	Specimens.	
Birds from the exploring expedition	471	
Birds from South America and other foreign parts	86	
Birds presented by the Jardin du Roi, Paris	87	
Birds of North America	276	
		920
Quadrupeds from the exploring expedition	26	
Quadrupeds from United States and other parts	49	
		75
Reptiles from the exploring expedition, etc	66	
Fishes from the exploring expedition, etc	48	
		114
		1, 109

There remain probably 300 bird skins to be set up, brought by the exploring expedition, and about 20 quadrupeds, some of large size. This is exclusive of an immense number of duplicate specimens.

C. P.

ANDREW ELLICOTT.

NOTE C.

REMARKS SUBMITTED TO THE HONORABLE MR. WALKER BY MR. MARKOE AND COLONEL ABERT.

In conformity with the desire you expressed, that we should put on paper the substance of our conversation with you on certain matters connected with the Institute, we submit the following to your consideration:

There are several points which, to our experience and reflections, are essential to the prosperity of the Institute, and to the great objects for which it was chartered. These are:

1st, That the Institute should be the organ of the Government in the arrangement and preservation of the collections, and in the supervision of the appropriations which the Government may make for those purposes.

2d, That the Institute should have the power of disposing of all duplicates by a system of exchanges with other institutes, or with States, or with individuals.

As all the Government collections are placed under the care of the Institute, and as all the collections which have been made, or will hereafter be made by the Institute, must, by its charter, eventually become the property of the Government, the necessity of a harmonious and intimate intercourse between the Institute and the Government seems, to our judgment, self-evident. This idea is clearly maintained in the charter of the Institute, which makes the six heads of the different Government Departments, six of its Directors.

But the nominal charge which the Institute now has, of the collections, amounts to nothing, and the same may be said of the very slight and extremely indirect influence which it has been allowed to exercise over the Government expenditures for the preservation and arrangement of the collections. At present there are three controlling or operating powers over these subjects: First, the Library Committee of Congress; second, the Navy Department; and third, the Institute; but of this last, its influence is so slight, if it can be said to have any, that it would be too much to say it is either felt or acknowledged. Such a divided state of control can not fail to operate injuriously upon persons employed and upon their duties, as it is difficult to say who is their head, who shall direct or superintend their operations, or who shall decide upon the propriety of expenditures, and to whom they are accountable.

It is clear, to our judgment, that the desired and necessary control can not well be exercised by the Library Committee. This committee can not be considered as present, upon an average, for more than six months of each year; and when present the legislative functions of its members must occupy each the greater part of their time and minds.[1] It is equally clear that these powers can not be well exercised by the Navy Department. In addition to its other various and highly important duties, there is no kindred occupation in any of its interesting functions which would give to it the means of judging of the proper occupation of the persons employed upon the collections, or of the propriety or appropriateness of any expenditure which may be made; nor can it devote the time requisite to superintend either occupations or expenditures. Under such circumstances surprise should not be created if disappointment were to be experienced in reference to anticipated results from Government patronage. The Institute, as before remarked, possessing neither influence or authority, can exercise no control; and although it may, as a consequence, be free from responsibility, it can not, in our opinion, be exempt from serious anxieties,

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[1] This committee also expires on the 4th of every other March, and in consequence it can exercise no control, either directly or indirectly, until after the election of a new committee at the ensuing December session of Congress.

nor from that moral responsibility which the country already attaches to it from its charter and from a general impression of the power it is supposed to possess. And yet it seems to us that the Institute is the most suitable agent for such purposes. It is always present; the very intuition of its organization was to promote matters of science, to arrange and preserve specimens of natural history, and to advise on subjects connected therewith. It ought to be supposed that the Institute possesses among its members competent knowledge for such duties, and that it has all the devotion and zeal and exclusiveness of feeling which the well-being of matters of science requires. During the period when the Institute exercised more influence than now, its vigilant vice-president was daily in his rooms, and for hours, advising and directing, to the great benefit of its management and to the prevention of many an injudicious expenditure.

In addition to these considerations, the organization of the Institute renders it peculiarly deserving of the confidence of Government, as it can offer, as an agent for government property and government expenditures, a board of its own officers.

The officers of the Institute consist of a president, vice-president, two secretaries, one treasurer, and twelve directors. Six of these twelve directors are the heads of Government Departments, namely, the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Attorney-General, and the Postmaster-General. These are directors *ex officio*, and constitute the Departments through which all Government expenditures are made. Six others are elected by the Institute from among its members. These six at present are the Hon. Mr. Woodbury, the Hon. Mr. Preston, Mr. Dayton, Fourth Auditor; Commodore Warrington, of the Navy; Colonel Totten, of the Corps of Engineers, and Colonel Abert, of the Corps of Topographical Engineers.[1]

These are the whole of those who are recognized by the charter as "Officers of the Institute," and constitute, by the charter, "a board of management for the fiscal concerns of the Institute."

The whole board consists of seventeen, five of which are the officers named, six are the heads of the Government Departments, *ex officio* directors, and six are elected annually from the body of members. Now, as it is hardly within the verge of possibility that the president, vice-president, secretaries, and treasurer of the Institute will be filled by any other than men of known fitness and good character, so is it impossible that eleven (adding the six *ex officio* directors), a majority of the board, can fail to deserve the fullest confidence of the Government. Then if we look to the six elected directors and reflect for a moment upon the palpable and decided interests of the Institute, and upon the vocations of its members, it is a probability so remote that it may be considered an impossibility that a great majority of this board of management can ever be other than persons deserving of confidence, holding important public places and in the employ of Government.

Now, then, if the Government were to place the control of its collections and of the appropriations for arranging and preserving them under this "board of management," it would be placing its property and funds where all its other property and funds are placed, namely, under its own officers and under accustomed and long-established responsibilities. But these officers are also officers of the Institute; therefore, to place this property under that board would also be to place it under the Institute.

[1] Since this paper was written a new election of directors has taken place, namely, on the 25th January, 1843, when the Honorable Mr. Walker was chosen in the place of the Honorable Mr. Preston, who could no longer attend, and Commodore Maury, of the Navy, was chosen in the place of Commodore Warrington, who was unwilling to serve.

Upon this plan the Institute would be made to fulfill the objects of its organization, the most appropriate organ would be selected by the Government, and the Government would, in the persons of its own officers, retain its just control over its own property.

If it should be said that this board of management can be controlled by directors of the Institute, the answer is easy. It would be worse than idle for the Institute to come in conflict with the Government or hazard a loss of its confidence, and it is not fair to suppose, against all experience, that the small portion of common sense necessary to avoid such a consequence would not be possessed by the Institute or that it would be unmindful of its own palpable interests.

Moreover, if this board of management should be required to lay a statement of its proceedings annually before Congress, it would be held to the established responsibility of the different Government Departments, and be subject, like those, to have its course and conduct investigated and corrected.

Such a plan would also preserve that union between the Government and the Institute collections so desirable and so essential to the prosperity of both.

It has been intimated to us that there was a desire to separate these and to form a distinction between the Exploring Squadron and the Institute collections. A course more fatal to the prosperity of both collections and to the great objects for which the Institute was chartered, could not well have been imagined.

All the collections in the care of the Institute, from whatever sources received, are either now the property of the Government or must, by our charter, eventually become so. They are the results of various donations from foreign ministers and consuls abroad; from foreign institutions and foreign governments; donations from domestic institutions and from citizens of our own country; donations from officers of our Army and Navy, the results of the official circulars from the War and Navy Departments; and deposits from individuals and from the different departments at Washington. Let the opinion once get abroad that contributions from these various sources are not to receive from the protecting hand of the Government that attention which their preservation and arrangement require; let it once be supposed that all these are to be neglected and those only of the Exploring Squadron to be cared for, and the consequence will soon be felt by the degenerating of the collection from a great and increasing storehouse of all that our own and other countries can furnish, to that of a small museum, forever limited to the results of the Exploring Squadron.

Far be it from our intention, by these remarks, to undervalue the collection from the Squadron. We are too sensible of its excellence and too conscious of the aid it has been to the Institute to entertain any such idea, and we fully and most highly appreciate the intelligent labor and industry of its collectors. But its specimens neither exhaust our admiration or our wants, nor render us insensible to the highly valuable and continually increasing supplies from other sources, nor relieve us from the conviction that upon other sources we must principally rely, if our desire be to extend the collection to a point worthy of the national character or of comparison with similar institutions in other countries.

In justice to the Institute it should also be borne in mind that but for its efforts these very specimens from the Exploring Squadron would have been scattered, we know not where; and but for those efforts the scientific describer might have searched in vain for a specimen upon which to found a description or to prove a discovery. It is to the Institute, chiefly, that those who gathered these specimens are indebted for the present collected results of their great industry and intelligence.

Second. The next matter which we desire to bring to your notice is the right of disposing of duplicate specimens. Our efforts to exchange have been paralyzed for the want of this right. The Institute is now seriously indebted to foreign governments, to foreign and domestic institutions, and to individuals, on the principle of exchanges, because the Institute has not the right to dispose of specimens, although its cases are loaded with duplicates. The collections of the Government being placed in the Institute on deposit, the committee upon exchanges have not felt themselves at liberty to use a specimen. We have heard with extreme regret that it is contemplated to give all duplicates back to the collectors. Such a course, in our opinion, would be ruinous in the extreme, as it would destroy one of the great means of increasing the collection by a system of exchanges. And as these collectors were amply paid for their labors, we can see no reason for such a course in justice or equity. Nor can we believe that such a course is desired by the scientific corps of the Expedition, for, while other men of science are daily making collections, at their own expense, and sending them to the Institute, many as presents, some in expectation of exchanges, it would place the gentlemen of this corps low in the scale of contributors to science if, after having been so long and so liberally paid for their labors, they should yet desire the result of these labors to be given back to them. Moreover, we have understood that by far the greater number of these specimens were actually bought by the collectors from funds furnished by the United States. We can see, therefore, no reason whatever that they should be returned unless the Government is disposed to abandon all idea of forming an enlarged scientific and interesting National Museum.

From our remarks, then, it will appear that, in our judgment, there are serious defects in the present condition of affairs which require to be remedied: one, in the absence of a responsible and adequate supervision of the arrangement and preservation of the collections and of the persons and expenditures in reference thereto; the other, in the absence of authority to dispose of duplicates. These defects can be properly remedied only by legislative provision.

We desire it to be distinctly understood that our reasoning has no reference to the publication of the results of the voyage, but is limited solely to the preservation, arrangement, and exhibition of the collections. We think, however, that the Institute might also be able to give acceptable opinions, even in reference to the publication—its form and style of execution. But as there is an anxiety to possess this power by others, and as it is already placed elsewhere, we do not seek to interfere with it, not doubting that in all its parts it will equal similar publications by other governments, and justify the anticipations which are now entertained of it by the learned world.

Having thus expressed our general views on these several subjects, we will conclude by an effort to condense them in a manner that will admit of their being incorporated in a law.

This law should, in our opinion, contain provisions investing—

First. The board of managers of the National Institute with the custody of all the Government collections which have been received or which may hereafter be received from the Exploring Squadron or other sources, with authority to make all necessary arrangements to preserve or exhibit the same, to regulate, under the supervision of the President of the United States, the number and compensations of persons employed on said duties, and to superintend the public disbursements in relation thereto.

Second. To authorize the said board to exchange any of the duplicates of said collections with other institutions, or with State collections, or with individuals; and to require the board annually to lay before the President of the United States, to be by him laid before Congress, a full account of their proceedings under this law.

Third. To direct the said board to furnish to the persons who shall be employed in thewriting or publication of the voyage and discoveries of the Exploring Squadron all desired facilities.[1]

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[1] Copied from original draft of Colonel Abert.

GEORGE WILLIAM FEATHERSTONHAUGH.

NOTE D.

WASHINGTON, *March 10, 1843.*

Hon. ROBERT J. WALKER,
United States Senator.

DEAR SIR: We beg leave to call your attention to Senate Document No. 233, of the 28th ultimo, being a report made by the Hon. Mr. Tappan, as from the Joint Committee of Congress on the Library, to which had been referred "A bill for the preservation of the collection of natural curiosities furnished by the Exploring Squadron, and from other sources," together with "remarks submitted by Mr. Markoe and Colonel Abert."

The "remarks" to which the "report" refers were made, as you will recollect, and, as is distinctly stated in the first paragraph of them, at your request, were intended to satisfy your mind of the propriety of the measure we wished you to befriend, and were addressed to you not only as the well-known friend and advocate of the Institute, but also as the chairman of one of its important committees, and as a director and consequently member of the board of management. They passed into the hands of the committee, of which Mr. Tappan is a member, without any desire on our part, and without our knowledge (certainly, however, with no unwillingness that they should be read by the whole world), and, under these circumstances, we respectfully submit to you whether the attack upon us by the Hon. Senator has not been as unprovoked as a referenceto our remarks will prove it to have been unmerited.

We can not suppose, as Mr. Tappan supposes, that you had not read our "remarks" before you laid them before the Library Committee; and therefore take it for granted that you did not perceive the "direct insult" to the committee which is so palpable to Mr. Tappan, or you would not have consented to be the medium through which the insult was conveyed. On the contrary, we have every reason to suppose that you had made yourself perfectly acquainted with the character and scope of our "remarks"—remarks hastily put together, and meant to afford hints and memoranda for your consideration and use, to illustrate the necessity or advantage of the measure recommended. They were certainly not intended or calculated to give offense in any quarter. We will therefore occupy your time by pointing to two paragraphs only of the "report" which we quote in answer to two serious allegations made against us by the Hon. Senator. You will judge whether they have any just foundation.

Mr. Tappan says: "The case presents two officers of the Government, one at the head of a bureau, the other a clerk in one of the public offices, who ask as a matter of right that they should have the supervision of a very important literary and scientific work, the publication of which Congress has thought proper to intrust to one of its regular committees."

We must deny that any such case is presented, or that it can be even inferred from our "remarks." Our "remarks" on this subject were as follows: "We desire it to be distinctly understood that our reasoning has no reference to the publication of the results of the voyage, but is limited solely to the preservation, arrangement, and exhibition of the collections. We think, however, that the Institute might be able to give acceptable opinions even in reference to the publication, its form, and style of execution. But as there is an anxiety to possess this power by others, and as it is already placed elsewhere, we do not seek to interfere with it, not doubting that in all its parts it will equal similar publications by other governments, and justify the anticipations that are now entertained of it by the learned world."

You are well aware that there are appropriations of two distinct characters in respect to the Exploring Squadron and the publication of its results (the Hon. Mr. Tappan does not appear to be aware of this, in our judgment, to have kept this distinction in his mind): One for the publication of the history of the voyage, the narrative and scientific descriptions; the other, for the preparation, preservation, and exhibition of the collections. It is the latter one that we have ever manifested a desire to see placed under the control of the Institute, which it appears to us is a most suitable agent for such purposes, and the more particularly as these collections had been placed by the Executive under its care.

The other allegation against us by Mr. Tappan is, in our opinion, equally incorrect. He says: "But the great point with Messrs. Abert and Markoe seems to be to get hold of the appropriations made by Congress to enable the committee to execute the law."

The law to which Mr. Tappan refers relates to the publication of the proceedings of the Expedition; the remarks made by us relate to a system for the preservation and exhibition of the collections.

Our remarks on this head were: "That the Institute should be the organ of the Government in the arrangement and preservation of its collections, and in the supervision of the appropriations which the Government may make for those purposes." We speak of the Institute, of which we are merely members, and of the "board of management," of which we are but two out of seventeen. To this "board of management" we think the power appropriately belongs, and in its hands we hope yet to see placed the management of whatever relates to the arrangement, preservation, and exhibition of the collections. It is clear to us that no better arrangement could be made with the superintendence of the publication, and in the appropriation which belongs to it (duties assigned to the Library Committee by law) we have not expressed a desire to interfere, and forbear, as we have forborne, to make any remarks upon them—except to express the natural hope that the wishes and opinions of the naturalists themselves will be consulted and their opinions be allowed a proper weight.

Our "remarks" in continuation of the above quotation were: "The organization of the Institute renders it peculiarly deserving of the confidence of the Government, as it can offer as an agent for Government property and Government expenditures a board of its own officers."

"The officers of the Institute consist of a president, vice-president, two secretaries, one treasurer, and twelve directors. Six of these twelve directors are the heads of the Government departments, namely, the Secretary of State, the Secretary of the Treasury, the Secretary of War, the Secretary of the Navy, the Attorney-General, and the Postmaster-General. These are directors, *ex officio*, and constitute the departments through which all Government expenditures are made. Six others are elected by the Institute, from among its members. These six at present are the Hon. Mr. Woodbury, the Hon. Mr. Preston, Mr. Dayton, Fourth Auditor; Commodore Warrington, Colonel Totten, of the Corps of Engineers, and Colonel Abert, of the Corps of Topographical Engineers."

"These are the whole of those who are recognized by the charter as 'officers of the Institute,' and constitute by the charter 'a board of management of the fiscal concerns of the Institute.'"

The quotations speak for themselves, and we will trouble you with but few more remarks. Mr. Tappan, in the beginning of his report, most truly says that "The remarks of Messrs. Markoe and Abert are not to be considered as the act of the National Institute." The "remarks" neither purport nor pretend to be the act of the Institute. And moreover we beg leave further to say that neither are Messrs. Abert and Markoe the "board of management for the fiscal concerns of the Institute," under the supervision of which they suggested the expediency of placing the appropriations which Government might make for the arrangement and preservation of its collections.

It also seems to have given offense to the honorable gentleman that we should have proposed in our remarks "to furnish to the persons who shall be employed in the writing or publication of the voyage and discoveries of the exploring squadron all desired facilities." We really are at a loss to perceive the offensive matter in this sentence. It has no allusion to the Library Committee, for they were neither to write nor to publish. The law invested them with power to enter into contract for the publication, and each member of the scientific corps of the squadron would, we presume, be required to furnish the narrative of his observations. The persons therefore employed in the "writing or publication of the voyage" were these scientific men and the contractors. If furnished with all desired facilities it would be all they ought to have, all they could want, and if furnished by the Institute there would be some agent responsible for the specimens and interested in seeing that they were returned after being taken out of the building by either the describer, the engraver, or the publisher. The Library Committee expired on the 4th of March, and there will be no committee until after a new election by the next Congress. We believe the committee can not appoint an agent to have a longer existence than itself; hence, appeared in our judgment the propriety that the Institute should be invested with the care of the collection.

Had the Hon. Senator published our "remarks" with his "report," as was due in all fairness, this letter would have been unnecessary, for the "remarks" contain, in our opinion, ample refutation of the errors of the "report." We deem it wholly unnecessary, also, to point out to you other inconsistencies and mistakes into which the Hon. Senator has fallen, and which have been, on his motion, published in his "report" to the Senate.

We rather limit ourselves, in conclusion, to soliciting your advice as to the best mode of correcting the erroneous impressions which the language of the Senator is calculated to make upon the public.

We remain, dear sir, with great esteem and respect, your most obedient servants.

LETTER FROM THE HON. MR. PRESTON TO COLONEL ABERT AND MR. MARKOE.

COLUMBIA, SOUTH CAROLINA, *April, 1843.*

MY DEAR SIR: Having had ample occasion to witness the devotion which you and Colonel Abert have manifested to the National Institute, you may imagine the surprise and mortification with which I have seen the total misconception of your motives and conduct in regard to it in Mr. Tappan's report to the Senate. To the unwearied and enthusiastic exertions of yourselves and a few other gentlemen, animated, as it seemed to me, by nothing but a pure love of science, that institution was mainly indebted for its origin and the eminent success which has attended it from the beginning. I can say with entire certainty that my own interest in it was stimulated and sustained by you, and that I was continually made ashamed of how little I felt and how little I did, while I saw the unabated zeal and unrecompensed labour which you bestowed upon it. While I wished well to the Institute from a conviction that it would promote the advancement of science, you and he particularly devoted yourselves to it with that deep enthusiasm which a more intimate knowledge can alone excite, and upon which all scientific projects must depend for their success. Men in public station or the munificent rich may contribute the means, but the vital principle of all such institutions is found in the hearts of those who are willing to work night and day, and whose labour is a labour of love. I was deeply impressed that the Institute had found in you and Colonel Abert precisely such agents, and my high hopes of its ultimate success arose from the fact that it had found such. I by no means mean to say that there are not associated with you other gentlemen equally impelled by as earnest and disinterested motives, but this I will say, that a vast deal of the labour was thrown upon you two, and that, to my mind, the discretion and wisdom of the Institute was evinced in the selection of such agents. I speak of Colonel Abert and yourself especially because you and he are made the subject of a most unmerited attack.

It is with great pleasure that I bear this testimony in your behalf. If I had been in the Senate when the report was made I think I would have been able to satisfy Mr. Tappan of the mistake into which he had fallen, but at all events I would have put upon record my opinion of the purity of purpose and the wisdom of the plans which have characterized the conduct of Colonel Abert and yourself throughout.

I am entirely satisfied that if the government collection derived from the exploring expedition, or from any other source, be not to a great extent subject to the control of a scientific association, or of men animated by a philosophic spirit, which spirit alone brings them to the task, it will not increase and will be dilapidated. Our government is peculiarly incapable of a proper superintendence of scientific institutes. In the first place, it may be said that it has no constitutional power, and if it had, the tenure of office is so liable to change, that in a department so removed from interests of intense excitement, negligence and decay would soon creep in. It therefore seems to me from the beginning that accessions to science, incidentally made, like the collections of the exploring expedition, should be deposited for arrangement, preservation, and exhibition with such a society as the National Institute, the government retaining the property while the Institute has the use of it, or rather while the Institute makes it useful to the public. Without some such arrangement the Government will find that its valuable specimens will be lost or moulder away in forgotten boxes, or become a mere mass of rubbish.

I am persuaded that Mr. Tappan, upon such explanations as you and other gentlemen in Washington can give him, will perceive the injustice of his remarks. He has an earnest love of science and literal learning of all sorts, and without some obvious misconception can not fail to sympathize and cooperate with gentlemen who with such singleness of purpose and such broad intelligence as yourself and others of our friends of the Institute have at heart the same objects with himself.

I am, my dear sir, your obedient servant,

WM. C. PRESTON.

FRANCIS MARKOE, jr., Esq.

SPRINGWELLS (NEAR DETROIT), *May 18, 1843.*

Col. J. J. ABERT.

DEAR SIR: I have read with much interest, but not without some pain, the pamphlet you had the goodness to send to me. I regret that anything should have occurred unpleasant to you, and especially in any matter in which the Library Committee should have participated. I do not remember the day when "the remarks" of yourself and Mr. Markoe were submitted in the Senate by Mr. Walker and referred; but my impression is that by reason of accident or delay in some of the officers of the Senate they did not reach the committee until more than a week after they were referred; and when taken up in committee the session had approached very nearly its termination. I do not remember whether, when so taken up, they were read *in extenso*, but the "bill" which accompanied them was read and its principle discussed. The committee was, I believe, unanimous in its opinion that it was not expedient to pass the bill—if at any time, certainly not until the Library Committee should have fully executed and terminated the trust committed to it by law. Very much inconvenience and embarrassment had already grown out of a confliction of an alleged power of control and direction, especially in relation to the "specimens of natural history," etc., collected, and in respect to which it has been made the duty of the Library Committee to cause to be prepared the appropriate publications.

Great responsibility must grow out of the execution of those powers, for a wide discretion must of necessity be exercised. Without expressing any opinion as to

WILLIAM FERREL.

what disposition should finally—and after the powers of the Committee in the matter shall have ceased—be made of those rare, rich, and beautiful materials, it remained the undivided opinion of the members of the Committee, I believe, that while those powers and correlative duties existed it was necessary that those materials should continue in the entire control of the Committee.

This conclusion being come to, the whole subject of the bill, "remarks," etc., was committed to Mr. Tappan, as a subcommittee, with directions to prepare and make report accordingly.

After this last measure was adopted in Committee I believe the Committee did not meet again; but it was certainly understood that Mr. Tappan should report to the Senate this result.

With respect to the doubt which had been raised as to whether all the powers of the Library Committee continued after the 3d of March, I hazard nothing, I believe, in saying that in analogy to the case of certain officers of Congress, those powers were believed by the Committee (on which, as you are aware, there were some professional gentlemen of very high standing) to continue during the recess, and it was in corroboration of that opinion asserted that always since the foundation of the Government the same construction had been put upon the Constitution and the powers of Congress. In conformity with that view I have been required, as chairman of the Joint Committee, to draw, in the name of that Committee, upon the funds subject to its order, for sums of money for books, salaries, compensations, etc., since the close of its last session. How else could the law be executed or justice done?

I trouble you with this long detail, my dear sir, because of the personal esteem and respect which, I beg leave to say, I entertain for you individually, and because I very sincerely regret that anything should have occurred in this matter tending to wound your feelings or to give you pain.

As chairman of that most highly respected Committee, whose proceedings have been the subject of comment, it may perhaps be esteemed indelicate in me to have made this exposition without its previous sanction. Please, therefore, consider this letter as intended for yourself alone.

I remain, with sincere respect, yours,

Wm. Woodbridge.

NOTE E.

January 21, 1845.

Sir: I have the honor of transmitting to you the memorial of the National Institute, drawn up in pursuance of a resolution of the Institute, of the 10th of December. And in further obedience to the resolution I have to request that you will do the Institute the favor of presenting the memorial to the consideration of the Senate and House of Representatives.

The papers herewith, and which constitute the memorial, are:

(1) The memorial as directed by the resolution.

(2) The resolution under which the committee acted.

(3) The memorial of the scientific men at their meeting in Washington during last April.

(4) The memorial of the Institute, of March, 1844.

J. J. Abert.

Honorable Mr. Woodbridge,
United States Senate.

Honorable J. Q. Adams,
House of Representatives.

I.

MEMORIAL OF THE NATIONAL INSTITUTE.

To the Honorable the Senate and House of Representatives of the United States of America in Congress assembled:

The undersigned, a committee appointed for the purpose of preparing a memorial on behalf of the National Institute, to be accompanied by copies of memorials which were presented to your Honorable body during the last session, beg leave to submit to your consideration the annexed copies of said memorials and to invoke the friendly views of your Honorable body to the prayer therein contained.

An examination of the character of the by-laws and of the proceedings of the National Institute will show that among the principal objects of its organization are those of forming at the seat of the General Government an extensive museum of the natural history of our country in all branches, and affording every possible facility for the development of mind in its devotion to the sciences and the useful arts. But the experience of a few years of our existence has satisfied the Institute that individual means are inadequate to meet the expenses involved in the exhibition and preservation of its already extensive and continually increasing collections, and for paying the transportation charges of valuable donations daily arriving from all parts of the world.

These collections, valuable and extensive as they are, have been obtained comparatively without cost, and will evidently go without cost to the United States, as by the conditions of our charter the Institute, in reference to all its collections, is in reality a trustee for the United States.

Its position and national character have enlisted the most enthusiastic feeling in its favor from the institutions and the enlightened men of all countries, evinced and daily evincing itself by presents of the most valuable literary works and by donations of specimens of natural history and the fine arts. It is to preserve and exhibit these and to pay for their transportation, which exceed our ability and for which, on behalf of the National Institute, we solicit the aid of your Honorable body on the grounds of our position in the District of Columbia, of the national character of our organization and action, and the consideration that all the property and collections of the Institute must by our charter eventually become the property and collections of the Government.

The Institute will readily acquiesce to any restrictions and safeguard with which your Honorable body think proper to protect any aid that may be granted, only begging leave to call the attention of your Honorable body to the safeguard already established in our charter, which makes the six heads of the principal Departments of the Government directors of the *ex officio* of the board of managers of the Institute.

J. J. ABERT, *Chairman*,
J. T. SULLIVAN,
T. SEWALL, M. D.,
M. THOMAS, M. D.,
W. W. SEATON,
J. C. BRENT,
Committee.

JANUARY 21, 1845.

II.

At a meeting of the National Institute, held December 9, 1844, the corresponding secretary (Mr. Markoe) offered the following resolution, which was, on motion, unanimously adopted:

Resolved, That a committee of six persons be appointed by the Chair to prepare a memorial to Congress in behalf of the National Institute, to be accompanied by a copy of the memorials which were presented at the last session; and that the committee request the Hon. Levi Woodbury to present it to the Senate, and the Hon. John Quincy Adams to present it to the House of Representatives, at the present session.

Whereupon, the Chair appointed the following gentlemen to constitute the committee: Colonel J. J. Abert, John T. Sullivan, Doctor Sewall, Doctor Thomas. Messrs. Seaton, and J. C. Brent.[1]

III.

MEMORIAL OF THE FRIENDS OF SCIENCE WHO ATTENDED THE APRIL MEETING OF THE NATIONAL INSTITUTE.

To the Congress of the United States.—The respectful memorial of the friends of Science, assembled at the City of Washington, from various parts of the Union:

The undersigned have come together at the capital of the United States, at the call of the National Institute for the Promotion of Science, with the purpose of communicating to each other the facts and reasonings in science which each one's research might have suggested, and of interchanging views and opinions in regard to the progress of science in our country.

While engrossed in this delightful and most profitable communion, we have had an opportunity to observe the results of the efforts made by the members of the National Institute for the advancement of science. Founded only four years since, they have already brought together valuable collections in natural history and in the arts. Connecting themselves with the Government, through the heads of Departments, who, by virtue of their offices, are directors of the Institute, they have voluntarily imposed restraints upon the operations of the Institute, which will preserve its national character and prevent its being tributary to any local or sectional purpose. By making the Institute merely a trustee for the United States of the property which it possesses, and may hereafter acquire, they have proved that no sordid or interested views guided them in framing their constitution. The zeal and industry shown in making collections, the disinterestedness in the disposition of them, would seem to deserve from the Government of the Republic approval and encouragement. The value of the property already collected, although the existence of the Institute has been so short, is very great. And yet it has no building for the convenient exhibition of its treasures, or even for their safe keeping. And if articles of so much interest and value have already been collected, what may not be expected from the army, the navy, and friends of science generally, in the long reach of years to come, if a suitable place can be provided for their preservation and exhibition. But how are the means of providing such a building to be obtained? If attained at all for such a purpose by voluntary contributions, it could only be in the midst of large and flourishing communities. Local feelings of interest or pride can not be transferred, and it is not to be expected that the means to arrange, display, preserve, and augment these collections can be procured by voluntary contributions of individuals in the District of Columbia, or that they can be procured out of the District. There is no civilized nation, however narrow its policy in other respects, which does not exhibit some measure of interest in promoting the advancement of human knowledge. In most countries science receives direct encouragement, and many Governments have vied with each other in their efforts to advance this cause. The Government of a country emulous to consider itself among the first of enlightened nations, we trust, will not refuse to aid in securing to its capital the benefits of the labors of the National Institute. We cordially unite with the resident members of the Institute in asking an appropriation in its behalf from Congress. Our only fear is that in thus requesting aid for the keeping of what in fact is the property of the Government, we may be considered as asking a boon far below that which the country calls for, and that we ought to urge upon the National Legislature a liberal and plenteous

[1] Proceedings of the National Institute, 3d Bull., p. 375.

endowment for a National Institute; and we are only withheld from doing so by considerations growing out of the present financial condition of the Government. But that which we ask is so entirely within the means of Congress, and the urgency of its application to preserve what has been accumulated, with so much labor and expense, is so great, that we can not but hope the enlightened and intelligent members of Congress will distinguish the present session by the necessary appropriation of funds to an object so truly national and so truly republican.[1]

ELIPHALET NOTT, *President Union College, Schenectady.*
BENJAMIN F. BUTLER, *New York.*
A. H. EVERETT, *President Jefferson College, Louisiana.*
JAMES TALLMADGE, *President University of New York, and President American Institute, New York.*
JOHN W. DRAPER, *Professor Chemistry, University of New York.*
W. W. MATHER, *Professor Natural Sciences, Ohio University, Athens, Ohio.*
L. R. WILLIAMS, *Professor Natural Philosophy and Chemistry, Jefferson College.*
C. GILL, *Professor Mathematics, St. Paul's College, Flushing, New York.*
JOHN W. DUNBAR, M. D., *Professor, University Maryland.*
W. A. NORTON, *Professor Mathematics and Natural Philosophy, Delaware College, Easton, Pennsylvania.*
JOHN W. YEOMANS, *President Lafayette College, Pennsylvania.*
JOHN W. LOCKE, *Professor Chemistry, Medical College, Ohio.*
HENRY R. SCHOOLCRAFT, *Delegate New York Historical Society.*
W. R. ABBOTT, *President Georgetown Library Association.*
GRAFTON TYLER, M. D., *Georgetown, District of Columbia.*
RICHARD S. MCCULLOH, *Professor Mathematics and Natural Philosophy, Jefferson College, Maryland.*
JOHN ELGAR, *Montgomery County, Maryland*
FRANCIS J. GRUND, *Philadelphia.*
A. D. CHALONER, M. D., *Philadelphia.*
S. C. DONALDSON, *Baltimore, Maryland.*
JAMES CURLEY, *Professor, Georgetown College.*
ALEXIS CASWELL, *Professor, Brown University, Rhode Island.*
JAMES P. ESPY.
EDWARD A. COOK, *New York.*
A. TALCOTT, *Connecticut.*
WM. STRICKLAND, *Philadelphia.*
BENJAMIN HALLOWELL, *Maryland.*
HECTOR HUMPHREYS, *President St. John's College, Annapolis, Maryland.*
GEORGE TUCKER, *Professor, University of Virginia.*
JAMES PRENTISS, *New York.*
RICHARD PETERS, *Philadelphia.*
R. M. PATTERSON, *Philadelphia.*
SAMUEL HAZARD, *Philadelphia.*
ELIAS LOOMIS, *Professor, Western Reserve College, Ohio.*
CHARLES D. CLEVELAND, *Philadelphia.*
SAMUEL F. B. MORSE, *New York.*
RICHARD RUSH, *Philadelphia.*
EDWARD HITCHCOCK, *Professor, Amherst College, Massachusetts.*

WASHINGTON, D. C., *April, 1844.*

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[1] Proceedings of the National Institute, 3d Bull., p. 386.

JOHN REINHOLD AND JOHN GEORGE FORSTER.

IV.

MEMORIAL OF THE NATIONAL INSTITUTE.

To the Honorable the Senate and House of Representatives of the United States of America:

The memorial and petition of the "National Institute for the Promotion of Science and the Arts," respectfully represent:

That its members have been induced, by a high sense of the duty to the body whose interests they represent, as well as to the great objects which it was the design of its creation to promote, to submit to the consideration of your honorable bodies, a statement of the origin and progress, of the past and present condition, and of the wants and exigencies of the Institute.

The Congress of the Union, after a full investigation of the subject, after duly estimating the value and importance of the design of its founders, and the means which it contemplated to employ in the accomplishment of those ends, deemed them so far entitled to its countenance and favor as to grant to the Institute a charter of incorporation. Some pecuniary aid incidentally followed, and it was made the custodier of much valuable property belonging to the Government. This charter, whose date is recent, naturally afforded the hope of national protection, thus inspiring everywhere confidence the moment it was seen, by the acts of Government, that confidence was felt at home.

Under these auspices, the National Institute began its career. Many of the most distinguished and illustrious individuals in the nation afforded it their aid and encouragement.

Its active members were chiefly composed of officers of Government and citizens of Washington, who, occupied in their own private concerns, neither men of wealth nor mere scholars, proposed to give a portion of their leisure to promote objects in which they had no other or ulterior motives and interest than such as were common to the nation, and, perhaps, to the whole human family.

These individuals have, so far, advanced with a success which they could have little anticipated, and they now approach the legislature of the Union, and the nation at large, with the fruits of their labors in their hands, spreading before those whose interests they have undertaken to advance, the results which in so brief a space of time they have accomplished, asking that their deeds should be examined and compared with their promises, and if they have performed their duty faithfully, and discharged the trusts confided to them honorably, zealously, and successfully, that they may be encouraged by the only reward they have ever sought, viz, the means of enlarging and giving additional efficiency to their patriotic efforts and purposes. They appear before your honorable bodies to render an account of their stewardship, and they solicit an examination of their proceedings.

In urging this matter upon Congress, it is not the design of your memorialists to present a formal argument to establish, either the constitutional authority of your honorable bodies to confer upon the National Institute that pecuniary aid which they so urgently need, or the expediency of so applying any portion of the public patronage. They believe that Congress is fully competent to the ascertainment and decision of all questions of this character. While, therefore, your memorialists abstain from entering into any discussion of constitutional questions, submitting, with the most respectful deference, to the judgment of your honorable bodies, they feel that they are, in no manner, trenching upon this ground, in exhibiting fully and distinctly those facts and circumstances which will furnish the general data upon which Congress is to decide.

The National Institute is composed of private individuals, with no other bond of connection than *their common labors as trustees of certain property for the public and the Government*—a common feeling of interest in promoting scientific and useful information, and the bond of union bestowed upon them by Congress in their charter of incorporation. In effecting the designs of their association, they have established an extensive correspondence with influential and useful men, men of experience, of letters, and of distinguished scientific attainments, not only throughout the Union, but throughout the world. In every part of Europe and of the American continent, in Asia, and in Africa, we find generous and enthusiastic friends and corresponding members; foreign Governments have evinced their interest by valuable contributions, and many of the most distinguished Institutions and Societies abroad are correspondents and contributors. An aggregate amount of munificence, zeal, learning, and adventitious advantage is thus possessed by the Institute, which has already yielded substantial results, and holds out assurances of the richest fruits. In further illustration of the advantages which are here imperfectly sketched, we submit for the examination of your honorable bodies, a communication lately received from Paris, with accompanying documents and transactions, exhibiting, in a remarkable manner and degree, evidences of interest and good will toward Congress, toward the States, and toward the Institute on the part of the Government and people of France.

Through this widespread instrumentality, the Institute has labored to form an extensive library and museum, or collection of objects of natural history, a repertorium of facts and contributions to science, documents illustrating history in general, but in an emphatic manner that of our own continent, and specimens of the fine arts, of mechanic ingenuity, valuable productions of the vegetable kingdom, and materials illustrating the moral and social condition of nations generally, but in a more especial manner of our own. From every quarter of the globe valuable and various contributions have been transmitted to us. The gallant officers of our army and navy; the diplomatic and consular representatives of the Government abroad, the men of learning and science everywhere, have entered with the most praiseworthy zeal in the cause, and vied with each other in the number and value of their contributions.

The collection thus made is not designed for, or appropriated to, the exclusive use of the Institute, or of any particular class of individuals. It is opened gratuitously and daily to the inspection and for the benefit of all. Without cost, the student of natural history may here find ample means of improvement in that department of science to which his attention has been directed; without cost, the geologist and mineralogist are furnished with abundant materials for prosecuting their researches; the curious may indulge their predilections, while the man of science is enabled to peruse the valuable contributions from learned societies and individuals throughout the world.

In addition to these materials, thus accumulated by the labors of the Institute itself, the convenience of the Government has made it the depository and guardian of numerous articles of its own property, which are thus exhibited to the public eye without trouble to the ordinary officers in the various Departments, and without the consequent abstraction of their time from more peculiar and appropriate duties. The interesting collections of Indian portraits and curiosities formerly deposited in the War Department; the objects of curiosity and various donations to the Government or to distinguished citizens from foreign countries, once in the State Department, are here shown to the public in connection with much other public property.

The articles arising from these, and from various other sources which it would be tedious to enumerate, already in the custody of the Institute, are of great value, and they are increasing with rapidity, and accumulating to an indefinite extent.

The real owners of these treasures are the Government and the nation. The individual members of the Institute contemplated no interest or property in them, beside their trust for the public, beyond what is enjoyed by every citizen in the land, or, indeed, every stranger who may feel disposed to use them as a means of indulging a liberal curiosity or gratifying his love of science. Such of the articles as at any time belonged to the Government, remain its absolute and exclusive property. They are simply intrusted to the Institute for safe-keeping and public exhibition, and may be withdrawn whenever it shall suit the wishes of the owners to dispose of them in any other manner. The donations by individuals and public bodies to the Institute are substantially in the same predicament. So long as this corporate association exists, it has the charge, custody, and control of it, as trustee for the Government; but upon the dissolution of the Institute, the entire mass becomes equally, as the other branch of the collection, the absolute and exclusive property of the nation. In the meantime, the members wish for no private interest in the collection, and if the present charter be not susceptible of the construction, that the whole beneficial interest of all the articles is now, as well as at its close, in the Government, they are anxious to have an amendment made to accompany the appropriation asked for, which shall, at once, regulate the property in that way. For the Institute has depended on the Government heretofore, and must continue to rely on it, not only for many of the most valuable articles in its possession, but for a place to deposit them and a place for their meetings, as well as for some of the means to defray the incidental expenses of opening, putting up, and preserving their collections. In short, all the property belongs to the Government. The guardians of it, under the charter, are chiefly the officers of the Government. The custody of such property was heretofore at the public expense. And that such sums should still be expended by Congress as would pay for the freight and other expenditures connected with it, would be the exercise of no other power than such as has been exercised by the Government every year since its organization.

The individuals who compose the Institute, have, by their pecuniary contributions and specific donations, largely aided in augmenting the value of this property, in arranging it so as to render it available, and in defraying the expenses necessarily attending the execution of the important and responsible trusts confided to them. They have thus created, enlarged, and rendered practically useful, the property of the Government and of the nation. Their means of usefulness, their capacity to extend the benefits of the museum, are limited only by their capacity to meet their daily expenses.

Not only are the Government and the nation the absolute owners of much of the property of the Institute, and the beneficiary owners of the residue, but they are also the exclusive recipients of the advantage to result from the entire enterprise. At this period of the world, and in this enlightened age, it is not necessary to present an argument to establish a truth which all history inculcates, that the highest glory of a nation, the purest and most durable happiness of a commonwealth, rest most upon a moral and intellectual advancement.

If, in the legitimate execution of those powers which by the Constitution are vested in your honorable bodies, collateral results should follow, by which science and literature shall be fostered and encouraged among your constituents, and diffused more widely through our Union, such consequences will not, we presume, furnish grounds of objection to the rightful exercise of power in the breast of any individual. It is believed that few are disposed to controvert the lawfulness, while a still smaller number will deny the expediency, of the appropriations heretofore made by Congress to the literary and benevolent associations of this district and city. None can doubt the lawfulness of those provisions which have been, from time to time, made for the protection of the property of the nation, and its adequate security and care by the erection of suitable buildings for its accommodation, and furnishing proper compensation to the officers or agents of the Government charged with its preservation and improvement.

All the Institute asks of Congress, then, is an appropriation of a sum sufficient to discharge the arrears of expense heretofore incurred, and due by the Institute. An annual appropriation for the necessary purposes of the Association, and the continuance of the indulgence hitherto granted, of the use of convenient rooms for preserving the property and holding the ordinary meetings.

Annexed to this memorial are various documents, of which the following is a list:

1. Charter of incorporation.
2. Constitution and by-laws.
3. Abstract of proceedings, comprising the contributions, donations, and deposits made to the cabinet and library of the Institution since its foundation, with the names of the contributors, donors, and depositors.
4. List of officers, and honorary, resident, paying corresponding, and corresponding members, and of the societies, institutions, etc., at home and abroad, in correspondence with the National Institute.[1]

PETER FORCE, *Vice-President*,
FRANCIS MARKOE, Jr., *Corresponding Secretary*,
JOHN K. TOWNSEND, *Recording Secretary*,
GEORGE W. RIGGS, Jr., *Treasurer*,
JOHN C. SPENCER,
JOHN NELSON,
WILLIAM WILKINS,
C. A. WICKLIFFE,
Directors, *ex officio*, *on the part of the Government.*
LEVI WOODBURY,
R. J. WALKER,
J. J. ABERT,
JOSEPH G. TOTTEN,
A. O. DAYTON,
M. F. MAURY,
Directors on the part of the National Institute.

WASHINGTON CITY, *March 18, 1844.*

NOTE F.

MEMORIAL TO CONGRESS.

The following appeal was made to Congress at its late session (first session of Twenty-ninth Congress) in favor of the National Institute, and was presented to the Senate by the Hon. Lewis Cass and to the House of Representatives by the Hon. John Quincy Adams:

To the Senate and House of Representatives in Congress assembled:

The undersigned would respectfully petition that the memorials[2] heretofore presented to your honorable bodies in behalf of the National Institute may again be taken into consideration and the prayers therein be granted.

In addition to the reasons before set forth in their favor, the undersigned would beg leave to state what they most sincerely deplore—the increasing difficulties of the Institute. It is becoming entirely impracticable, by mere private contributions and taxes, to pay the large incidental expenses attendant on the collection and preservation of so much valuable property connected with the advancement of science, literature, and the arts. The Institute asks and has asked nothing for the private emolu-

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[1] Proceedings of the National Institute, 3d Bull., p. 383.

[2] Copies of these memorials will be found at pp. 383 and 386 of the Third Bulletin of the Proceedings of the National Institute, which accompanies this memorial.

BENJAMIN FRANKLIN.

ment of its members. It merely seeks means to secure the property coming into its custody from time to time so that it may not be injured or lost, and so that it may be exhibited and used by the public, as it is dedicated to the public, and the title to it is intended to be in the Government.

For want of pecuniary means all our collections, whether in possession or increasing by new additions weekly, are in jeopardy; and unless Congress interfere to save what is so public in its character, and so peculiarly under its guardianship as is the encouragement of matters of this kind within this District, subject to its exclusive legislation, the prospect is that the operations of the Institute must of necessity cease and the property be abandoned.

Deprecating, as we do, an event so unfortunate for the cause of science and the arts, not only here, but from here in some degree over the whole Union, and not a little disreputable to our character abroad, the undersigned would earnestly pray that Congress, at an early date, may avert the calamity by taking steps to aid efficiently in preserving this important public property; and the more especially do we ask this, when, for various reasons, it can be done at moderate expense and in entire conformity to the provisions of the Constitution.

The undersigned respectfully refer to the documents annexed, which exhibit the character of the Institute and the course of its proceedings.

LEVI WOODBURY, *President*,
PETER FORCE, *Vice-President*,
FRANCIS MARKOE, Jr., *Corresponding Secretary*,
G. W. RIGGS, Jr., *Treasurer*,
ROBERT J. WALKER, *Secretary of the Treasury*,
J. J. ABERT, *Topographical Engineers*,
J. G. TOTTEN, *Engineer Corps*,
M. F. MAURY, *U. S. Navy*,
A. O. DAYTON, *Fourth Auditor*,
Directors.

WASHINGTON, *December 16, 1845.*

LIST OF DOCUMENTS ACCOMPANYING THE ABOVE MEMORIAL.

First Bulletin of the Proceedings of the National Institution for the Promotion of Science, established at Washington, 1840: Washington, 1841.

Second Bulletin, etc., March, 1841, to February, 1842: Washington, 1842.

Third Bulletin, etc., February, 1842, to February, 1845; also proceedings of the meeting of April, 1844: Washington, 1845.

THE PRINCIPLES OF MUSEUM ADMINISTRATION.

BY

GEORGE BROWN GOODE,

Assistant Secretary, Smithsonian Institution, in charge of the U. S. National Museum.

THE PRINCIPLES OF MUSEUM ADMINISTRATION.[1]

By GEORGE BROWN GOODE,

Assistant Secretary, Smithsonian Institution, in charge of the United States National Museum; Member, National Academy of Sciences; America Philosophical Society; American Society of Naturalists; Fellow, American Academy of Arts and Sciences; Corresponding Member, American Institute of Architects; Société des Amis des Sciences Naturelles, Moscow; Société Zoologique, France; Zoological Society of London.

ANALYSIS.

INTRODUCTION.

In an article on The use and abuse of museums, written nearly fifteen years ago by Professor William Stanley Jevons, it was stated that there was not at that time in the English language a treatise analyzing the purposes and kinds of museums and discussing the general principles of their management and economy. It is somewhat surprising that the lack then made so evident has not since been supplied and that there is not at the present day such a treatise in the English or any other language. Many important papers have in the interval been printed in regard to particular classes of museums and special branches of museum work. Notable among these have been the addresses by Sir William H. Flower on the uses and conduct of natural-history museums. Among the especially significant general papers which had previously been

[1] Reprinted from the Annual Report of the Museums Association, 1895.

printed were Edward Forbes's suggestive essay on The educational uses of museums, dated 1853, and the still earlier one by Edward Edwards on The maintenance and management of public galleries and museums, printed in 1840.

No one, however, has as yet attempted, even in a preliminary way, to formulate a general theory of administration applicable to museum work in all its branches except Professor Jevons, who in the paper already referred to presented in an exceedingly suggestive manner the ideas which should underlie such a theory.

It is still true, however, as it was when Professor Jevons wrote in 1881, that there is not in existence "a treatise analyzing the purposes and kinds of museums and discussing the general principles of their management and economy." With this fact in mind, I have ventured to attempt the preparation of such a treatise, and to bring together in one systematic sequence the principles which I believe to underlie the policy of the wisest and most experienced of modern museum administrators.

My ideas are presented in a somewhat dogmatic manner, often in the form of aphorisms, and possibly many of them may sound like truisms to the experienced museum administrator.

I have no doubt that my purpose in preparing this paper will be at once understood by the members of the Museums Association.

I have had two objects in view:

It has been my desire, in the first place, to begin the codification or the accepted principles of museum administration, hoping that the outline which is here presented may serve as the foundation for a complete statement of those principles, such as can only be prepared by the cooperation of many minds. With this in view, it is hoped that the paper may be the cause of much critical discussion.

My other purpose has been to set forth the aims and ambitions of modern museum practice in such a manner that they shall be intelligible to the persons who are responsible for the establishment of museums, and the conduct of other public institutions founded for similar purposes, in order to evoke more fully their sympathy and cooperation.

Museums of art and history, as well as those of science, are discussed in this paper, since the same general principles appear to be applicable to all.

The theses proposed are as follows:

I.—THE MUSEUM AND ITS RELATIONSHIPS.

A.—THE MUSEUM DEFINED.

1. A museum is an institution for the preservation of those objects which best illustrate the phenomena of nature and the works of man, and the utilization of these for the increase of knowledge and for the culture and enlightenment of the people.

J. C. Fremont

B.—THE RELATION OF THE MUSEUM TO OTHER INSTITUTIONS OF LEARNING.

1. The museum in its effort for the increase and diffusion of knowledge aids, and is aided by, the university and college, the learned society, and the public library.

2. The special function of the museum is to preserve and utilize objects of nature and works of art and industry; that of the library to guard the records of human thought and activity; that of the learned society to discuss facts and theories; that of the school to educate the individual, while all meet together on common ground in the custodianship of learning and in extending the boundaries of knowledge.

3. The care and utilization of material objects being the peculiar duty of the museum, it should not enter the field of other institutions of learning, except to such a degree as may be found absolutely necessary in connection with its own work.

COMMENT.—For example, its library should contain only such books as are necessary for use within its own walls. Its publications should be solely those which are (directly or indirectly) the outgrowth of its own activities. Its teaching work should be such as can not be performed by other institutions.

On the other hand, schools may advantageously limit their cabinets in accordance with the needs of their lecture rooms and laboratories, and the library and the learned society should not enter the field of the museum, except in localities where museum agencies are not provided.

C.—THE RELATION OF THE MUSEUM TO THE EXPOSITION.

1. The museum differs from the exposition or fair both in aims and in method.

2. The exposition or exhibition and fair are primarily for the promotion of industry and commerce; the museum for the advancement of learning.

3. Of the former, the principal object is to make known the names of the exhibitors for their own professional or financial advantage; in the latter, the name of the exhibitor is incidental, the thing chiefly in mind being the lesson taught by the exhibit.

4. Into the work of the former enters the element of competition coupled with a system of awards by diplomas or medals; in the latter, the element of competition does not appear.

5. The educational results of expositions, though undeniably important, are chiefly incidental, and not at all proportionate to the prodigal expenditure of energy and money which are inseparable from every great exposition.

D.—MUSEUM FEATURES ADOPTED IN EXPOSITIONS

1. Museum methods have been in part adopted by many expositions, in some instances to attract visitors, in others because it has been desired

to utilize the occasion to give museum lessons to multitudes to whom museums are not accessible.

2. Those expositions which have been most successful from an educational standpoint have been the ones which have most fully availed themselves of museum methods, notably the London Exhibition of 1851 and the Paris Exposition of 1889.

3. Special or limited exhibitions have a relatively greater educational value, owing to the fact that it is possible in these to apply more fully the methods of the museum. The four expositions held in London in the last decade—fisheries, health, inventions, and colonial—are good illustrations.

4. The annual exhibitions of the academies of art are allied to the exposition rather than to the museum.

5. Many so-called "museums" are really "permanent exhibitions," and many a great collection of pictures can only be suitably designated by the name "picture gallery."

E.—TEMPORARY MUSEUMS.

1. There are many exhibitions which are administered in accordance with museum principles, and which are really temporary museums. To this class belong the best of the loan exhibitions, and also special exhibits made by public institutions, like the Luther "Memorial Exhibition" of 1894, the material for which was derived chiefly from the library of the British Museum, and similar exhibitions subsequently held under the same auspices.

F.—MUSEUM METHODS IN OTHER INSTITUTIONS—"MUSEUM EXTENSION."

1. The Zoological Park, the Botanical Garden, and the Aquarium are essentially museums, and the principles of museum administration are entirely applicable to them.

2. An herbarium in its usual form corresponds to the study series in a museum, and is capable of expansion to the full scope of the general museum.

3. Certain churches and ecclesiastical edifices as well as antiquities in place, when they have been pronounced "public monuments," are subject to the principles of museum administration.

4. Many cities, like Rome, Naples, Milan, and Florence, by reason of the number of buildings, architectural features, sculpture, and other objects in the streets and squares, together with the historical houses duly labeled by tablets, have become practically great museums and these various objects are administered much in the manner of museums. Indeed, the number of "public monuments" in Italy is so great that the whole country might properly be described as a museum of art and his-

tory. A government commission for the preservation of the monuments of history and art regulates the contents of every church, monastery, and public edifice, the architectural features of private buildings, and even private collections, to the extent of requiring that nothing shall be removed from the country without governmental sanction. Each Italian town is thus made a museum, and in Rome the site of the Forum and the adjacent structures has been set aside as an outdoor museum under the name of the *Passegiata Archeologica.* Similar Government control of public monuments and works of art exists in Greece and Egypt and in a lesser degree in the Ottoman Empire, and for more than half a century there has been a commission of historic monuments in France which has not only efficiently protected the national antiquities, but has published an exceedingly important series of descriptive monographs concerning them.

II.—THE RESPONSIBILITIES AND REQUIREMENTS OF MUSEUMS.

A.—THE RELATION OF THE MUSEUM TO THE COMMUNITY.

1. The museum supplies a need which is felt by every intelligent community and which can not be supplied by any other agency. The museum does not exist except among highly enlightened peoples, and attains its highest development only in great centers of civilization.

2. The museum is more closely in touch with the masses than the university and learned society, and quite as much so as the public library, while even more than the last, it is a recent outgrowth of modern tendencies of thought. Therefore—

3. The public museum is a necessity in every highly civilized community.

B.—THE MUTUAL RESPONSIBILITIES OF THE COMMUNITY AND THE MUSEUM.

1. The museums in the midst of a community perform certain functions which are essential to its welfare, and hence arise mutual responsibilities between the community and the museum administrator.

2. The museum administrator must maintain his work with the highest possible degree of efficiency in order to retain the confidence of the community.

3. The community should provide adequate means for the support of the museum.[1]

4. A failure on the part of one leads inevitably to a failure on the part of the other.

[1] See Chapter III, p. 202.

C.—THE SPECIFIC RESPONSIBILITIES OF THE MUSEUM.

1. The museum should be held responsible for special services, chiefly as follows:

a. For the advancement of learning.

To aid learned men in the work of extending the boundaries of knowledge, by affording them the use of material for investigation, laboratories, and appliances.

To stimulate original research in connection with its own collections, and to promote the publications of the results.

b. For record.

To preserve for future comparative and critical study the material upon which studies have been made in the past, or which may confirm, correct, or modify the results of such studies. Such materials serve to perpetuate the names and identifications used by investigators in their publications, and thus authenticated, are useful as a basis for future investigation in connection with new material. Specimens which thus vouch for the work of investigators are called types. Besides types, museums retain for purposes of record many specimens which, though not having been used in investigation, are landmarks for past stages in the history of man and nature.

c. As an adjunct to the class room and the lecture room.

To aid the teacher either of elementary, secondary, technological, or higher knowledge in expounding to his pupils the principles of Art, Nature, and History, and to be used by advanced or professional students in practical laboratory or studio work.

To furnish to the advanced or professional student, materials and opportunity for laboratory training.

d. To impart special information.

To aid the occasional inquirer, be he a laboring man, schoolboy, journalist, public speaker, or savant, to obtain, without cost, exact information upon any subject related to the specialties of the institution; serving thus as a "bureau of information."

e. For the culture of the public.

To serve the needs of the general public, through the display of attractive exhibition series, well planned, complete, and thoroughly labeled; and thus stimulate and broaden the mind of those who are not engaged in scholarly research, and to draw them to the public library and the lecture room. In this respect the effect of the museum is somewhat analogous to that of travel in distant regions.

2. A museum to be useful and reputable must be constantly engaged in aggressive work, either in education or investigation, or in both.

3. A museum which is not aggressive in policy and constantly improving can not retain in its service a competent staff, and will surely fall into decay.

GEORGE GIBBS.

4. A finished museum is a dead museum, and a dead museum is a useless museum.

5. Many so-called "museums" are little more than storehouses filled with the materials of which museums are made.

D.—THE RESPONSIBILITY OF MUSEUMS TO EACH OTHER.

1. There can be no occasion for envious rivalry between museums, even when they are in the same city. Every good museum strengthens its neighbors, and the success of the one tends to the popularity and public support of the others.

2. A system of cooperation between museums is seemingly possible by means of which much duplication of work and much expenditure of money may be avoided.

3. The first and most important field for mutual understanding is in regard to specialization of plan. If museums in the same town, province, or nation, would divide the field of work so that each should be recognized as having the first rights in one or more specialties, rivalry would be converted into friendly association, and the interests of science and education better served.

4. An important outcome of such a system of cooperation might be the transfer of entire groups of specimens from one museum to another. This would greatly facilitate the work of specialization referred to, and at the same time relieve each museum of the responsibility of maintaining collections which are not germane to its real purpose. Such transfers have occasionally been made in the past, and there are few museums which might not benefit individually, in a large degree, by a sweeping application of this principle. If its effect on the attractiveness and interest of any local or national group of museums be taken into account, as no one can doubt that the result would be exceedingly beneficial.

5. Another field for cooperation is in joint expenditure of effort and money upon labels and catalogues, and in the economical purchase of supplies and material.

COMMENT.—In the United States, for instance, the iron molds for specimen jars used for terra-cotta mounting tablets, and the dies used in rolling the metal guiding strips for supporting the drawers in specimen cabinets, which have been made at considerable expense for the National Museum, are placed without cost at the disposition of other museums; drawings and specifications for the construction of cases, and many other results of experiment in this Museum are placed at the service of all others.

6. Still another would lie in the cooperative employment of expert curators and preparators, it being thus practicable to pay larger salaries and secure better men.

COMMENT.—The curator of graphic arts in the United States National Museum is the custodian of the collection of engravings in the Boston Museum of Fine Arts, giving part of his time to each institution—an arrangement advantageous to both.

III.—THE FIVE CARDINAL NECESSITIES IN MUSEUM ADMINISTRATION.

A museum can not be established and creditably maintained without adequate provision in five directions:

(*a*) A stable organization and adequate means of support.

(*b*) A definite plan, wisely framed in accordance with the opportunities of the institution and the needs of the community for whose benefit it is to be maintained.

(*c*) Material to work upon—good collections or facilities for creating them.

(*d*) Men to do the work—a staff of competent curators.

(*e*) A place to work in—a suitable building.

(*f*) Appliances to work with—proper accessories, installation materials, tools, and mechanical assistance.

A.—STABILITY OF ORGANIZATION.

1. The only absolute assurance of permanence for a museum lies either in governmental protection, or in a connection with some endowed institution of learning, or in special organization with ample endowments.

2. The cabinets of unendowed societies, or those gathered and supported by the efforts of individuals, must inevitably in time be dispersed or destroyed.

B.—DEFINITENESS OF PLAN.

1. No two museums can be or ought to be exactly alike. Each should be devoted to one or more special subjects, and should select those subjects not only with reference to opportunity and the needs of the community, but also with regard to the specialties of other museums in the same region with a view to cooperation.

2. It is the duty of every museum to be preeminent in at least one specialty, be this specialty never so limited.

3. The specialties or departments of any museum may be few or many, but it is important that its plan should be positively defined and limited, since lack of purpose in museum work leads in a most conspicuous way to a waste of effort and to partial or complete failure.

4. It will undoubtedly be found desirable for certain museums, founded for local uses, to specialize mainly in the direction of popular education. If they can not also provide for a certain amount of scholarly endeavor in connection with the other advantages, it would be of the utmost importance that they should be associated (by a system of cooperation) with some institution which is in the position of being a center of original work.

5. The general character of a museum should be clearly determined at its very inception. Specialization and division of labor are essential for institutions as well as for individuals. It is only a great national museum

which can hope to include all departments, and which can with safety encourage growth in every direction.

6. Small museums, it is needless to say, can not attempt specialization in the same degree as large ones, but the principles just enunciated should be constantly kept in view, even by the least of them.

C.—COLLECTIONS.

1. The sources of collections are the following: (*a*) by gift; (*b*) by purchase; (*c*) by exchange; (*d*) by collecting and exploration; (*e*) by construction; (*f*) through deposit or temporary loan.

a. *By gift.*

Acquisition by gift is a most important source, but very uncertain. If a museum has a plan to which it intends to adhere, a large proportion of the gifts offered to it will be unavailable; while on the other hand only a small proportion of the desiderata will ever be thus obtained. A museum may properly, by the offer of a large and complete collection illustrating a subject outside of its plan, be induced to expand its scope. In the case of a large benefaction of this kind, necessitating extensive changes in installation, there will always be careful consideration of the result. It should be borne in mind, however, that the random, thoughtless acceptance of proffered gifts, which, insignificant in itself, but in the course of a few years by no means insignificant in the consumption of space and money for their care, may modify the plan of a museum in a most radical manner. It requires quite as much judgment and mental effort on the part of a museum officer to keep out unsuitable objects as to bring in those which are desirable.

b. *By purchase.*

Acquisition by purchase is often the only means of obtaining desirable objects, particularly so in the case of art museums, least so in natural history museums. Money is especially necessary for the filling of gaps in series obtained by gift or otherwise.

c. *By exchange.*

Acquisition by exchange is especially advantageous, since it enables a museum to dispose of unavailable duplicate material. When exchanges are made with well-conducted museums, there is the additional advantage that the materials thus obtained have been studied and identified by expert authorities. Little is gained by conducting exchanges in a commercial spirit and insisting on too exact valuations and balancing of equivalents, especially when the parties to the exchange are public institutions. Large museums in dealing with small ones may often advantageously give largely and receive comparatively little in return, since they not only become disembarrassed of useless duplicates not desired by institutions of equal rank, but they are also building up sister institutions which may in time afford them much more substantial aid. Exchanges with private collectors may well be carried on in the same spirit, since the collector is thus encouraged to gather more material, in the midst of which unexpected treasures may come to light, and is also aided to build up a private collection which in time will probably fall into the hands of some public museum.

d. By collecting and exploration.

For all museums save those of art this is usually the most profitable and satisfactory, since by gathering fresh material in unexplored fields new facts are discovered, science is enriched, and the reputation of the institution improved. Furthermore, material is obtained in such large quantities that there always remains much in the way of duplicate specimens valuable for exchange. A museum which carries its activities into unexplored fields secures for itself material which will always be unique and unobtainable by others, and thus makes itself a center of interest for the entire world.

The smallest museum can enrich its collections and make contributions to enlarge others by modest explorations under its own walls; it can do much by simply encouraging the people in the adjacent region to save what they accidentally encounter in the course of their daily pursuits. Explorations of this kind are preeminently the function of the local and provincial museum.

e. By construction.

Any museum may do much to enrich its exhibition series by the construction of models and the making of drawings and maps and by making copies of important objects in its own collections to secure material to be used in exchange. Even small museums may do this, for extensive workshops are not necessary. A specialist himself devoid of mechanical skill may accomplish marvelous things with the aid of a patient mechanic.

f. Through deposit and temporary loan.

Possessors of private collections will often lend them for purposes of exhibition or study, if assured that they will be properly cared for. Such loan collections often become permanent gifts. Single specimens, or small groups of objects, still more frequently are offered on deposit, and such deposits when within the province of the museum should be encouraged.

COMMENT.—In the United States National Museum small deposits are received for short periods, but large collections, involving trouble and expense in installation, only with the understanding that they shall not be removed within a certain period—never less than two years.

2. Collections which are incumbered by conditions as to manner of disposition and installation are usually sources of serious embarrassment. It is especially undesirable to accept either as a gift or as a loan any

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unimportant collection with the pledge that it shall be kept intact and installed as a unit. The acceptance of any collection, no matter how important, incumbered by conditions, is a serious matter, since no one can foresee how much these conditions may interfere with the future development of the museum.

3. Gifts, deposits, and cooperation of all kinds may be greatly encouraged by liberal acknowledgment upon labels and in public reports. This is but simple justice to the generosity of the benefactor. It is also a legitimate way to gratify a natural and praiseworthy sentiment; for a collection, to the accumulation of which a man has devoted a lifetime, becomes so connected with his personality that it is but natural that he should wish his name to be permanently associated with it. If acknowledgment of this kind is made upon the individual label of each specimen, this will usually fully satisfy the desire of the donor that the individuality of his gift should be preserved—an arrangement much more satisfactory than one requiring that the objects shall be kept together and treated as a unit for installation.

Gifts and deposits may also be encouraged by the fact that the buildings are fireproof, the cases so built as to afford perfect protection, and the scheme of installation dignified and attractive. Collections of great value may to advantage be afforded accommodations of a specially sumptuous character, and such protection, in case of priceless objects, as is afforded by special electric attachments.

4. Notwithstanding what has been said about the importance of specialization, it is often necessary for a museum to accept collections of objects not at all germane to its plan. This is particularly so in provincial museums, when valuable private cabinets are offered as gifts. It may be impolitic for an institution to refuse such an offer, and it is much less disastrous to receive a special collection to be installed as a unit than to accept numerous promiscuous gifts. In time, in all probability, a collection of this kind can be transferred to the custody of some other institution in the same town, and the museum which has housed it in the meantime has deserved well of the community by preserving for it a valuable possession.

5. Since the plan and character of a museum is largely determined for all time by the nature of the collections which fall first into its possession, at the time of its organization, the authorities temporarily in charge of such an institution at the time of organization should be exceedingly careful in accepting materials which are to serve as a nucleus for its future growth.

Comment.—It is not unusual for boards of trustees, having erected a building, to proceed at once to partially fill it with showy material before the staff has been appointed or a plan considered. This can only be characterized as "pernicious activity," which is certain to result in more harm than good. A plan having been determined upon and a director selected, the collections may be developed at much less expenditure and with any degree of rapidity which may be desired.

D.—MUSEUM OFFICERS.

1. A museum without intelligent, progressive, and well-trained curators is as ineffective as a school without teachers, a library without librarians, or a learned society without a working membership of learned men.

2. Museum administration has become one of the learned professions, and success in this field can only be attained as the result of years of study and of experience in a well-organized museum. Intelligence, a liberal education, administrative ability, enthusiasm, and that special endowment which may be called "the museum sense," are prerequisite qualifications.

Each member of a museum staff should become an authority in some special field of research, and should have time for investigation and opportunity to publish its results.

3. A museum which employs untrained curators must expect to pay the cost of their education in delays, experimental failures, and waste of materials.

4. No investment is more profitable to a museum than that in its salary fund, for only when this is liberal may the services of a permanent staff of men of established reputation be secured.

Around the nucleus of such a staff will naturally grow up a corps of volunteer assistants, whose work, properly assisted and directed, will be of infinite value.

5. "Collaborators" or "associates," as well as curators, may be placed upon the staff of a large museum, the sole duty of the former being to carry on investigations, to publish, and, if need be, to lecture.

6. Volunteers may be advantageously employed either as curators and custodians or collaborators. Such cooperation is especially desirable and practicable when a museum is situated in the same town with a college or university, or in a national capital where there are scientific bureaus connected with the government. Professors in a university or scientific experts in the government service often find it of great advantage to have free access to the facilities afforded by a museum, and are usually able to render useful service in return. Younger men in the same establishments may be employed as volunteer aids, either in the museum or in the field.

7. No man is fitted to be a museum officer who is disposed to repel students or inquirers or to place obstacles in the way of access to the material under his charge.

8. A museum officer or employee should, for obvious reasons, never be the possessor of a private collection.

9. The museum which carries on explorations in the field as a part of its regular work has great advantages over other institutions in holding men of ability upon its staff and in securing the most satisfactory results from their activities. No work is more exhausting to body and mind

than the care of collections, and nowhere are enthusiasm and abundant vitality more essential. Every museum must constantly obtain new material through exploration, and it is better that this exploration should be done by the men who are to study the collections and arrange them than that this should be placed in the hands of others. The necessity of exploration from another point of view has already been spoken of.[1]

10. In a large museum staff it is almost essential that certain persons should give their attention chiefly to administrative and financial matters, thus leaving their associates free from occupation of this description. The business affairs of a museum can not be conducted with too great promptness and precision. It is desirable, however, that the administrative officers of a museum should be men who comprehend the meaning of museum work and are in sympathy with its highest aims, and that its business affairs and scientific work should be controlled by the same executive head.

E.—MUSEUM BUILDINGS.

1. The museum building should be absolutely fireproof and substantially constructed; the architecture simple, dignified, and appropriate—a structure worthy of the treasures to be placed within.

2. Above all things the interior should be well lighted and ventilated, dry, and protected from dust. The halls should be well proportioned; the decoration simple and restful to the eye. No decorative features should be permitted which tend to draw attention from the collections or reduce the floor or wall spaces.

3. While the museum building should be planned with reference to the character of the collections it is to contain, the fact that unexpected development or rapid growth in some one direction may necessitate the rearrangement and reassignment of halls to different departments should always be borne in mind.

4. Since no two museums can be alike, there can be no general uniformity in their buildings. It is manifestly undesirable then that a board of trustees should erect a building for a museum before its character is decided upon or its staff appointed; or that the opinion of the architect of a museum building should be allowed to overweigh the judgment of the experts who are responsible for its utilization after completion. Museum architecture affords no exception to the principle that an edifice should be perfectly adapted to the purpose for which it is designed. No architectural effect which lessens the usefulness of the building can be pleasing to an intelligent public.

F.—ACCESSORIES TO MUSEUM WORK.

1. A well-equipped museum requires as accessories to its work—

(*a*) A reference library, for the use of staff, students, and visitors.

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[1] See Chapter III C., I, d., p. 204.

(*b*) Laboratories for the classification of material, for the storage of the study series, and for the use of students and investigators.

(*c*) Workshops for preparation, mounting, and repair of specimens, and for the making and adjustment of mounts and cases, and storage rooms for material not yet available. (A printing press is an essential feature.)

(*d*) An assembly hall for public lectures, society meetings, and special exhibitions.

(*e*) A bulletin or other official publication to preserve the history of its activities, to maintain its standing among similar institutions, to serve as a means of communication with correspondents, and to exchange for specimens and books for the library.

2. In addition to local accessories, the opportunity for exploration and field work are equally essential, not only because of considerations connected with the efficiency of the staff already referred to,[1] but in behalf of the general welfare of the institution. Other things being equal, exploration can be carried on more advantageously by the museum than by any other institution of learning, and there is no other field of research which it can pursue to better advantage.

IV.—THE CLASSIFICATION OF MUSEUMS.

Museums may best be classified in two ways—by the character of their contents, and by the purposes for which they are founded.

Under the first category they may be grouped as follows:

(*a*) Art museums; (*b*) historical museums; (*c*) anthropological museums; (*d*) natural history museums; (*e*) technological or industrial museums; (*f*) commercial museums.

Under the second category they may be classed as:

(*g*) National museums; (*h*) local, provincial, or city museums; (*i*) college and school museums; (*j*) professional or class museums; (*k*) private museums or cabinets.

COMMENT.—In the reference to special museums in this chapter, nothing has been further from my idea than to catalogue existing museums. Many of the most important are not even referred to by name. I have spoken only of those which are especially familiar to myself, and which seem to be the best illustration of the idea in connection with which they are named.

A.—ART MUSEUMS.

1. The museum of art is a depository for the æsthetic products of man's creative genius, such as paintings, sculptures, architecture (so far as it can be shown by models, drawings, and structural fragments), and specimens of the illustrative arts (such as engravings), and illustrations of the application of art to decorative uses.

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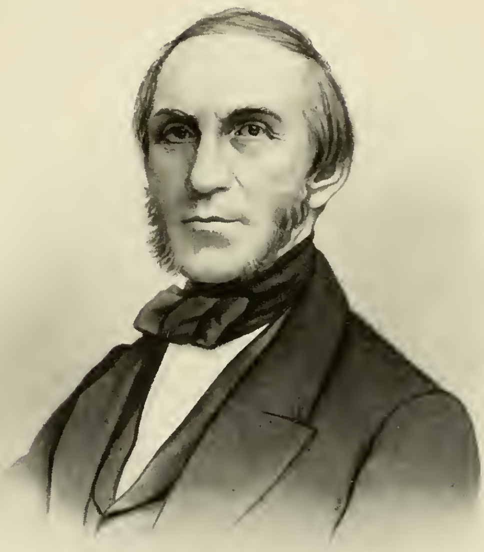
[1] See Chapter III. d., p. 204.



Augustus A. Gould

2. The greater art collections illustrate, in a manner peculiarly their own, not only the successive phases in the intellectual progress of the civilized races of man, their sentiments, passions, and morals, but also their habits and customs, their dress, implements, and the minor accessories of their culture often not otherwise recorded.

3. Museums of art, wherever they may be situated, have a certain general similarity to each other in purpose, contents, and method of management. Those which most fully represent the art of the communities to which they belong, other things being equal, are the most useful and famous.

Comment.—Since Cosmo de'Medici founded in Florence, at the beginning of the sixteenth century, the Museum of the Uffizi—perhaps the oldest museum of art now in existence—every great city in the civilized world has become the seat of a museum or gallery of art. Besides the great general collections of art, there are special museums devoted to the work of single masters, such as the Thorwaldsen Museum in Copenhagen, and the one at Brussels containing only the works of the eccentric painter, Wiertz; the Donatello Museum in the Bargello at Florence, and the Michael Angelo collections in its Academy of Fine Arts and in the Casa Buonarrotti.

4. The distinction between art museum and a gallery of art is a valid one. It depends upon the system of administration and the character of the officers who control it.

Comment.—The scientific tendencies of modern thought have permeated every department of human activity, even influencing the artist. Many art galleries are now called museums, and the assumption of the name usually tends toward the adoption in some degree of a scientific method of installation. The Cluny Museum in Paris is, notwithstanding its name, simply a gallery of curious objects. Its contents are arranged primarily with reference to their effect. The old monastery in which they are placed, affords a magnificent example of the interior decorative art of the Middle Ages.

The Cluny Museum is a most fascinating and instructive place. I would not have it otherwise than it is, but it will always be unique, the sole representative of its kind. The features which render it attractive would be ruinous to any museum. It is, more than any other that I know, a collection from the standpoint of the artist. The same material, in the hands of a Klemm or Pitt-Rivers, arranged to show the history of human thought, would, however, be much more interesting, and, if the work were judiciously done, would lose none of its æsthetic allurements.

Another collection of the same general character as the one just described is the Soane Museum in London. Another, the famous collection of crown jewels and metal work in the Green Vaults at Dresden, a counterpart of which may be cited in the collection in the Tower of London. The Museum of the Hohenzollerns in Berlin and the Museum of the City of Paris are of necessity unique. Such collections can not be created. They grow in obedience to the action of natural law, just as a tree or a sponge may grow.

The city which is in possession of such an heirloom is blessed just as is the possessor of an historic surname, or he who inherits the cumulative genius of generations of gifted forefathers. The possession of one or a score of such shrines does not, however, free any community from the obligation to form a museum for purposes of education and scientific research.

B.—HISTORICAL MUSEUMS.

1. The museum of history preserves those material objects which are associated with events in the history of individuals, nations, or races, or which illustrate their condition at different periods in their national life.

2. Every museum of art and every archæological museum is also a museum of history, since it contains portraits of historical personages, pictures of historical events, and delineations of customs, costumes, architecture, and race characteristics.

COMMENT.—Historical museums are manifold in character, and usually of local interest. Some relate to the histories of provinces and cities. One of the oldest and best of these is the Provincial Museum of the Mark of Brandenburg in Berlin. Of the same class are the Museum of the City of Paris in the Hotel Canavelet, and the museums of the city of Brussels and the city of Antwerp.

Others illustrate the early history of a race or country, such as the Musée Gallo-Romain at St. Germain, the Romano-German Museum at Mainz, the Etruscan museums at Florence and Bologna, the Ghizeh Museum near Cairo, the Acropolis Museum at Athens, and the museums at Constantinople.

Such institutions as the Bavarian National Museum at Nuremberg and the German National Museum in Munich have to do with later periods of history, and there are throughout Europe numerous collections of armor, furniture, costumes, and architectural and other objects, illustrating the life and arts of the Middle Ages and the later periods, which are even more significant from the standpoint of the historian than from that of the artist. Important among these are the Royal Irish Academy at Dublin, and the Musée des Thermes—the Cluny Museum—in Paris.

Many of the cathedrals of Europe are essentially either civic or national museums, and such edifices as Saint Paul's and Westminster Abbey belong preeminently to the latter class.

There are biographical museums, either devoted to single men, like the Galileo, Dante, and Buonarrotti museums in Florence, or the Goethe Museum in Weimar, and the Beethoven Museum in Bonn; to the great men of a nation, as the National Portrait Gallery of Great Britain, the German Valhalla at Ratisbon, etc.; or to great men of a special profession, such as the Gallery of Artists in the Pitti Museum of Florence.

In this connection would come also collections of autographs and manuscripts (like the Dyce-Forster Collection at South Kensington), and collections of personal relics.

Midway between the museum of history and that of biography stands the dynastic or family museum, such as the Museum of the Hohenzollerns in Berlin, and that section of the Kunsthistorisches Museum in Vienna which illustrates the history of the Hapsburgs. The Musée Historique de Versailles is similar in its aims.

C.—ANTHROPOLOGICAL MUSEUMS.

1. The museum of anthropology includes such objects as illustrate the natural history of man, his classification in races and tribes, his geographical distribution, past and present, and the origin, history, and methods of his arts, industries, customs, and opinions, particularly among primitive and semicivilized peoples.

2. Museums of anthropology and history meet on common ground in the field of archæology. In practice, historic archæology is usually

assigned to the latter, and prehistoric archæology to the former. This is partly because historical museums, which are usually national in scope and unsupported on documentary evidence, treat the prehistoric races as extralimital; partly because prehistoric material is studied to best advantage through the natural history methods in use among anthropologists but not among historical students.

COMMENT.—Ethnographic museums were proposed half a century ago by the French geographer, Jomard, and the idea was first carried into effect about 1840 in the establishment of the Danish Ethnographical Museum. In Germany, there are anthropological museums in Berlin, Dresden, and Munich, and the Museum für Volkerkunde in Leipzig; in Austria, the Court and the Oriental museums in Vienna; in Holland, the Ethnographichal Museum in Leyden, and smaller ones in Amsterdam, Rotterdam, and at The Hague; in France, the Trocadero; in Italy, the important Prehistoric and Ethnographic museums in Rome and Florence; in Spain, the Philippine Collections in the Museo de Ultramar in Madrid; and in Hawaii, the Bernice Pauahi Bishop Museum at Honolulu.

In England less attention has been given to the subject than elsewhere in Europe, the Christy Collection in the British Museum, the Pitt-Rivers Collection at Oxford, and the Blackmore Museum at Salisbury being the most important ones specially devoted to ethnography. In the United States, the Peabody Museum of Archæology in Cambridge, the collections in the Peabody Academy of Sciences at Salem, and the American Museum of Natural History in New York are arranged ethnographically, while the ethnological collections in the National Museum in Washington are classified on a double system—one with regard to race, the other, like the Pitt-Rivers Collection, intended to show the evolution or development of culture and civilization without regard to race. This broader plan admits much material excluded by the advocates of ethnographic museums, who devote their attention almost exclusively to the primitive or non-European peoples.

Closely related to the ethnographic museum are others devoted to some special field, such as the Musée Guimet in Paris, which is intended to illustrate the history of religious ceremonial among all races of men—a field also occupied by one department of the National Museum in Washington. Other good examples of this class are some of those in Paris, such as the Musée de Marine, which shows not only the development of the merchant and naval marines of the country, but also, by trophies and other historical souvenirs, the history of the naval battles of the nation, and the Musée d'Artillerie, which has a rival in Madrid.

Of musical museums, perhaps the most important are Clapisson's Musée Instrumental, in Paris; that in Brussels, and that in the National Museum at Washington. The collection of musical instruments at South Kensington has had its contents selected chiefly with reference to their suggestiveness in decorative art.

The Theatrical Museum at the Académie Français in Paris, the Museum of Journalism at Antwerp, the Museums of Pedagogy in Paris and St. Petersburg, are professional rather than scientific or educational, as are also the Museum of Practical Fish Culture at South Kensington, the Monetary Museum at the Paris Mint, the Museums of Hygiene in London and Washington, and the United States Army Medical Museum.

The value of archæological collections, both historic and prehistoric, has long been understood. The museums of London, Paris, Berlin, Copenhagen, and Rome need no comment. In the Peabody Museum in Cambridge, the American Museum in New York, the Museum of the University of Pennsylvania, and the National Museum in Washington, are immense collections of the remains of prehistoric man in America.

3. There are many objects now in the custody of art museums, which would be more appropriately placed if in the museums of anthropology or history.

COMMENT.—There are special collections on the boundary line between art and ethnology, the manner of best installation for which has scarcely yet been determined. The Louvre admits within its walls a museum of ship models. South Kensington includes musical instruments, and many other objects equally appropriate in an ethnological collection. Other art museums take up art and armor, selected costumes, shoes, and articles of household use. Such objects, like porcelains, laces, medals, and metal work, appeal to the art museum administrator through their decorations and graceful forms. For their uses he cares presumably nothing. As a consequence of this feeling, only articles of artistic excellence have been saved, and much has gone to destruction which would be of the utmost importance to those who are now studying the history of human thought in the past.

On the other hand, there is much in art museums which might to much better purpose be delivered to the ethnologist for use in his exhibition cases. There is also much which the art museum, tied as it often is to traditionary methods of installation, might learn from the scientific museums.

Many of the arrangements in the European art collections are calculated to send cold shivers down the back of a sensitive visitor. The defects of these arrangements have been well described by a German critic, W. Bürger. "Our museums," he writes, "are the veritable graveyards of art in which have been heaped up, with a tumulous-like promiscuousness, the remains which have been carried thither. A Venus is placed side by side with a Madonna, a satyr next to a saint. Luther is in close proximity to a pope, a painting of a lady's chamber next to that of a church. Pieces executed for churches, palaces, city halls, for a particular edifice to teach some moral or historic truth, designed for some especial light, for some well-studied surrounding, all are hung pellmell upon the walls of some noncommittal gallery—a kind of posthumous asylum, where a people, no longer capable of producing works of art, come to admire this magnificent gallery of débris."

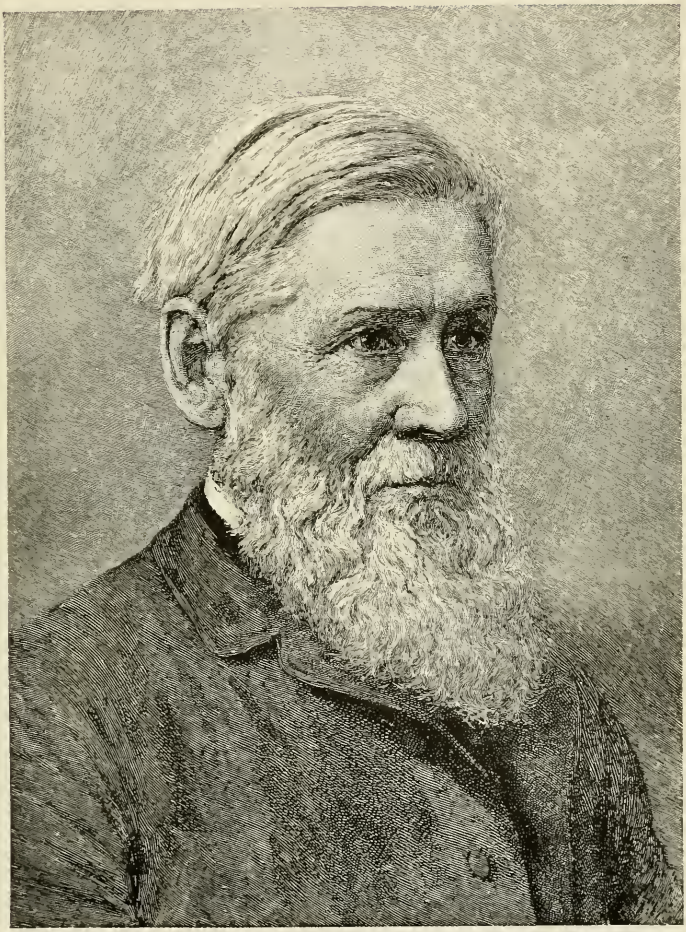
D.—NATURAL HISTORY MUSEUMS.

1. The museum of natural history is the depository for objects which illustrate the forces and phenomena of nature—the named units included within the three kingdoms, animal, vegetable, and mineral—and whatever illustrates their origin in time (or phylogeny), their individual origin, development, growth, function, structure, and geographical distribution—past and present; also their relation to each other, and their influence upon the structure of the earth and phenomena observed upon it.

2. Museums of natural history and anthropology meet on common ground in man. In practice, the former usually treats of man in his relations to other animals, the latter of man in his relations to other men.

COMMENT.—In most national capitals there are general museums in which collections representing the three kingdoms of nature are included in one group. Among the oldest and most prominent types of this class are the British Museum of Natural History in South Kensington, and the Musée d'Histoire Naturelle in Paris, and there are numerous others in the great cities of both hemispheres.

Among specialized natural history collections, a good type is the Museum of Comparative Zoology in Cambridge, Massachusetts, founded by Agassiz to illustrate the history of creation, as far as the present state of knowledge reveals that history, which was, in 1887, pronounced by Alfred Russell Wallace to be far in advance of



ASA GRAY.

similar institutions in Europe, whether as regards the general public, the private student, or the specialist.

Next in order after the zoological sections of the museums in London and Paris, stands those of the Imperial Cabinet in Vienna; those in Berlin, Leyden, Copenhagen, Christiania, Brussels, and Florence, and the La Plata Museum in Argentina, so rich in paleontological material.

The best type of the botanical museum is perhaps the Royal Garden at Kew, with its colossal herbarium and its special museum of economic botany, both standing in the midst of great botanic gardens. The Royal Botanical Museum in Berlin and the herbaria of the Imperial Botanical Garden in St. Petersburg are other examples.

Of specialized geological museums, the Imperial Cabinet in Vienna is a good type. The Museum of Practical Geology in London, founded to exhibit the collections of the survey of the United Kingdom, and also in order to show the applications of geology to the useful processes of life, is another type of the same class. The department of economic geology in the Field Columbian Museum of Chicago—an outgrowth of the exposition of 1893—represents this idea in the New World.

Besides the great special museums, there are the museums of local natural history, intended to show the natural history of a special region, or it may be to illustrate its resources in some restricted branch.

The Royal Museum of Vertebrates in Florence, devoted to the vertebrate fauna of Italy, is a type of this class, and many local museums are so prominent in some special field (such as ornithology or entomology) that their other activities attract little attention.

E.—TECHNOLOGICAL OR INDUSTRIAL MUSEUMS.

1. The museum of technology or industrial museum is devoted to the industrial arts and manufactures, including:

(1) Materials and their sources.

(2) Tools and machinery.

(3) Methods and processes.

(4) Products and results.

(5) Waste products and undeveloped resources.

The interests here treated are thus classified:

(1) Primary or exploitative industries (as agriculture, mining, or the fisheries).

(2) Secondary or elaborative industries (as the textile industries, the ceramic industries).

(3) Auxiliary industries (as transportation).

(4) Technical professions (as engineering, war, medicine, engraving).

The final product of one industry (primary or secondary) may become a material or tool in another art industry or handicraft.

2. Technological museums come in contact with others as follows:

With the natural history museum in respect to primary materials;

With the anthropological museum in the matter of tools and processes, especially if historical and retrospective collections are undertaken;

With the art museum in regard to certain products in which a high degree of æsthetic merit has been attained;

With the commercial museum in respect to all products and materials used in commerce and manufactures.

3. There is no such thing in existence to-day as a general technological museum, conducted upon a liberal plan and doing useful educational work. The possibility of establishing such a museum remains to be demonstrated. Attempts have been made at the close of various international expositions, but without success.

4. It is possible that experience may show that museum work in this field can best be done in connection with museums of natural history and anthropology, organizing sections of economic zoology in connection with zoological museums, economic geology and botany, respectively with the general botanical and geological collections. In this way, at least the natural products and the crude materials could be disposed of to advantage, and the manufactured products, tools, and processes, on the other hand, could be shown by the museums of anthropology and art, and in connection with the mechanical or patent museums; though, after all, a factory in actual operation is the best place to study most modern industries. The constantly changing interests of commerce, dependent upon changing fashions and the caprice of markets, might safely be left to the exposition and fair, or, if need be, cared for by commercial organizations. In the city of Philadelphia, for instance, there is a most permanent exhibition of objects and materials used in the construction and ornamentation of houses, kept by the Building Trades' Association.

F.—COMMERCIAL MUSEUMS.

1. The commercial museum has to do with the salable crude material and manufactured articles; with markets, means of commercial distribution, prices, and the demand and supply of trade.

2. It may properly be connected with the technological museum, but for the fact that its purposes are likely to be more akin to those of the exposition or fair, involving a frequent renewal of exhibits in connection with commercial changes, and often certain features of competitive advertising or display on the part of private exhibitors.

3. The function of this class of museums is twofold:

(*a*) To exhibit to home producers the character and location of foreign markets.

(*b*) To exhibit to foreign buyers the location and products of the home producer.

4. Although the usefulness of the commercial museum has not yet been fully demonstrated, it is conceivable that it might be of great service, could it be made the medium of wide international communication, and the means of a comprehensive system of exchange, through which the collections should be kept up to date and indicate the condition of the various markets of the world.

Essential to the success of such a museum would probably be a bureau of information, through which practical knowledge concerning prices, shipment, and the quality of products, might be obtained by manufacturers and other interested persons, and samples distributed for use in experiment and comparison.

COMMENT.—Examples of commercial museums may be found in the Musée de Melle at Ghent; that of the Chamber of Commerce at Liege, founded in 1888, and the Ottoman Commercial Museum, established in 1890, at Constantinople. These are too recent, however, to afford many lessons.

G.—NATIONAL MUSEUMS.

1. National museums contain the treasures belonging to national governments and are legitimate successors of those treasure houses of monarchs, princes, and ecclesiastical establishments which, until within the last two centuries, were the sole representatives of the museum idea. Every great nation now has a museum, or a group of museums, more or less liberally supported, and intimately connected with the educational undertakings of the government; often, when there are several great cities under one government, each has its own system of museums, and these form the national system.

2. In most countries of continental Europe the collections of the national universities form a part of the national museum system and are exceedingly efficient when thus administered.

3. National museums have opportunities which are not often shared by those under state control, and their responsibilities are correspondingly great. They should occupy specially those fields which are not provided for in the other museums of the country in which they exist, and should not only refrain from competition with these museums but afford to them unreserved cooperation.

COMMENT.—The principal purpose of a national museum must be, as Jevons has well said, "the advancement of knowledge and the preservation of specimens of works of art which hand down the history of the nation and the world." In other words, to serve as museums of record and research. It is by no means impossible, however, for them to render excellent service as educational museums, and quite independent of other considerations, they can rarely afford to sacrifice the material advantages gained from engaging in educational work.

A serious obstacle to success in this direction is the vast amount of material which they all possess, and the lack of space in which to admit it. This difficulty may be partly overcome by a liberal assignment of objects to that portion of the study series which is not on exhibition.

A national museum may not, it is true, advantageously attempt to install its separate departments in such manner as to produce the unity of effect possible in small specialized museums. This, however, is due to the fact that they are obliged to classify their material more strictly, for the attractiveness of a specialized museum grows largely from the fact that many illustrative objects are introduced into the exhibition series which are not strictly in place. The extreme attractiveness of fishery exhibitions, for instance, grows from the fact that so many interesting objects only incidentally connected with the fisheries may be introduced as a setting for the objects directly related to the fisheries.

A result of the same kind is obtained in the Museum of Practical Geology in London, where a selected series of products of all the arts deriving their material from the mineral kingdom—glass, pottery, gems, metal work, and many similar groups—are brought in, legitimately increasing the attractiveness of the museum to the visitor and its instructiveness to the student.

Though the great general museum can not vie in this respect with the local museum, it has a certain advantage of another kind in its very wealth of material, for the display of vast collections, assembled from all parts of the earth and covering it may be acres of floor space, strictly classified and arranged so as to show mutual relationships, affords in itself the most impressive lesson. While in smaller museums the study of individual objects may be easier, in those of the other kind there is a better opportunity for the study of great general relationships.

H.—LOCAL, PROVINCIAL, OR CITY MUSEUMS.

1. To museums of this class belongs the duty of preserving all that which is characteristic of the region or city in which they are located. Every State or province should have an institution of this kind to care for material illustrating its own geology, zoology, botany, and archæology. Every city should have an historical collection for memorials of events in its history and that of its representative men.

2. It is legitimate and desirable that local and municipal museums should also enter upon general museum work of a scientific and educational character. They may form collections of a general character in order that their visitors may see and study the unfamiliar products of foreign lands, as well as those of local interest. For museums of this class, models, casts, copies, and pictures of objects not actually obtainable may be used.

3. It is often advantageous in small communities for the museum and public library to be combined under one roof and one management.

I.—COLLEGE AND SCHOOL MUSEUMS.

1. Museums of this class are intended for the use of teachers in connection with their class room and laboratory instruction and to reenforce the library in the no less important work which it performs for the student.

2. It need scarcely be said that it is impracticable for the smaller teaching museums connected with schools and colleges to carry out the thorough specialization which is attainable in large institutions. A small collection, however scanty and imperfect it may be, is of great value, not only for study purposes in connection with some school or college and for exhibition to the local public of a small town, but also as a nucleus for future development.

3. The college or school museum often becomes the local or city museum for the locality in which it is situated, and what has been said about museums of the latter class then becomes applicable to the college museum.

J.—PROFESSIONAL OR CLASS MUSEUMS.

1. Professional museums are those formed specially for the use of groups of specialists and for the education of specialists. Here belong medical,

Jacob Green.

surgical, and pathological museums; military and naval museums; mechanical museums (such as those connected with patent offices and the Conservatory of Arts and Manufactures in Paris); museums for special arts (like the Textile Museum connected with the Gobelin establishment, the Museum of Porcelains in Sèvres, the Museum of Mosaics in Florence), and certain scientific museums like that of the Geological Survey of Great Britain—the Museum of Practical Geology—the Museo Psicologico in Florence, founded by Mantegazza, and many others.

2. Such institutions, usually under the control of a society, school, or specialized bureau, although they may allow inspection by the public, do not necessarily undertake general educational work, but may with propriety consult first, in all matters relating to administration and display, the interests of the class for which they are formed.

K.—PRIVATE MUSEUMS OR CABINETS.

1. Such collections undertake work in only one portion of the museum field—that of fostering scientific and historical studies—and so long as they are fruitful in this direction, the manner in which they are administered concerns only the persons by whom they are controlled. It is well that there should be many museums of this kind, and that those who work in them should not be encouraged to dissipate their energies in attempting to do too much of the work which belongs to institutions of other classes and for which they should be held responsible. These are, to all intents and purposes, scientific laboratories.

2. The private collector is of the greatest service to the public museum. He can, by the use of private wealth or individual freedom, do many things which the officers of a public museum can not.

3. The private cabinet is the school in which the museum administrator forms the tastes and receives the preliminary training which fits him for his profession. There is much truth in the remark of Jevons that the best museum is that which a person forms for himself. If everyone could do this, there would be no need for public museums; but since they can not, the person who has formed a private collection ought to be able to manage one for the use of the public, since he, better than anyone else, is able, in considering the needs of the museum visitor, to keep in mind that saying which is so useful a guide in museum practice, "Put yourself in his place."

4. Private collectors should be encouraged for educational reasons also, for it has been frequently remarked that the men who have had in youth the training afforded by forming a collection have derived therefrom great advantage over others, even though they subsequently pursued commerce or the learned professions.

V.—THE USES OF SPECIMENS AND COLLECTIONS.

A.—THE USES OF SPECIMENS.

1. Specimens are like the types in a printing office. They may be sorted in the cases in convenient order, so as to be accessible when needed, and may be used to make intelligible almost any train of thought or series of ideas, each being available to hundreds of different relationships.

2. A museum is rarely justified in exhibiting all its materials; as well might a publishing house insist upon using every piece of type in its possession in the printing of each book which it issues.

3. An exhibition series, when properly installed and labeled, is usually most effective when limited in extent.

4. Such a series should not only be limited in extent, but also selected and arranged as to produce a certain unity of effect.

COMMENT.—This principle has been stated by Jevons, who writes: "There may be many specimens exhibited, but they ought to have some degree of relation that they may conduce to the same general mental impression. It is in this way that the Thorwaldsen Museum at Copenhagen exercises a peculiarly impressive effect upon the multitude of all classes of Danes and Swedes who visit it. This museum contains in a single building almost the whole works of this great sculptor, Thorwaldsen, together with all the engravings and pictures having reference to the same. Very numerous though the statues and bas-reliefs are, there is naturally a unity of style in them, and the visitor as he progresses is gradually educated to an appreciation of the works. In somewhat the same way we may explain the ineffaceable effect which certain other foreign galleries produce upon the traveller, especially those of the Vatican. This is not due simply to the excellence of any particular works of art, for in the Louvre or the British Museum we may see antique sculptures of equal excellence, but in the principal Vatican galleries we are not distracted by objects belonging to every place and time. The genius of the classical age spreads around us, and we leave one manifestation of it but to drink in a deeper impression from the next."

The Museo delle Belle Arti in Sienna, the collections in the Monastery of San Marco in Florence, the Musée Gallo-Romain at St. Germain near Paris, the Museo Borbonico in Naples, the Musée des Thermes in the Hotel de Cluny, the German National Museum in Nuremberg, the Museo de Ultramar in Madrid, the Museum of Practical Geology in London, all have been successful in maintaining this unity of effect.

A noteworthy example of a museum of limited scope in which unity of effect is sacrificed is the Musée Guimet in Paris, although notwithstanding this effect it is one of the most interesting and beautiful small museums in the world. In this instance it is evidently due to the fact that the original purpose of the museum—which was to illustrate the comparative history of religions—has been modified by the admission of extensive collections illustrating the arts of the Orient, and that these are not separated in their installation from the religious collections.

Great national museums are usually so hampered in the matter of space that they are not able to attain to such unity, and perhaps it is not equally important in these great establishments in which popular education is only one of several purposes.

5. Single or unrelated specimens, though valuable or interesting, are in themselves of little moment in comparison with series of much less precious objects which unite to teach some lesson to the student or visitor.

6. Specimens are often most useful when placed in a reserve or study series, to be used by special students or to be exchanged, or given to other museums.

7. Advancement in a museum is effected, not only by accession and enlargement, but by the constant substitution of better specimens for study and exhibition, by improvements in methods of display and labeling, and by publishing contributions to knowledge based upon the collections.

B.—THE STUDY SERIES.

1. The effectiveness of a museum as an agency for the increase of knowledge and for higher education depends upon the maintenance of a study series, the administration of which should be upon a plan quite different from that employed for the exhibition series.

2. While it may be desirable to exhibit publicly many large or indestructible objects belonging to the study series, this series should be as a rule permanently arranged in laboratories and storerooms not accessible to the general public.

3. The study series is the storehouse from which the exhibition series is replaced or extended, and from which the needs of other museums may be supplied.

4. Objects of the following classes should never be placed in the exhibition series:

(*a*) Those which are unique or very rare, and liable to destruction from exposure to light and dust.

(*b*) Those which are the types of descriptions, except when large and indestructible.

(*c*) Those belonging to series which are often required for purposes of comparison by students.

5. In collecting materials for the study series, the needs of the future as well as those of the present should be kept in view. Specimens in this series should therefore be acquired in quantities sufficiently large to meet the needs of students hereafter. While nothing of value should be lost, it is questionable, however, whether material should be sought in large quantity when there is no indication that it will soon be needed.

6. The fact that an object is common now is no indication that it will remain so, and the abundance of any kind of objects in a given locality, is often good evidence that it is rare in most other parts of the world.

7. Specimens in the study series, though hidden from sight, should be the object of care as solicitous as that bestowed upon the exhibition series, and should be available upon demand, like the books in the stack rooms of a library.

C.—THE EXHIBITION SERIES.

1. The "People's museum" is that portion of a museum which is on public exhibition; the "Student's museum" that which is devoted

to laboratories and lecture rooms. The "People's museum" should be much more than a hall full of specimens in glass cases. It should be a hall full of ideas, arranged with the strictest attention to system.

2. The ideas which a museum is intended to teach can only be conveyed by means of labels.

As I have said in a previous paper:

An efficient educational museum may be described as a collection of instructive labels, each illustrated by a well-selected specimen.

3. The effectiveness of a museum for the use of the public at large depends chiefly upon the following considerations:

(*a*) There should be a careful selection and effective arrangement of the specimens exhibited (which implies the exclusion of many objects in themselves attractive and interesting).

(*b*) The specimens for exhibition must be chosen solely with reference to the lesson they can teach, singly or in combination.

(*c*) A small exhibition series, complete within its own limits, systematically arranged, fully labeled, and effectively displayed, is far more useful than a vast collection exhibited without reference to its teaching power.

(*d*) To complete a series any specimen is better than none.

(*e*) A copy, model, or picture of a good thing is often more useful than an actual specimen of a poor one.

(*f*) A picture or model may often be shown to advantage in place of a minute or unintelligible object.

(*g*) Books, manuscripts, pictures, maps, etc., become specimens when treated in the museum method.

(*h*) There should be a thorough system of labels, written in simple language, supplemented by pictures, diagrams, maps, and books of reference.

(*i*) Cases, labels, colors of backgrounds, aisles, and all the practical details of arrangement, however minute, should be considered with the comfort and physical ease of the visitor in mind, since the use of a museum is at best necessarily attended by fatigue of eyes and of body, which may be greatly lessened by the adoption of proper devices.

(*j*) Installation ideals can not be too lofty.

D.—CUMBERSOME AND SUPERFLUOUS MATERIALS IN COLLECTIONS.

1. There are few objects which may not be used in museum work. It does not follow, however, that any one museum should attempt to include such objects. There are many which in the present stage of museum practice may be entirely neglected. If any museum were to be extended to the limits of its possibilities, a dictionary might be made to serve as an alphabetical index to its contents.

2. One of the chief perils to a museum is the possession of vast collections.

3. Not the least important duty of the curator is to prevent the accession of undesirable material.

A. Guyot.

4. Material not germane to the plan of a museum should be exchanged or given to the other museums which have uses for it. What is expensive and unprofitable to one may be of the greatest value to another.

E.—SYNOPTICAL AND SPECIAL COLLECTIONS WITHIN MUSEUMS.

1. Synoptical or dictionary collections are advantageous in museums of every class. Their purpose is to teach some special lesson by means of a small or complete series of specimens, arranged, labeled and provided with all possible illustrative accessories.

A synoptical series with a full complement of descriptive labels forms for any science an elementary manual, the labels, forming the text, the specimens the illustrations.

COMMENT.—A collection of this kind in a natural history museum may either illustrate the principles of classification and phylogeny, those of geographical distribution, or may deal with the problems of comparative morphology. One of the best of the latter classes is that in the great central hall of the British Museum of Natural History, while an excellent type of the second class is the Museum of Comparative Zoology, and of the first, that developed under the direction of Mr. Higgins in the Liverpool Museum.

Collections illustrating systems of crystallization and scales of hardness and color are found in many mineralogical cabinets.

Many of the best school museums are practically synoptical collections, and this and nothing more is what they should always aim at.

2. In some collections there is a similar separation of certain objects with a less definite purpose, as, for instance, in the well-known Tribuna in the Uffizi Gallery in Florence. In many art museums there is a similar effort to bring together their most valuable and famous possessions in one central hall.

3. There is no limit to the possibilities in the way of developing special collections, and such collections, with judicious treatment, do more than anything else to add to the attractiveness and individuality of a museum.

The collections of British birds in attitudes of life, mounted in the midst of their natural surroundings, at South Kensington, is one of the most striking and memorable features in that museum. A similar collection in the Museum of the University of Pisa, formed early in this century by Paolo Savi, though on a smaller scale, is no less prominent a feature of that smaller museum. There are several special halls in the Museum at Naples, especially that containing the collection of burnt manuscripts from the buried city, which are unique. Numerous other examples might readily be cited.

F.—LOAN COLLECTIONS AND ITINERATING MUSEUMS.

1. Large museums may greatly increase their educational effectiveness by lending special collections, well labeled and arranged, to towns not provided with museum facilities, and by replacing these from time to time with others. This has been done with success by the department of science and art in Great Britain, and it has resulted not only in a

great improvement in the provincial museums throughout the United Kingdom, but in the establishment of many new ones.

COMMENT.—This system appears to have grown out of the suggestion made more than half a century ago by George Rennie and others to the committee on arts and manufactures appointed by the House of Commons.

2. In the United States the same thing has been attempted in requiring the National Museum, as well as the several Departments of the Government at Washington, to exhibit in the great expositions which have been held from time to time in the principal cities. This method is much more costly than that employed in Great Britain, and it will scarcely be claimed that it is equally effective.

VI.—THE PRESERVATION AND PREPARATION OF MUSEUM MATERIALS.

A.—CONSERVATISM AND TRUTHFULNESS IN THE HANDLING OF MUSEUM MATERIALS.

1. It is not only essential that the full history, locality, original appearance, etc., of each specimen should be fully recorded, but that the specimen itself should be preserved from mutilation, distortion, and all other harm. Carelessness is the unpardonable sin in a museum worker, and the officers in charge of valuable collections should be held to a strict accountability and if need be placed under bond, not only for the safety, but for the proper treatment of the treasures in their care. Preparators and taxidermists should be kept under the strictest surveillance.

B.—REPAIRS AND RESTORATION OF SPECIMENS.

1. Repairs are legitimate when necessary for the safety or permanent preservation of objects, for keeping together the parts of objects which have been broken, but in the interests of truth and science the fact that an object thus repaired should never be disguised.

2. This principle applies to natural history specimens, to archæological objects, and to works of art as well.

3. Restoration, or the replacing of missing parts, is rarely defensible when in the process of restoration any portion of the original object is covered up. Restorations made in such manner that the part restored is not at once distinguishable are unpardonable. If it is necessary to restore missing parts, the restorations should be made upon a cast or model, and not upon the original.

COMMENT.—This principle has reference to hypothetical restorations. It is quite permissible to restore upon the original specimens, in natural history collections, where there are in existence similar specimens from which further guidance may be obtained.

C.—COPIES.

1. Copies are available under certain limitations. Sculptures, coins, metal work, many ethnographical objects, architectural models, and

many products of the decorative and industrial art may be reproduced easily and inexpensively, and the copying of pictures though more difficult is still practicable. In natural history, as has already been said, only fossils can advantageously be reproduced by copies.

2. A copy of an important object is always more desirable for educational use than an original of minor significance.

D.—MODELS.

1. Models may also be used to represent objects which are unattainable, or from their magnitude or minuteness[1] unavailable. Models may also be used to replace alcoholic preparations, or in the place of pictures, when the latter are less effective. Aquatic invertebrates, fishes, reptiles, cetaceans, figures showing the races of mankind and abnormal and normal developments of the human body, and almost everything in the field of anatomy, osteology, and embryology can be shown admirably by the use of models.

E.—PICTURES

1. Pictures are often better than specimens to illustrate certain ideas. The races of man and their distribution, for instance, can only be shown by pictures and maps.

F.—BOOKS.

1. Certain kinds of books are more useful and safer in the museum than on the library shelves, for in the museum they may be seen daily by thousands, while in the library their very existence is forgotten by all except their custodian. Books such as Audubon's Birds of North America, Gould's Humming Birds, and Owen Jones's Alhambra, are a few among the numerous works of which everyone has heard and which everyone wants to see once in his lifetime. In a library they are probably not examined by ten persons in a year; in a museum the volumes exposed to view in a glass case, and a few of the most striking plates attractively framed and hung upon the wall near at hand, teach a lesson to every visitor.

G.—THE MOUNTING OF ANIMALS.

1. Taxidermy is allied to sculpture, and should be governed by the same canons of synthesis and repose. The attitudes of nature should be preserved, but action should be avoided except in the case of groups mounted in the midst of natural accessories, and even then action should never be violent. In mounting specimens to be arranged in the systematic series the attitudes should always be simple and in some degree conventional and uniform.

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[1] Where enlargements are employed it is well to place the actual objects by their side, to give an idea of the scale of enlargements.

H.—TYPES AND UNIQUES.

1. These should always be marked in some conspicuous and unmistakable manner, and if not placed in special cases so labeled that their value may be understood by all.[1]

The safety of types should be provided for by special rules, and it is doubtful whether they should ever be allowed to leave the building in which they are deposited.

2. In zoology, botany, or mineralogy a type is a specimen which has been described in giving a new specific name. Besides types of new species there are equally valuable specimens which have served as the foundation of critical revisions or monographs of groups, which are equally deserving of special protection. Specimens which have been figured in standard works are subject to similar treatment.

I.—DUPLICATES.

1. A duplicate, from the museum standpoint, is simply a superfluous specimen. A collection may possess scores of specimens at first view seemingly precisely identical, and yet not be able to spare one of them. Specimens can never be separated as duplicates until after the collection to which they belong has been exhaustively studied and the results of the study published. Even then there is danger in parting with them.

COMMENT.—The practice in the United States National Museum is to reserve from the material upon which a given memoir has been based enough to render it possible to rewrite the memoir from the beginning if every copy should be destroyed.

2. In great museums of research it is necessary and practicable to preserve extensive series of specimens, representing every possible variation and a great number of localities. In smaller museums this can not be done, except, it may be, in special fields, and the lesser museums can usually throw a much larger proportion of specimens into the duplicate series.

3. The use of duplicates is for exchange and distribution. Their value when thus dispersed depends upon the most accurate identification and labeling, based upon comparisons with the reserve collection from which they are taken.

VII.—THE ART OF INSTALLATION.

A.—INSTALLATION METHODS.

1. The arrangement and mounting of collections for exhibition, commonly known as their "installation," is an art worthy of serious attention on the part of every museum officer. This art is allied to certain branches of architecture, especially that of interior decoration, but the

[1] In addition to the usual label a wafer or painted spot of bright color—red or green—greatly aids in making a type conspicuous.

STEPHEN HALES.

services of an architect are not always to be had, and the man who is responsible for the arrangement of the halls and cases in a museum should be able to do this work effectively. If a collection is to be exhibited at all, it should be done well, and I have little sympathy with my judicious friend who protested against the writing of this chapter on the ground that such "considerations of upholstery" are beneath the dignity of an institution of learning.

The success of installation, like that of every art, depends largely upon attention to minute details. Insignificant as they may seem, the slightest of these is as worthy of consideration as that which seems to be the greatest.

2. Installation work has to do with two matters: (*a*) The arrangement of halls, and of cases and other objects with relation to the halls, light, and general effect. (*b*) The construction and fitting of cases and the arrangement of objects and labels within the cases. The form and arrangement of labels is also intimately connected with installation, but this will hereafter be discussed under the head of "Labels." [1]

B.—THE ARRANGEMENT OF HALLS.

Among the essential features of effective arrangement of floor space are the following:

1. An arrangement in each hall, and especially in that which is first entered, which shall convey to the visitor an impression of the character and aims of the museum, and at the same time give an impression of repose, dignity, and beauty. The impression which the mind receives immediately after the first door has been passed is always the strongest and most lasting.

2. A single entrance and one consecutive line of progress through the halls is most advantageous, both to administrator and visitor, and should be duly considered.

3. If the main or circulation aisles be wide and uninterrupted, and there are occasional broad spaces in front of important exhibits, the passages between the cases may be very narrow, provided the cases are built with this view.

4. The exhibits should be so arranged that their general features may be apprehended in a rapid stroll through the halls, while those wishing to study a special subject minutely may find the extended collections in close proximity to the landmark exhibits intended for the casual visitor. A striking exhibit at the end of a wide aisle may be used to draw visitors to a particular portion of the hall.

5. In the interest of good light and general effect the lower cases and objects should be placed nearest the main aisles and the center of the hall, while tall cases should be farthest from the eye.

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[1] See Chapter IX, A, 1–6, p. 229; D. 3, p. 234.

6. In large halls a system of alcoves with liberal aisles, or a double, triple, or quadruple system of circulation aisles, may be used to advantage.

7. Transverse aisles are usually objectionable; when used a wide, open area near the center of the hall is advantageous. This may be enlarged so as to surround some striking and symmetrical pedestal exhibit. (A formal case should never interrupt the course of an aisle.) Very wide aisles may often be advantageously divided by symmetrical and graceful pedestal exhibits, by which the current of visitors is parted.

8. Objects too large to take their proper place in the cases may be declared "out of classification," and used decoratively on the walls or pedestals, with cross-reference labels.

9. A small label, map, or diagram at the eye level is as conspicuous as an immense one hung high on the walls. Such accessories should only be made large when needed for decorative uses and treated in a decorative manner.

10. These principles apply also to exposition installation, in which, however, an "open system" of installation is needed, with twice or thrice the floor space for the same material that is required in ordinary museum installation.

C.—CASES AND THEIR ARRANGEMENT.

1. The function of a case or pedestal is to protect the exhibit and to display it to the best advantage. Its character should be determined not only by its intended use, but by the position in which it is to stand, the form of adjacent cases, direction and amount of light, etc. Cases should therefore be built only as need arises. They should be planned so that they can be used with advantage in halls that have light from overhead as well as from the sides. This precaution will simplify the problem of lighting at night.

2. Cases should not attract attention either by their austerity of design or workmanship, but should be simply appropriate and pleasing, well locked, dust-tight, and nearly air-tight. The frames should be as light and inconspicuous as possible. Transverse bars across an exhibited object are unpardonable. Glass should be as large, clear, and good as possible, for economy in glass is rarely true economy.

3. The space above the 6-foot line is rarely of use, while for small objects nothing is gained by display below a height of 30 inches. Large objects may be shelved at 10 or 12 inches from the floor. Where the aisles are very wide lower shelving for small objects is possible, but it is more economical to shelve high, narrow the minor aisles, and use the lower parts of the cases for storage closets.

4. A system of interchangeable units in drawers and mounts, as well as in cases, is of the highest importance, as facilitating the transfer of cases from hall to hall and saving cost in manufacture. This should include not only the exhibition cases, but those in the storage series as well.

5. Mobility is even more necessary. All floor cases and pedestals should have fixed rollers or roller trucks so that they may be moved with their contents, and all fixed cases should be built with screws so as to be readily moved from hall to hall.

6. Cases which permit a fixed installation and a recombination of units without a rehandling of specimens are economical and in many departments indispensable. Possibility of interchange of units between the exhibition and storage systems of cases is indispensable.

7. For the interior of cases the prime need is that the system of shelving should be as flexible as possible, and that the inside colors should be restful to the eye and no lighter in color than the necessity of illumination may require.

8. The mountings for individual specimens should not attract the eye either by beauty or ugliness, but should support and set off the specimens, and by their uniformity and propriety add to the appearance of system and order in the exhibits.

9. The inscription should be so attached that it can not be removed or effaced, and, when possible, engraved or painted upon the object itself. When a mark of this kind is not possible, a ticket or label, preferably the latter, should be attached in the most prominent manner. Even when a ticket is used at least the catalogue number should be inscribed upon the specimen, if this can be done without injuring it. These requirements do not apply so much to large and heavy objects permanently installed in an exhibition series as to those kept, even temporarily, in a study or storage series. Fragile objects, or those which can not receive a permanent mark, should be kept in type receptacles of glass or other material, upon which should be placed the inscription. Even when preparations are thus kept in jars or boxes they should, when possible, have some ticket attached to them bearing the same number as the receptacle in which they are placed, so that if specimens are taken out they shall not be put back in the wrong receptacle.

COMMENT.—In the United States National Museum, each alcoholic preparation is marked with a ticket of block tin, on which the catalogue number is stamped, the same number being engraved with a diamond upon the glass jar in which it belongs.

10. A specimen may consist of a single object, or of a large number of similar objects from one source. For instance, a collection of engravings in one portfolio; a collection of similar kinds of stone implements from one excavation; a number of animals or plants of one species from the same locality.

For lack of a better term, the material included in a museum catalogue number, whether a single specimen or many, is called a "lot." This term is chiefly employed in museum statistics.

11. Explorers and collectors in the field should keep their records by catalogue and label, in accordance with the principles laid down for museums. Their work thus gains immensely in definiteness and value,

and their temporary labels, catalogue numbers, and registers are easily brought into relation with those of the permanent museum series. Private collectors, no matter how small their field of activity, are in duty bound to follow the same methods of record.

12. The principles crudely stated above may require modification, but the fundamental ideas are applicable to collections of every kind, public and private; and the owner of any interesting object, be it picture, manuscript, decorative object, or heirloom, should be urged to label his possessions for the benefit and protection of posterity.

13. What is inscribed upon the specimen is properly a "mark;" what is attached to it upon a card or its equivalent is properly a "label." The term "etiquette," used in France, Germany, and upon the Continent generally is equivalent to our "label." But neither the term "etiquette" nor its equivalent "ticket," though the last is allowable in the same sense as "label," is often used by those who speak English.

In practice it is convenient to speak of the inscription which serves to identify an individual specimen, whether inscribed upon it or attached to it, as its "label." Thus the individual or "specimen label" should be clearly distinguished from the "exhibition label," which has quite a different function and which ought to have a more distinctive name.

VIII.—RECORDS, CATALOGUES, AND SPECIMEN LABELS.

A.—MUSEUM RECORDS.

1. The value of a collection depends in the highest degree upon the accuracy and fullness of the records of the history of the objects which it contains.

2. A museum specimen without a history is practically without value, and had much better be destroyed than preserved.

COMMENT.—There will be many legitimate exceptions to this rule, but it can do no harm to state it forcibly, since the museum curator is more likely to err on the side of saving too much.

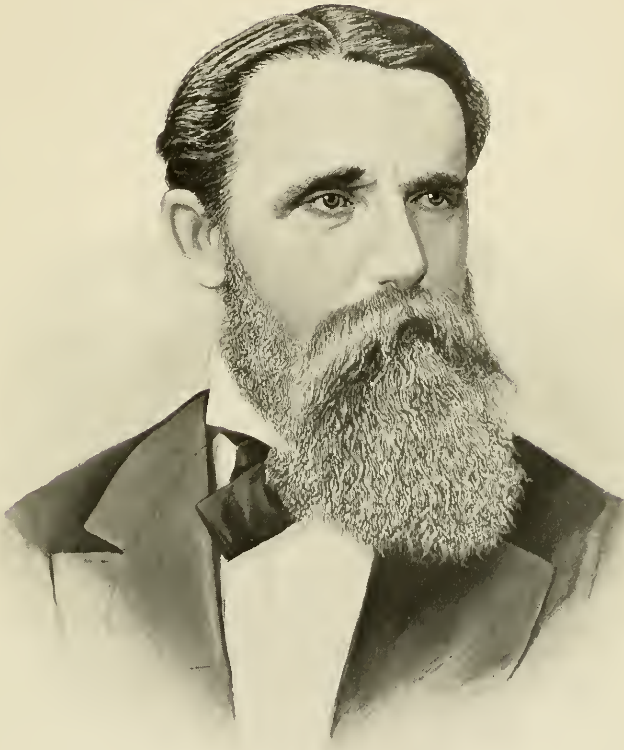
B.—CATALOGUES OR REGISTERS.

1. A museum catalogue is a numerical list or register in which each specimen is recorded, under a separate number, in connection with which are entered all the facts known in regard to its history.

2. The catalogue should be supplemented by a file case, in which should be preserved notes, letters, or papers relating to each specimen classified under the catalogue number.

3. The numerical register may advantageously be supplemented by card catalogues systematically arranged.

4. In a large museum, or one of a varied character, it is desirable that there should be separate catalogues or registers for the several departments, each with a separate series of numbers.



CHARLES FREDERIC HARTT.

5. When a museum has a system of departmental catalogues, there should be a general catalogue, or accession book, in which "accessions" are entered in the order of their reception. The term "accession" is used to describe the material received at one time, from one source, whether it be a single specimen or a shipload.

In connection with the accession book should be filed, under the "accession numbers," all invoices and correspondence relating to the special accession.

In each departmental catalogue a separate column should be provided in which the accession number should be recorded. A large number of specimens in many departments may fall under one accession number.

6. There is much advantage in printing the catalogues of a museum. When a collection is sufficiently rich in material to afford the opportunity for a scientific revision and classification of the science which it illustrates, the advantage is very great indeed, as is demonstrated by what the British Museum has accomplished.

7. When great general catalogues are not practicable, much advantage is gained by printing catalogues of special collections, however small they may be, provided that each is complete in its own field. A report or memoir upon a special collection may be made to serve the purpose of a special catalogue.

When printed catalogues can be well illustrated, their usefulness is increased many fold, since by this means the treasures of one museum are made available for study and comparison in every other museum, as well as by the multitudes who have not the opportunity to see the museums in person.

8. Catalogues are the keys to the treasure vaults of a museum.

C.—SPECIMEN LABELS OR TICKETS.

1. The inscription which is inseparably affixed to each individual specimen is the most essential part of the museum record; for this not only establishes the identity of the specimen, but serves to show to what museum it belongs. Registers and other records may burn, but the individual label will remain as long as the specimen itself, to give to it authenticity and significance.

2. The inscription should not only refer definitely to the register by means of the catalogue number, but should, if possible, contain a statement of locality, and the name of the collector or maker.

IX.—EXHIBITION LABELS AND THEIR FUNCTIONS.

A.—THE PURPOSE OF THE EXHIBITION LABEL.

1. The exhibition label is the principal means by which the treasures in a museum are made intelligible to the public, the guide, the lecturer, and the published handbook, though each in a limited field more effec-

tive, being absolutely powerless when the needs of the great majority of students and visitors are concerned.

2. The labels describing the specimens in a collection are intended to take the place of the curator of the collection when it is impossible for him personally to exhibit the objects and explain their meaning. When collections were small and visitors few, the curator or owner of a cabinet was accustomed to conduct visitors in person among the cases, to take the specimens in his hand, to tell their names and where they came from, to indicate features of special interest, and to answer questions. This was in some respects an ideal way when the curator was a man of wide knowledge and so much of an enthusiast that he took pleasure in talking without limit. The method was not without defects, however, since the lecturer (for such he was in fact) selected for exhibition a limited number of objects which interested him, or which he supposed might interest the visitors, and gave the latter no chance for selection. Furthermore, the arrangement could not be such as to convey a sequence of ideas, such as a selected and well-labeled series of specimens can do, and the spoken descriptions, being as a rule full of unfamiliar words, were not remembered. The printed label may be read over again and again, and is often copied into the visitor's notebook. Again, under the old system, examining a collection was looked upon rather in the light of amusement than study, and what might have been possible in the way of instruction was rarely attempted.

In these days, when the curator attempts verbal instruction, it is by means of a lecture in the museum lecture hall, or, if a floor lecture, among the cases, surrounded by hundreds or scores of auditors, who may either take notes or find the substance of the lecture in a syllabus or printed text-book prepared by the lecturer.

Where one museum visitor listens to the museum lectures, tens of thousands pass through the halls without a guide. They must depend entirely upon the labels for information; for guide books, if such have been printed, are rarely bought, still more rarely used in the presence of specimens, and though often taken home with the intention of studying them, are only in the rarest instances ever opened after leaving the museum.

3. The function of a label, then, is a most important one, since it is practically only through the aid of the labels that visitors derive any benefit whatever from a visit to a museum. Therefore a label should answer all the questions which are likely to arise in the mind of the persons examining the object to which it is attached.

4. The office of the descriptive label may be stated as follows:

(*a*) The label must tell the name of the object; its exact and technical name always, and if there be one, its common name.

(*b*) It must call attention to the features which it is important for the visitor to notice.

(*c*) It must explain its meaning and its relations to the other objects in the same series. If it is a natural history specimen it should explain its geographical distribution, which, if possible, should be plotted on a small map, forming a part of the label, and mentioning peculiarities of structure or habit.

If it is an ethnological object, its uses and construction should be explained, its materials named, if they are not obvious, and supplementary information given by means of pictures; and where pictures are better than words, these may be attached.

(*d*) The exact locality, date of collection, and source of the specimen exhibited, should be mentioned.

(*e*) For the convenience of visitors it is well, in many cases, to give the dimensions or weight of the specimen.

5. The label may be made to convey much information in addition to that which is printed upon it by means of maps, pictures, and diagrams, which may be placed by its side to reenforce its teachings, and also by cross references to other specimens in the museum, or to books on the museum reading tables, or in its library.

6. Exact references from the label to the specimen which it explains may be effected by a system of reference numbers, such as are used to bring a diagram into relation with descriptive text.

Colors may be applied to portions of a specimen, in order to make the label system more intelligible; as, for instance, when it is desired to compare similar parts in a series of specimens placed side by side, the same color in each signifying homology.

And "pointers" may be used upon the specimens to indicate the localities of small objects, or especially noteworthy features referred to on the label.

COMMENT.—The late Professor Moseley was one of the first to adopt these methods, in the Oxford Museum. The system of showing homologies by color was used in the Milan Museum as early as 1878, and has been very effectively used by Mr. F. A. Lucas in the United States National Museum.

B.—THE ART OF LABEL WRITING.

1. The preparation of labels is one of the most difficult tasks of the museum man. The selection of the descriptive matter to be printed requires the best of judgment and the widest and most accurate information; while to determine the form and size of the different labels in a series, and to secure the best typographic effect, is equally difficult, and requires abilities of quite a different order.

2. A label may contain a vast amount of exact and valuable information, and yet by reason of faulty literary and typographic arrangement, have as little significance and value as a piece of blank paper.

3. Before a specialist is prepared to label a collection he must be a complete master of the subject which the collection is intended to illustrate. After he has written the series of labels, if the collection is com-

plete he will have the material under control which would enable him to write a very complete book of reference upon the subject.

4. No task is more exacting than this form of *précis* writing. Not only is it impossible to conceal lack of perfect knowledge, but the information must be conveyed in a terse, concise, and definite phraseology, such as is not demanded by any other class of writing, unless it may be the preparation of definitions for a dictionary. He who writes definitions for a dictionary, however, has usually the advantage of having before him numerous other definitions of the same term which he needs only to collate and rearrange.

5. A good descriptive label should do something more than impart information. It must be so phrased as to excite the interest of the person who is examining the specimen to which it is attached; to call his attention to the points which it is most important that he should observe; to give him the information which he most needs while looking at the specimen, and to refer him to the books by means of which he can, if so disposed, learn all that is known upon the subject illustrated.

6. The art of label writing is in its infancy, and there are doubtless possibilities of educational results through the agency of labels and specimens which are not as yet at all understood. It is clear, however, that the advice of the old cook in regard to making soup applies equally well to a good label; that "its merit depends much more on what you leave out than on what you put in." The value of this method of instruction is perhaps better understood by the most advanced writers of school text-books and dictionaries than even by the average museum worker.

COMMENT.—In Doctor Edward Eggleston's new School History of the United States engravings, portraits, pictures of historical localities, costumes, and archæological objects, are interspersed through the text, and each of these has a label of the museum type surrounded by rules and separated from the text, with which it has usually only general relationship. The originals which are thus illustrated, if brought together, would make an admirable museum of American history, and the book itself could hardly be improved upon as a handbook to such a collection. The modern illustrated dictionary owes much of its success to the adoption of museum methods, due perhaps to the fact that so many men familiar with museum methods have been engaged upon the preparation of the latest American publication of this kind, the Century Dictionary, and the more recently published Standard Dictionary. These works thus impart instruction by methods very similar to those in use in museums, except that they are much at a disadvantage by reason of their alphabetical arrangement. This is, of course, one respect in which the museum exhibition case has the advantage over the lecturer who can only present one subject at a time, or over the writer of books who is prevented by the size of his pages from bringing a large number of ideas into view at once. This difficulty has been in part overcome by the editor of the Standard Dictionary, in the great plates where are shown in one case all the principal varieties of precious stones; in another plate all the races of the domesticated dog; in another, the badges of orders of chivalry. Even this, however, is far from reaching the possibility possessed by the museum, with its broad expanses of exhibition cases, of showing a large number of objects so arranged as to explain their mutual relationship, and so labeled as to explain the method of arrangement.

F: R: Hassler

C.—FORM AND SIZE OF LABELS.

1. The size and typography of the label are of the greatest importance. The best written label may be ruined by the printer. Not only must the letters be large enough to be legible from the customary point of view, but the type must be pleasing in form and so arranged as to lead the eye of the reader with pleasure from one line to another, and so broken into paragraphs as to separate from each other the topics discussed.

Furthermore, a system of subordinate sizes of type is essential, so that the most important facts shall first meet the eye. In many of the labels printed for the National Museum type of four or five different sizes is used, the largest giving the name of the object, the next size the name of the locality and donor, the next its distribution, and so on, much in the order of importance of the topics already proposed, while the least essential illustrated matter at the bottom of the label is placed in the smallest type. The theory is that the largest type should give the information desired by the greatest number of visitors (by everyone); the next size, that needed by those who are studying the collection in a more leisurely way, and so on.

Too much can not be said of the necessity of breaking the descriptive matter into short paragraphs, which should never be more than half a square in length.

COMMENT.—Where a label of great width is printed, it is believed that it is better to arrange the matter in two columns, rather than to weary the eye by following back and fro across the card. Labels, as a rule, seem to be most satisfactory when nearly square, or with the height less than the width.

2. Much attention should be given to the selection of type and color for labels, it having been found that labels printed on white cardboard become dirty or turn yellow, besides being dazzling and hard to read. Many tints of cardboard, which would otherwise be available, can not be used because of their tendency to fade, objectionable in itself and doubly objectionable when it becomes necessary to put a fresh bright label by the side of one which has become soiled in use.

COMMENT.—Almost every sample of colored cardboard which has been tried in the United States National Museum has faded after a time. The most satisfactory has been one of greenish gray. This is temporarily in use in the geological and mineralogical collections, where a light gray color for the interior of the cases and shelves seems preferable, and also in the collection of birds, which is installed, by preference, in a somewhat dark apartment. The standard label board, however, is a heavy rough-faced manila. The color, being that natural to this fiber, is unchangeable. There is no fading, little tendency to become dirty, and the soft, rich, brownish-yellow tone sets off admirably the heavy black lines of the antique-faced type which is used, and harmonizes well with the buffs and maroons which are favorite colors for case interiors. Cartridge paper in any tint of gray or light brown is an admirable material for labels, especially large ones. It must, however, be glued to a tablet. If this is made of dark wood with a bevel retreating from the edge of the label, forming a dark border, the effect is very pleasing. Labels thus prepared and mounted upon metal rods are used by the National Museum for general-classification labels in the interior of cases.

D.—CLASSIFICATION LABELS.

1. In addition to the labels of individual objects there are "classification labels," which serve the same purpose as the volume, chapter, section, and paragraph headings in a printed work.

For the smaller groups these are placed inside of the case; for the larger ones outside, often serving as "case labels."

2. The relationship of the objects in a series to each other may usually be indicated by the size of the labels, which should be uniform for objects of the same general character in the same case. When a deviation from this rule is necessary, if the size of the type remain the same, more space may be obtained, either by slight widening or slight lengthening; but in the same series it should be always lengthened or always widened. Classification labels which are placed unattached among the specimens increase in size with the importance of the grade of that case.

3. There are limits to the possibilities of making labels speak by their size. An object at the top of a case or on a pedestal or in a case by itself is always regarded as "out of classification," and its label arranged solely with reference to its appearance or utility in the place where it is to stand. It is necessary to vary the size somewhat in the same series, when, as in a long case of mammals, a small species and a large one are placed side by side. Here, for æsthetic reasons, the rule is usually set aside.

COMMENT.—It is the plan in the United States National Museum to have a large label, glazed and framed, at the top of each case or in front of each panel. These are printed on black or maroon paper in gold or silver letters. The labels in gold or black are printed from large wooden type and are used to indicate the general system of classification of the cases upon the floor. When it is desired to use outside labels, glazed and framed, which are not in this general classification series, we print with heavy-faced type in black upon manila or cartridge paper, since the black upon yellow is more legible with comparatively small type than the gold upon black.

X.—GUIDES AND LECTURERS; HANDBOOKS AND REFERENCE BOOKS.

A.—GUIDES AND LECTURERS.

1. In the days when museums were small and visitors few it was possible, as has already been said, for a curator of a collection personally to conduct the visitors and to explain to them the collections; but this can no longer be done under the changed conditions. The label and the handbook have forever replaced the guide, for an unintelligent leader can effect nothing but harm.

2. A modification of the guide system is still practicable under certain circumstances, as when a party of persons interested in some special subject are conducted through a portion of a museum by a teacher or some member of the museum staff who serves in this capacity. This is the floor-lecture system, which, however, to be efficient must be coupled with

some method of excluding the general public from the alcove in which the party is for the time engaged.

3. Formal lectures in the lecture hall of the museum, illustrated by specimens withdrawn from the cases, are exceedingly useful, although they reach but a limited number of persons. Such lectures are most useful when in courses and devoted to a special topic; still better when they are addressed to a particular class in the community, as, for instance, the teachers in public schools.

COMMENT.—The courses carried on at the American Museum of Natural History in connection with the normal-school system of the State of New York are an example.

4. In university towns the use of the lecture room and the illustrative resources of the museum may to good advantage be placed at the disposal of the professors and their classes.

5. A member of the staff may sometimes do good service by inviting a group of visitors to his laboratory, in order to explain, with the use of specimens and reference books, some special point upon which they seek information.

B.—HANDBOOKS AND GUIDEBOOKS.

1. The handbook and guidebook supplement the label system, and used in connection with labels render still more unnecessary the services of a guide.

2. The guidebook, properly speaking, is a brief manual in which the plan of the museum and the general character of its contents are described. It should have diagrams of buildings, showing the location of the various halls and their uses, and diagrams when necessary of the halls, showing the system of arrangement. The guidebook, in short, is a general label for the museum as a whole. Since guidebooks are usually kept as souvenirs, they should contain a certain amount of descriptive and historical matter, and pictures of the building and of some of its most notable treasures.

3. The handbook relates to a portion of the museum, either a department or a special collection within the department, and should present the information conveyed by the exhibition labels belonging to the branch to which it relates.

When a collection has been well labeled, a complete handbook may be made simply by combining the labels in proper order and printing them. If the collection is complete and well selected, the handbook describing it becomes an encyclopædic manual of the subject illustrated.

Printed catalogues, such as have already been referred to, often fulfill the function of handbooks, though usually too technical for that purpose.

The catalogue should be technical and exhaustive and adapted for the use of the professional student. When it relates to a large collection, and especially when illustrated, it is too large to be convenient for general use.

A handbook is usually intended for the use of the public and should be what its name signifies—a volume which may be carried in the hand by the visitor or general student.

The handbook also serves to remind the visitor of what he has seen, and enable him to review the teachings of the museum after he has left it. It supplements and to some extent replaces the visitor's personal notebook.

4. The handbook and guidebook should never replace the descriptive label attached to each exhibited object. The practice not uncommon in art galleries and expositions of designating objects by number and describing them only in the guidebook does not seem judicious, although in temporary exhibitions it can not always be avoided. It is a relic of the days when it was thought legitimate by this means to force every visitor to buy a catalogue, and thus contribute to the revenues of the establishment.

C.—READING TABLES.

1. A certain number of bibliographies, dictionaries, and standard works of reference, directing visitors to the literature of the subject, should be placed in each hall, each table being devoted to the subject illustrated by the collections in the midst of which it stands. These books may, for safety, be fastened to a reading desk or table.

2. It is often advantageous to display books within the exhibition cases, with the specimens, to teach visitors what books they should use in carrying on the studies suggested by their visit to the museum.

D.—LIBRARY.

1. Every well-appointed museum should have a good reference library, which should include the principal books of reference in regard to the various specialties with which it is concerned, and especially the great illustrated works relating to other museums which can not be displayed in the exhibition halls. This library should be freely accessible to visitors and provided with comfortable furniture and facilities for taking notes.

2. The museum library should, if possible, be so situated as to form one of the features of the museum, and the doors so arranged that visitors can look in without disturbing those who are reading. The effectiveness of such an arrangement will be appreciated by all who have visited the Musée Guimet in Paris, or the Museo di Ultramar in Madrid:

3. In addition to the general reference library, special collections of books may advantageously be developed in connection with the several departments of a museum. So long as these are judiciously limited in scope, they can not well be too extensive, since a technical library is always more useful when it is more directly under the influence of a specialist, than when administered as a part of a great general library by

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professional librarians. In a library of this kind, much material not usually of much service elsewhere—pamphlets, cuttings, pictures, technical manuscripts, etc.—will accumulate and be kept under control.

COMMENT.—In the United States National Museum, there are a considerable number of sectional libraries, shelved in proximity to the collections to which they relate, and under the direct care of the curators. These are all under control, by means of a card catalogue, kept in the central library, where works of general interest are retained, and may be recalled at any moment by the museum librarian.

XI.—THE FUTURE OF MUSEUM WORK.

A.—THE GROWTH OF THE MUSEUM IDEA.

1. There can be no doubt that the importance of the museum as an agency for the increase and diffusion of knowledge will be recognized so long as interest in science and education continues to exist. The prediction of Professor Jevons, in 1881, that the increase in the number of museums of some sort or other must be almost coextensive with the progress of real popular education, is already being realized. Numerous local museums have been organized within the past fifteen years in the midst of new communities. Special museums of new kinds are developing in the old centers, and every university, college, and school is organizing or extending its cabinet. The success of the Museums Association in Great Britain is another evidence of the growing popularity of the museum idea, and similar organizations must of necessity soon be formed in every civilized nation.

2. With this increase of interest there has been a corresponding improvement in museum administration. More men of ability and originality are engaging in this work, and the results are manifest in all its branches.

The museum recluse, a type which had many representatives in past years, among them not a few eminent specialists, is becoming much less common, and this change is not to be regretted. The general use of specimens in class-room instruction and still more, the introduction of laboratory work in higher institutions, has brought an army of teachers intc direct relations with museum administration, and much support and improvement has resulted.

3. Museum administration having become a profession, the feeling is growing more and more general that it is one in which talents of a high order can be utilized. It is essential to the future development of the museum that the best men should be secured for this kind of work, and to this end it is important that a lofty professional standard should be established.

B.—PUBLIC APPRECIATION OF THE MATERIAL VALUE OF COLLECTIONS.

1. The museum of nature or art is one of the most valuable material possessions of a nation or a city. It is, as has well been said, "the peo-

ple's vested fund." It brings not only world-wide reputation, but many visitors and consequent commercial advantage. What Alpine scenery is to Switzerland, museums are to many neighboring nations. Some one has written that the Venus of Melos has brought more wealth to Paris than the Queen of Sheba brought to King Solomon, and that but for the possession of their collections (which are intrinsically so much treasure) Rome and Florence would be impoverished towns.

This is thoroughly understood by the rulers of modern Italy. We are told that the first act of Garibaldi, after he had entered Naples in 1860, was to proclaim the city of Pompeii the property of the nation, and to increase the appropriation for excavations, so that these might be carried on with greater activity. "He appreciated the fact that a nation which owns a gold mine ought to work it, and that Pompeii could be made for Naples and for Italy a source of wealth more productive than the gold mines of Sacramento." If capital is an accumulation of labor, as economists say, works of art, which are the result of the highest type of labor, must be capital of the most productive character. A country which has rich museums attracts to itself the money of travelers, even though it may have no other source of wealth. If, besides, the populace is made to understand the interest which is possessed by their treasures of art, they are inspired with the desire to produce others of the same kind; and so, labor increasing capital, there is infinite possibility for the growth of national societies devoted to the formation of museums, to their maintenance, and to the education of the people by this means.

Suggestive in this same connection was the remark of Sir William Flower to the effect that the largest museum yet erected, with all its internal fittings, "has not cost so much as a single fully-equipped line of battle ship, which in a few years may be either at the bottom of the sea or so obsolete in construction as to be worth no more than the material of which it is made."

COMMENT.—This principle was well stated more than half a century ago by Henry Edwards in his treatise on the Administrative economy of the fine arts in England, as follows: In addition to the broad principle that the public funds can never be better employed than in the establishment of institutions tending at once to refine the feeling and to improve the industry of the whole population, there is the subordinate, but yet important, ground of inducing and enabling private persons greatly to benefit the public by contributing toward the same end. No country [he continues] has more cause to be proud of that munificent spirit of liberality which leads private individuals to present or bequeath to the community valuable collections which it has been the labor of their lives to form; but to give due effect to this liberality and to make that effect permanent, it is necessary that the State step in and contribute its sanction and its assistance; and in many cases the very munificence of spirit which has formed an immense collection and given birth to the wish to make it national has, by its own excess, made that wish powerless without the active aid of the legislature. The actual cost, and still more the inherent value, of the collections of Sloane, Elgin, and Angerstein made them in reality gifts to the nation, although they could never have been acquired (without gross injustice to the descendants of the large-minded collectors) had not Parliament made certain pecuniary advances on account of them. While but for the foundation of the British Museum and of the National Gallery, the collections of Cracherode and Holwell Carr, of Beaumont, of Sir Joseph Banks, and of King George III would have continued in the hands of individuals.

C.—PUBLIC APPRECIATION OF THE HIGHER FUNCTION OF MUSEUMS.

1. Museums, libraries, reading rooms, and parks have been referred to by some wise person as "passionless reformers," and no better term can be employed to describe one of the most important of their uses.

COMMENT.—The appreciation of the utility of museums to the great public lies at the foundation of what is known as "the modern museum idea." No one has written more eloquently of the moral influence of museums than Mr. Ruskin, and whatever may be thought of the manner in which he has carried his idea into practice in his workingmen's museum, near Sheffield, his influence has undoubtedly done much to stimulate the development of the "people's museum." The same spirit inspired Sir Henry Cole when he said to the people of Birmingham in 1894: "If you wish your schools of science and art to be effective, your health, your air, and your food to be wholesome, your life to be long, and your manufactures to improve, your trade to increase, and your people to be civilized, you must have museums of science and art to illustrate the principles of life, wealth, nature, science, art, and beauty."

And I never shall forget the words of the late Sir Philip Cunliffe Owen, who said to me some years ago: "We educate our working people in the public schools, give them a love for refined and beautiful objects, and stimulate them in a desire for information. They leave school, go into the pursuits of town life, and have no means provided for the gratification of the tastes they have been forced to acquire. It is as much the duty of the Government to provide them with museums and libraries for their higher education as it is to establish schools for their primary instruction."

2. The development of the modern museum idea is due to Great Britain in much greater degree than to any other nation, and the movement dates from the period of the great exhibition of 1851, which is recognized upon the western side of the Atlantic as marking an epoch in the intellectual progress of English-speaking peoples. The munificence with which the national museums of Great Britain have been supported, and the liberal-minded manner in which they have been utilized in the cause of popular education and for the promotion of the highest intellectual ideals, has been and still is a source of inspiration to all in America who are laboring for similar results.

3. The future of the museum, as of all similar public institutions, is inseparably associated with the continuance of modern civilization, by means of which those sources of enjoyment which were formerly accessible to the rich only, are now, more and more, placed in the possession and ownership of all the people (an adaption of what Jevons has called "the principle of the multiplication of utility"), with the result that objects which were formerly accessible only to the wealthy, and seen by

a very small number of people each year, are now held in common ownership and enjoyed by hundreds of thousands.

In this connection the maintenance of museums should be especially favored, because these, more than any other public agency, are invitations to the wealthy owners of private treasures to give them in perpetuity to the public.

4. If it be possible to sum up in a single sentence the principles which have been discussed in the present paper, this sentence would be phrased in these words: The degree of civilization to which any nation, city, or province has attained is best shown by the character of its public museums and the liberality with which they are maintained.

JOSEPH HENRY.

THE MUSEUMS OF THE FUTURE.

BY

GEORGE BROWN GOODE,

Assistant Secretary, Smithsonian Institution, in charge of the U. S. National Museum.

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There is an Oriental saying that the distance between ear and eye is small, but the difference between hearing and seeing very great.

More terse and not less forcible is our own proverb, "To see is to know," which expresses a growing tendency in the human mind.

In this busy, critical, and skeptical age each man is seeking to know all things, and life is too short for many words. The eye is used more and more, the ear less and less, and in the use of the eye, descriptive writing is set aside for pictures, and pictures in their turn are replaced by actual objects. In the schoolroom the diagram, the blackboard, and the object lesson, unknown thirty years ago, are universally employed. The public lecturer uses the stereopticon to reenforce his words, the editor illustrates his journals and magazines with engravings a hundred-fold more numerous and elaborate than his predecessor thought needful, and the merchant and manufacturer recommend their wares by means of vivid pictographs. The local fair of old has grown into the great exposition, often international and always under some governmental patronage, and thousands of such have taken place within forty years, from Japan to Tasmania, and from Norway to Brazil.

Amid such tendencies, the museum, it would seem, should find congenial place, for it is the most powerful and useful auxiliary of all systems of teaching by means of object lessons.

The work of organizing museums has not kept pace with the times. The United States is far behind the spirit of its own people, and less progressive than England, Germany, France, Italy, or Japan. We have, it is true, two or three centers of great activity in museum work, but there have been few new ones established within twenty years, and many of the old ones are in a state of torpor. This can not long continue. The museum of the past must be set aside, reconstructed, transformed from a cemetery of bric-a-brac into a nursery of living thoughts. The museum of the future must stand side by side with the library and the

[1] A lecture delivered before the Brooklyn Institute, February 28, 1889.

laboratory, as a part of the teaching equipment of the college and university, and in the great cities cooperate with the public library as one of the principal agencies for the enlightenment of the people.

The true significance of the word museum may best be appreciated through an allusion to the ages which preceded its origin—when our ancestors, hundreds of generations removed, were in the midst of those great migrations which peopled Europe with races originally seated in central Asia.

It has been well said that the early history of Greece is the first chapter in the political and intellectual life of Europe. To the history of Greece let us go for the origin of the museum idea, which, in its present form, seems to have found its only congenial home among the European offshoots of the great Indo-Germanic or Aryan division of the world's inhabitants. Long centuries before the invention of written languages there lived along the borders of northern Greece, upon the slopes of Mount Olympus and Helicon, a people whom the later Greeks called "Thracians," a half-mythical race, whose language even has perished. They survived in memory, we are told, as a race of bards, associated with that peculiar legendary poetry of pre-Homeric date, in which the powers of nature were first definitely personified. This poetry belonged, presumably, to an age when the ancestors of the Greeks had left their Indo-European home, but had not yet taken full possession of the lands which were afterwards Hellenic. The spirits of nature sang to their sensitive souls with the voice of brook and tree and bird, and each agency or form which their senses perceived was personified in connection with a system of worship. There were spirits in every forest or mountain, but in Thrace alone dwelt the Muses—the spirits who know and who remember, who are the guardians of all wisdom, and who impart to their disciples the knowledge and the skill to write.

Museums, in the language of Ancient Greece, were the homes of the Muses. The first were in the groves of Parnassus and Helicon, and later they were temples in various parts of Helles. Soon, however, the meaning of the word changed, and it was used to describe a place of study, or a school. Athenæus, in the second century, described Athens as "the museum of Greece," and the name was applied to that portion of the palace of Alexandria which was set apart for the study of the sciences and which contained the famous Alexandrian library. The museum of Alexandria was a great unversity, the abiding place of men of science and letters, who were divided into many companies or colleges, for the support of each of which a handsome revenue was allotted.

The Alexandrian museum was burned in the days of Cæsar and Aurelian, and the term museum, as applied to a great public institution, dropped out of use from the fourth to the seventeenth century. The disappearance of a word is an indication that the idea for which it stood had also fallen into disfavor, and such, indeed, was the fact.

EDWARD HITCHCOCK.

The history of museum and library runs in parallel lines. It is not until the development of the arts and sciences has taken place, until an extensive written literature has grown up, and a distinct literary and scientific class has been developed, that it is possible for the modern library and museum to come into existence. The museum of the present is more unlike its old-time representative than is our library unlike its prototype.

There were, in the remote past, galleries of pictures and sculpture as well as museums, so called. Public collections of paintings and statuary were founded in Greece and Rome at a very early day. There was a gallery of paintings (Pinacotheca) in one of the marble halls of the Propylæum at Athens, and in Rome there was a lavish public display of works of art.

M. Dezobry, in his brilliant work upon "Rome in the time of Augustus" (*Rome au siècle d'Auguste*), described this phase of the Latin civilization in the first century before Christ.

"For many years," remarks one of his characters, "the taste for paintings has been extending in a most extraordinary manner. In former times they were only to be found in the temples, where they were placed, less for purposes of ornament than as an act of homage to the gods; now they are everywhere, not only in temples, in private houses, and in public halls, but also on outside walls, exposed freely to air and sunlight. Rome is one great picture gallery; the Forum of Augustus is gorgeous with paintings, and they may be seen also in the Forum of Cæsar, in the Roman Forum, under the peristyles of many of the temples, and especially in the porticos used for public promenades, some of which are literally filled with them. Thus everybody is enabled to enjoy them, and to enjoy them at all hours of the day."

The public men of Rome at a later period in its history were no less mindful of the claims of art. They believed that the metropolis of a great nation should be adorned with all the best products of civilization. We are told by Pliny that when Cæsar was dictator, he purchased for 300,000 deniers two Greek paintings, which he caused to be publicly displayed, and that Agrippa placed many costly works of art in a hall which he built and bequeathed to the Roman people. Constantine gathered together in Constantinople the paintings and sculptures of the great masters, so that the city before its destruction became a great museum like Rome.

The taste for works of art was in the days of the ancient civilizations generally prevalent throughout the whole Mediterranean region, and there is abundant reason to believe that there were prototypes of the modern museum in Persia, Assyria, Babylonia, and Egypt, as well as in Rome.

Collections in natural history also undoubtedly existed, though we have no positive descriptions of them. Natural curiosities, of course, found their way into the private collections of monarchs, and were doubtless also in use for study among the savants in the Alexandrian museums. Aristotle, in the fourth century before Christ, had, it is said, an enormous grant of money for use in his scientific researches, and Alexander the Great, his patron, "took care to send to him a great variety of zoological specimens, collected in the countries which he had subdued," and also "placed at his disposal several thousand persons, who were occupied in hunting, fishing, and making the observations which were necessary for completing his History of Animals." If human nature has not changed more than we suppose, Aristotle must have had a great museum of natural history.

When the Roman capital was removed to Byzantium, the arts and letters of Europe began to decline. The church was unpropitious, and the invasions of the northern barbarians destroyed everything. In 476, with the close of the Western Empire, began a period of intellectual torpidity which was to last for a thousand years. It was in Bagdad and Cordova that science and letters were next to be revived, and Africa was to surpass Europe in the exhibit of its libraries.

With the renaissance came a period of new life for collectors. The churches of southern Europe became art galleries, and monarchs and noblemen and ecclesiastical dignitaries collected books, manuscripts, sculptures, pottery, and gems, forming the beginnings of collections which have since grown into public museums. Some of these collections doubtless had their first beginnings in the midst of the Dark Ages within the walls of feudal castles or the larger monasteries, but their number was small, and they must have consisted chiefly of those objects so nearly akin to literature as especially to command the attention of bookish men.

The idea of a great national museum of science and art was first worked out by Lord Bacon in his New Atlantis, a philosophical romance, published at the close of the seventeenth century.

The first scientific museum actually founded was that begun at Oxford, in 1677, by Elias Ashmole, still known as the Ashmolean Museum, composed chiefly of natural-history specimens, collected by the botanists Tradescant, father and son, in Virginia and in the north of Africa. Soon after, in 1753, the British Museum was established by act of Parliament, inspired by the will of Sir Hans Sloane, who, dying in 1749, left to the nation his invaluable collection of books, manuscripts, and curiosities.

Many of the great national museums of Europe had their origin in the private collections of monarchs. France claims the honor of having been the first to change a royal into a national museum when, in 1789, the Louvre came into the possession of a republican government.

It is very clear, however, that democratic England stands several decades in advance—its act, moreover, being one of deliberate founding rather than a species of conquest. A century before this, when Charles I was beheaded by order of Parliament, his magnificent private collection was dispersed. What a blessing it would be to England to-day if the idea of founding a national museum had been suggested to the Cromwellians. The intellectual life of America is so closely bound to that of England, that the revival of interest in museums and in popular education at the middle of the present century is especially significant to us.

The great exhibition of 1851 was one of the most striking features of the industrial revolution in England, that great transformation which, following closely upon the introduction of railroads, turned England, feudal and agricultural, into England democratic and commercial. This exhibition marked an epoch in the intellectual progress of English-speaking peoples. "The great exhibition," writes a popular novelist—a social philosopher as well—"did one great service for country people: It taught them how easy it is to get to London, and what a mine of wealth, especially for after-memory and purposes of conversation, exists in that great place."

Our own Centennial Exhibition in 1876 was almost as great a revelation to the people of the United States. The thoughts of the country were opened to many things before undreamed of. One thing we may regret, that we have no such widespread system of museums as that which has developed in the motherland, with South Kensington as its administrative center.

Under the wise administration of the South Kensington staff, an outgrowth of the events of 1851, a great system of educational museums has been developed all through the United Kingdom. A similar extension of public museums in this country would be quite in harmony with the spirit of the times, as shown in the present efforts toward university extensions.

England has had nearly forty years in which to develop these tendencies and we but thirteen since our exhibition. May we not hope that within a like period of time and before the year 1914 the United States may have attained the position which England now occupies, at least in the respect of popular interest and substantial governmental support.

There are now over one hundred and fifty public museums in the United Kingdom, all active and useful. The museum systems of Great Britain are, it seems to me, much closer to the ideal which America should follow than are those of either France or Germany. They are designed more thoughtfully to meet the needs of the people, and are more intimately intertwined with the policy of national, popular education. Sir Henry Cole, the founder of the "department of science and art," speaking of the purpose of the museum under his care, said to the people of Birmingham in 1874: "If you wish your schools of science and art to be effective, your health, the air, and your food to be wholesome, your life to be long, your manufactures to improve, your trade to increase, and your people to be civilized, you must have museums of science and art, to illustrate the principles of life, health, nature, science, art, and beauty.''

Again, in words as applicable to America of to-day as to Britain in 1874, said he: ''A thorough education and a knowledge of science and art are vital to the nation and to the place it holds at present in the civilized world. Science and art are the lifeblood of successful production. All civilized nations are running a race with us, and our national decline will date from the period when we go to sleep over the work of education, science, and art. What has been done is at the mere threshold of the work yet to be done.''

The museums of the future in this democratic land should be adapted to the needs of the mechanic, the factory operator, the day laborer, the salesman, and the clerk, as much as to those of the professional man and the man of leisure. It is proper that there be laboratories and professional libraries for the development of the experts who are to organize, arrange, and explain the museums. It is proper that the laboratories be utilized to the fullest extent for the credit of the institution to which they belong. No museum can grow and be respected which does not each year give additional proofs of its claims to be considered a center of learning.

On the other hand, the public have a right to ask that much shall be done directly in their interest. They will gladly allow the museum officer to use part of his time in study and experiment. They will take pride in the possession by the museum of tens of thousands of specimens, interesting only to the specialists, hidden away perpetually from public view, but necessary for purpose of scientific research. These are foundations of the intellectual superstructure which gives the institution its standing.

Still, no pains must be spared in the presentation of the material in the exhibition halls. The specimens must be prepared in the most careful and artistic manner, and arranged attractively in well-designed cases and behind the clearest of glass. Each object must bear a label, giving its name and history so fully that all the probable questions of the visitor are answered in advance. Books of reference must be kept in convenient places. Colors of walls, cases, and labels must be restful and quiet, and comfortable seats should be everywhere accessible, for the task of the museum visitor is a weary one at best.

In short, the public museum is, first of all, for the benefit of the public. When the officers are few in number, each must of necessity devote a considerable portion of his time to the public halls. When the staff becomes larger, it is possible by specialization of work to arrange that certain men may devote their time uninterruptedly to laboratory work,

E. N. Horsford

while others are engaged in the increase of the collections and their installation.

I hope and firmly believe that every American community with inhabitants to the number of five thousand or more will within the next half century have a public library, under the management of a trained librarian. Be it ever so small, its influence upon the people would be of untold value. One of the saddest things in this life is to realize that in the death of the elder members of a community so much that is precious in the way of knowledge and experience is lost to the world. It is through the agency of books that mankind benefits by the toil of past generations and is able to avoid their errors.

In these days, when printing is cheap and authors are countless, that which is good and true in human thought is in danger of being entirely overlooked. The daily papers, and above all the overgrown and uncanny Sunday papers, are like weeds in a garden, whose rank leaves not only consume the resources of the soil but hide from view the more modest and more useful plants of slower growth.

Most suggestive may we find an essay on Capital and Culture in America, which recently appeared in one of the English reviews. The author, a well-known Anglo-American astronomer, boldly asserts that—

> Year by year it becomes clearer that, despite the large absolute increase in the number of men and women of culture in America, the nation is deteriorating in regard to culture. Among five hundred towns where formerly courses of varied entertainments worthy of civilized communities—concerts, readings, lectures on artistic, literary, and scientific subjects, etc.—were successfully arranged season after season, scarcely fifty now feel justified in continuing their efforts in the cause of culture, knowing that the community will no longer support them. Scientific, literary, and artistic societies, formerly flourishing, are now dying, or dead in many cities which have in the meantime increased in wealth and population.

He instances Chicago as typical of an important portion of America, and cites evidences of decided deterioration within sixteen years.

The people's museum should be much more than a house full of specimens in glass cases. It should be a house full of ideas, arranged with the strictest attention to system.

I once tried to express this thought by saying, "An efficient educational museum may be described as a collection of instructive labels, each illustrated by a well-selected specimen."

The museum, let me add, should be more than a collection of specimens well arranged and well labeled. Like the library, it should be under the constant supervision of one or more men well informed, scholarly, and withal practical, and fitted by tastes and training to aid in the educational work.

I should not organize the museum primarily for the use of the people in their larval or school-going stage of existence. The public-school teacher, with the illustrated text-book, diagrams, and other appliances, is in these days a professional outfit which is usually quite sufficient to enable him to teach his pupils. School days last, at the most, only from five to fifteen years, and they end with the majority of mankind before their minds have reached the stage of growth most favorable for the reception and assimilation of the best and most useful thought. Why should we be crammed in the times of infancy and kept in a state of mental starvation during the period which follows, from maturity to old age, a state which is disheartening and unnatural, all the more because of the intellectual tastes which have been stimulated and partially formed by school life.

The boundary line between the library and the museum is neither straight nor plain. The former, if its scope be rightly indicated by its name, is primarily a place for books. The latter is a depository for objects of every kind, books not excepted.

The British Museum, with its libraries, its pictures, its archæological galleries, its anthropological, geological, botanical, and zoological collections, is an example of the most comprehensive interpretation of the term.

Professor Huxley has described the museum as "a consultative library of objects." This definition is suggestive but unsatisfactory. It relates only to the contents of the museum, as distinguished from those of the library, and makes no reference to the differences in the methods of their administration. The treasures of the library must be examined one at a time and by one person at a time; their use requires long-continued attention and their removal from their proper places in the system of arrangement. Those of the museum are displayed to public view, in groups, in systematic sequence, so that they have a collective as well as an individual significance. Furthermore, much of their meaning may be read at a glance.

The museum cultivates the powers of observation, and the casual visitor even makes discoveries for himself and under the guidance of the labels forms his own impressions. In the library one studies the impressions of others. The library is most useful to the educated, the museum to educated and uneducated alike, to the masses as well as to the few, and is a powerful stimulant to intellectual activity in either class. The influence of the museum upon a community is not so deep as that of the library, but extends to a much larger number of people.

The National Museum has 300,000 visitors a year, each of whom carries away a certain number of new thoughts.

The two ideas may be carried out, side by side, in the same building, and if need be under the same management, not only without antagonism, but with advantage.

That the proximity of a good library is absolutely essential to the usefulness of a museum will be admitted by everyone.

I am confident also that a museum, wisely organized and properly arranged, is certain to benefit the library near which it stands in many ways through its power to stimulate interest in books, thus increasing the general popularity of the library and enlarging its endowment.

Many books, and valuable ones, would be required in the first kind of museum work, but it is not intended to enter into competition with the library. (When necessary, volumes could be duplicated.) It is very often the case, however, that books are more useful and safer in the museum than on the library shelves, for in the museum they may be seen daily by thousands, while in the library their very existence is forgotten by all except their custodian.

Audubon's Birds of North America is a book which everyone has heard of and which everyone wants to see at least once in his lifetime. In a library, it probably is not examined by ten persons in a year; in a museum, the volumes exposed to view in a glass case, a few of the most striking plates attractively framed and hung upon the wall near at hand, it teaches a lesson to every passer-by.

The library may be called upon for aid by the museum in many directions. Pictures are often better than specimens to illustrate certain ideas. The races of man and their distribution can only be shown by pictures and maps. Atlases of ethnological portraits and maps are out of place in a library if there is a museum near by in which they can be displayed. They are not even members of the class described by Lamb as "books which are not books." They are not books, but museum specimens masquerading in the dress of books.

There is another kind of depository which, though in external features so similar to the museum, and often confused with it in name as well as in thought, is really very unlike it. This is the art gallery. The scientific tendencies of modern thought have permeated every department of human activity, even influencing the artist. Many art galleries are now called museums, and the assumption of the name usually tends toward the adoption in some degree of a scientific method of installation. The difference between a museum and a gallery is solely one of method of management. The Musée des Thermes—the Cluny Museum—in Paris is, notwithstanding its name, simply a gallery of curious objects. Its contents are arranged primarily with reference to their effect. The old monastery in which they are placed affords a magnificent example of the interior decorative art of the Middle Ages.

The Cluny Museum is a most fascinating and instructive place. I would not have it otherwise than it is, but it will always be unique, the sole representative of its kind. The features which render it attractive would be ruinous to any museum. It is, more than any other that I know, a collection arranged from the standpoint of the artist. The same material, in the hands of a Klemm or a Pitt-Rivers, arranged to show the history of human thought, would, however, be much more interesting, and, if the work were judiciously done, would lose none of its æsthetic allurements.

Another collection of the same general character as the one just described is the Soane Museum in London. Another, the famous collection of crown jewels and metal work in the Green Vaults at Dresden, a counterpart of which may be cited in the collection in the Tower of London. The Museum of the Hohenzollerns in Berlin and the Museum of the City of Paris are of necessity unique. Such collections can not be created. They grow in obedience to the action of natural law, just as a tree or a sponge may grow.

The city which is in the possession of such an heirloom is blessed just as is the possessor of a historic surname or he who inherits the cumulative genius of generations of gifted forefathers. The possession of one or a score of such shrines does not, however, free any community from the obligation to form a museum for purposes of education and scientific research.

The founding of a public museum in a city like Brooklyn is a work whose importance can scarcely be overestimated. The founders of institutions of this character do not often realize how much they are doing for the future. Opportunity such as that which is now open to the members of the Brooklyn Institute occur only once in the lifetime of a nation. It is by no means improbable that the persons now in this room have it in their power to decide whether, in the future intellectual progress of this nation, Brooklyn is to lead or to follow far in the rear.

Many of my hearers are doubtless familiar with that densely populated wilderness, the east end of London, twice as large as Brooklyn, yet with scarce an intellectual oasis in its midst. Who can say how different might have been its condition to-day if Walter Besant's apostolic labors had begun a century sooner, and if the People's Palace, that wonderful materialization of a poet's dream, had been for three generations brightening the lives of the citizens of the Lower Hamlets and Hackney?

Libraries and museums do not necessarily spring up where they are needed. Our governments, Federal, State, and municipal, are not "paternal" in spirit. They are less so even in practical working than in England, where, notwithstanding the theory that all should be left to private effort, the Government, under the leadership of the late Prince Consort and of the Prince of Wales, has done wonderful things for all the provincial cities, as well as for London, in the encouragement of libraries, museums, art, and industrial education.

However much the state may help, the private individual must lead, organize, and prepare the way. "It is universally admitted," said the Marquis of Lansdowne in 1847, "that governments are the worst of cultivators, the worst of manufacturers, the worst of traders," and Sir Robert Peel said in similar strain that "the action of government is torpid at best."

In beginning a museum the endowment is of course the most essential thing, especially in a great city like Brooklyn, which has a high ideal of what is due to the intelligence of its populace and to the civic dignity.

David Hosack

Unremunerated service in museum administration, though it may be enthusiastically offered and conscientiously performed, will in the end fail to be satisfactory. Still more is it impossible for a respectable museum to grow up without liberal expenditure for the acquisition of collections and their installation.

Good administration is not to be had for nothing. As to the qualification of a museum administrator, whether it be for a museum of science or a museum of art, it is perhaps superfluous to say that he should be the very best obtainable, a man of ability, enthusiasm, and, withal, of experience; for the administration of museums and exhibitions has become of late years a profession, and careful study of methods of administration is indispensable. If the new administrator has not had experience he must needs gain it at the expense of the establishment which employes him—an expense of which delay, waste, and needless experiment form considerable elements.

No investment is more profitable to a museum than that in the salary fund. Around a nucleus of men of established reputation and administrative tact will naturally grow up a staff of volunteer assistants whose work, assisted and directed in the best channels, will be of infinite value.

The sinews and brains of the organism being first provided, the development of its body still remains. The outer covering, the dress, can wait. It is much better to hire buildings for temporary use, or to build rude fireproof sheds, than to put up a permanent museum building before at least a provisional idea of its personnel and contents has been acquired.

As has been already said, a museum must spend money in the acquisition of collections, and a great deal of money. The British Museum has already cost the nation for establishment and maintenance not far from $30,000,000. Up to 1882 over $1,500,000 had been expended in purchase of objects for the art collections at South Kensington alone.

Such expenditures are usually good investments of national funds, however. In 1882, after about twenty-five years of experience, the buildings and contents of the South Kensington Museum had cost the nation about $5,000,000, but competent authorities were satisfied that an auction on the premises could not bring less than $100,000,000. For every dollar spent, however, gifts will come in to the value of many dollars. In this connection it may not be amiss to quote the words of one of the most experienced of English museum administrators (presumably Sir Philip Cunliffe Owen) when asked many years ago whether Americans might not develop great public institutions on the plan of those at Kensington:

> Let them plant the thing [he said], and it can't help growing, and most likely beyond their powers—as it has been almost beyond ours—to keep up with it. What is wanted first of all is one or two good good brains, with the means of erecting a good building on a piece of ground considerably larger than is required for that building. Where there have been secured substantial, luminous galleries for exhi-

bition, in a fireproof building, and these are known to be carefully guarded by night and day, there can be no need to wait long for treasures to flow into it. Above all, let your men take care of the interior and not set out wasting their strength and money on external grandeur and decoration. The inward built up rightly, the outward will be added in due season.[1]

Much will, of course, be given to any museum which has the confidence of the public—much that is of great value, and much that is useless.

The Trojans of old distrusted the Greeks when they came bearing gifts. The museum administrator must be on his guard against every one who proffers gifts. An unconditional donation may be usually accepted without hesitation, but a gift coupled with conditions is, except in very extraordinary cases, far from a benefaction.

A donor demands that his collection shall be exhibited as a whole, and kept separate from all others. When his collection is monographic in character and very complete, it is sometimes desirable to accept it on such conditions. As a rule, however, it is best to try to induce the donor to allow his collections to be merged in the general series—each object being separately and distinctively labeled. I would not be understood to say that the gift of collections is not, under careful management, a most beneficial source of increase to a public collection. I simply wish to call attention to the fact that a museum which accepts without reserve gifts of every description, and fails to reenforce these gifts by extensive and judicious purchasing, is certain to develop in an unsystematical and ill-balanced way.

Furthermore, unless a museum be supported by liberal and constantly increasing grants from some State or municipal treasury, it will ultimately become suffocated. It is essential that every museum, whether of science or art, should from the start make provision for laboratories and storage galleries as well as for exhibition halls.

All intellectual work may be divided into two classes, the one tending toward the increase of knowledge, the other toward its diffusion—the one toward investigation and discovery, the other toward the education of the people and the application of known facts to promoting their material welfare. The efforts of learned men are sometimes applied solely to one of these departments of effort, sometimes to both, and it is generally admitted by the most advanced teachers that, for their students as well as for themselves, the happiest results are reached by investigation and instruction simultaneously. Still more is this true of institutions of learning. The college which imparts only secondhand knowledge to its students belongs to a stage of civilization which is fast being left behind. The museum likewise must, in order to perform its proper functions, contribute to the advancement of learning through the increase as well as through the diffusion of knowledge.

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[1] Conway, Travels in South Kensington, p. 26.

We speak of educational museums and of the educational method of installation so frequently that there may be danger of inconsistency in the use of the term. An educational museum, as it is usually spoken of, is one in which an attempt is made to teach the unprofessional visitor—an institution for popular education by means of labeled collections, and it may be also by popular lectures. A college museum, although used as an aid to advanced instruction, is not an "educational museum" in the ordinary sense; nor does a museum of research, like the Museum of Comparative Zoology in Cambridge, Massachusetts, belong to this class, although to a limited extent it attempts and performs popular educational work in addition to its other functions.

In the National Museum in Washington the collections are divided into two great classes—the exhibition series, which constitutes the educational portion of the Museum, and is exposed to public view with all possible accessions for public entertainment and instruction, and the study series, which is kept in the scientific laboratories, and is scarcely examined except by professional investigators.

In every properly conducted museum the collections must from the very beginning divide themselves into these two classes, and in planning for its administration provision should be made not only for the exhibition of objects in glass cases, but for the preservation of large collections not available for exhibition, to be used for the studies of a very limited number of specialists.

Lord Bacon, who, as we have noticed, was the first to whom occurred the idea of a great museum of science and art, complained three centuries ago, in his book On the Advancement of Learning, that up to that time the means for intellectual progress had been used exclusively for "amusement" and "teaching," and not for the "augmentation of science."

It will undoubtedly be found desirable for certain museums, founded for local effect, to specialize mainly in the direction of popular education. If they can not also provide for a certain amount of scholarly endeavor in connection with the other advantages, it would be of the utmost importance that they should be assorted by a system of administrative cooperation with some institution which is in the position of being a center of original work.

The general character of museums should be clearly determined at its very inception. Specialization and division of labor are essential for institutions as well as for individuals. It is only a great national museum which can hope to include all departments and which can with safety encourage growth in every direction.

A city museum, even in a great metropolis like Brooklyn, should, if possible, select certain special lines of activity and pursue them with the intention of excelling. If there are already beginnings in many directions, it is equally necessary to decide which lines of development are to be favored in preference to all others. Many museums fail to make this choice at the start, and instead of steering toward some definite point, drift hither and thither, and, it may be, are foundered in mid-ocean.

There is no reason why the museum of the Brooklyn Institute may not in time attain to world-wide fame and attract students and visitors from afar. It would be wise, perhaps, in shaping its policy to remember that in the twin city of New York are two admirable museums which may be met more advantageously in cooperation than in rivalry. Brooklyn may appropriately have its own museum of art and its museum of natural history, but they should avoid the repetition of collections already so near at hand.

In selecting courses for the development of a museum, it may be useful to consider what are the fields open to museum work.

As a matter of convenience museums are commonly classed in two groups—those of science and those of art, and in Great Britain the great national system is mainly under the control of The Science and Art Department of the Committee of Council on Education.

The classification is not entirely satisfactory, since it is based upon methods of arrangement, rather than upon the nature of the objects to be arranged, and since it leaves a middle territory (only partially occupied by the English museum men of either department), a great mass of museum material of the greatest moment both in regard to its interest and its adaptability for purposes of public instruction.

On the one side stand the natural history collections, undoubtedly best to be administrated by the geologist, botanist, and zoologist. On the other side are the fine art collections, best to be arranged from an æsthetic standpoint, by artists. Between is a territory which no English word can adequately describe—which the Germans call *Culturgeschichte*—the natural history of cult, or civilization, of man and his ideas and achievements. The museums of science and art have not yet learned how to partition this territory. An exact classification of museums is not at present practicable, nor will it be until there has been some redistribution of the collections which they contain. It may be instructive, however, to pass in review the principal museums of the world, indicating briefly their chief characteristics.

Every great nation has its museum of nature. The natural history department of the British Museum, recently removed from the heart of London to palatial quarters in South Kensington, is probably the most extensive—with its three great divisions, zoological, botanical, and geological. The Musée d'Histoire Naturelle, in the garden of plants in Paris, founded in 1795, with its galleries of anatomy, anthropology, zoology, botany, mineralogy, and geology, is one of the most extensive, but far less potent in science now than in the days of Cuvier, Lamarck, St. Hilaire, Jussieu, and Brongniart. In Washington, again, there is a

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National Museum with anthropological, zoological, botanical, mineralogical, and geological collections in one organization, together with a large additional department of arts and industries, or technology.

Passing to specialized natural history collections, perhaps the most noteworthy are those devoted to zoology, and chief among them that in our own American Cambridge. The Museum of Comparative Zoology, founded by the Agassizes "to illustrate the history of creation, as far as the present state of knowledge reveals that history," was in 1887 pronounced by the English naturalist, Alfred Russell Wallace, "to be far in advance of similar institutions in Europe as an educational institution, whether as regards the general public, the private student, or the specialist."

Next to Cambridge, after the zoological section of the museums of London and Paris, stands the collections in the Imperial Cabinet in Vienna, and those of the zoological museums in Berlin, Leyden, Copenhagen, and Christiania.

Among botanical museums, that in the Royal Gardens at Kew, near London, is preeminent, with its colossal herbarium, containing the finest collection in the world, and its special museum of economic botany, founded in 1847, both standing in the midst of a collection of living plants. There is also in Berlin the Royal Botanical Museum, founded in 1818 as the Royal Herbarium; in St. Petersburg, the Herbaria of the Imperial Botanical Garden.

Among the geological and mineralogical collections the mineral cabinet in Vienna, arranged in the imperial castle, is among the first.

The Museum of Practical Geology in London, which is attached to the Geological Survey of the United Kingdom, was founded in 1837, to exhibit the collections of the survey, in order to "show the applications of geology to the useful purposes of life." Like every other healthy museum, it soon had investigations in progress in connection with its educational work, and many very important discoveries have been made in its laboratories. It stands in the very first rank of museums for popular instruction, the arrangement of the exhibition halls being most admirable. Of museums of anatomy there are thirty of considerable magnitude, all of which have grown up in connection with schools of medicine and surgery, except the magnificent Army Medical Museum in Washington.

The Medical Museum of the Royal College of Surgeons in London is probably first in importance. The collections of St. Thomas's, Guy's, St. George's, and other hospitals are very rich in anatomical and pathological specimens. The oldest public anatomical museum in London is that of St. Bartholomew's.

Paris, Edinburgh, and Dublin have large anatomical and materia medica collections. As a rule, the medical museums of Europe are connected with universities. Doctor Billings, curator of the Army Medical

Museum in Washington, has traced accurately the growth of medical collections both at home and abroad, and from his address upon medical museums, as president of the Congress of American Physicians and Surgeons, delivered in 1888, the facts here stated relating to this class of museums have been gathered. The Army Medical Museum apparently owes its establishment to Doctor William A. Hammond, in 1862. The museum contained in 1888 more than 15,000 specimens, besides those contained in the microscopical department. "An ideal medical museum," says Doctor Billings, "should be very complete in the department of preventive medicine or hygiene. It is a wide field, covering, as it does, air, water, food, clothing, habitations, geology, meteorology, occupations, etc., in their relations to the production or prevention of disease, and thus far has had little place in medical museums, being taken up as a specialty in the half dozen museums of hygiene which now exist."

William Hunter formed the great Glasgow collection between the years 1770 and 1800, and John Hunter, in 1787, opened the famous Hunterian Museum in London, bought by the English Government soon after (1799), and now known as the Museum of the Royal College of Surgeons.

Paris is proud of the two collections at the School of Medicine, the Musée Orfila and the Musée Dupuytren, devoted, the one to normal, the other to pathological anatomy.

Ethnographic museums are especially numerous and fine in the northern part of continental Europe. They were proposed more than half a century ago by the French geographer Jomard, and the idea was first carried into effect about 1840 in the establishment of the Danish Ethnographical Museum, which long remained the best in Europe. Within the past twenty years there has been an extraordinary activity in this direction.

In Germany, besides the museums in Berlin, Dresden, and Leipsic, considerable collections have been founded in Hamburg and Munich. Austria has in Vienna two for ethnography, the Court Museum (Hof-Museum) and the Oriental (Orientalisches) Museum. Holland has reorganized the National Ethnographical Museum (Rijks Ethnographisch Museum) in Leyden, and there are smaller collections in Amsterdam, Rotterdam, and The Hague. France has founded the Trocadero (Musée de Trocadéro). In Italy there is the important Prehistoric and Ethnographic Museum (Museo prehistorico ed ethnografico) in Rome, as well as the collection of the Propaganda, and there are museums in Florence and Venice.

Ethnographical museums have also been founded in Christiania and Stockholm, the latter of which will include the rich material collection by Doctor Stolpe on the voyage of the frigate *Vanadis* around the world. In England there is less attention to the subject—the Christy collection in the British Museum being the only one specially devoted to ethnography, unless we include also the local Blackmore Museum in Salisbury.

In the United States the principal establishments arranged on the ethnographic plan are the Peabody Museum of Archæology in Cambridge and the collections in the Peabody Academy of Sciences in Salem, and the American Museum of Natural History in New York.

The ethnological collections in Washington are classified on a double system; in one of its features corresponding to that of the European; in the other, like the famous Pitt-Rivers collection at Oxford, arranged to show the evolution of culture and civilization without regard to race. This broader plan admits much material excluded by the advocates of ethnographic museums, who devote their attention almost exclusively to the primitive or non-European peoples.

In close relation to the ethnographic museums are those which are devoted to some special field of human thought and interest. Most remarkable among these, perhaps, is the Musée Guimet, recently removed from Lyons to Paris, which is intended to illustrate the history of religious ceremonial among all races of men. Other good examples of this class are some of those in Paris, such as the Musée de Marine, which shows not only the development of the merchant and naval marines of the country, but also, by trophies and other historical souvenirs, the history of the naval battles of the nation. The Musée d'Artillerie does for war, but less thoroughly, what the Marine Museum does in its own department, and there are similar museums in other countries. Of musical museums, perhaps, the most important is the Musée Instrumental founded by Clapisson, attached to the Conservatory of Music in Paris. There is a magnificent collection of musical instruments at South Kensington, but its contents are selected in reference to their suggestiveness in decorative art. There are also large collections in the National Museum in Washington and in the Conservatory of Music in Boston, and the Metropolitan Museum in New York has recently been given a very full collection by Mrs. John Crosby Brown, of that city.

There is a Theatrical Museum at the Académie Française in Paris, a Museum of Journalism in Antwerp, a Museum of Pedagogy in Paris, which has its counterpart in South Kensington. These are professional, rather than scientific or educational, as are perhaps also the Museum of Practical Fish Culture at South Kensington and the Museums of Hygiene in London and Washington.

Archæological collections are of two classes, those of prehistoric and historic archæology. The former are usually absorbed by the ethnographic museums, the latter by the art museums. The value to the historian of archæological collections, both historic and prehistoric, has long been understood. The museums of London, Paris, Berlin, and Rome need no comment. In Cambridge, New York, and Washington are immense collections of the remains of man in America in the pre-Columbian period, collections which are yearly growing in significance, as they are made the subject of investigation, and there is an immense amount of material of this kind in the hands of institutions and private collectors in all parts of the United States.

The museum at Naples shows, so far as a museum can, the history of Pompeii at one period. The museum of St. Germain, near Paris, exhibits the history of France in the time of the Gauls and of the Roman occupation. In Switzerland, especially at Neuchatel, the history of the inhabitants of the Lake Dwellings is shown. The Assyrian and Egyptian galleries in the British Museums are museums of themselves.

Historical museums are manifold in character, and of necessity local in interest. Some relate to the history of provinces or cities. One of the oldest and best of these is the Märkisch Provinzial Museum in Berlin; another is the museum of the city of Paris, recently opened in the Hotel Canaveral. Many historical societies have collections of this character. Some historical museums relate to a dynasty, as the Museum of the Hohenzollerns in Berlin.

The cathedrals of southern Europe, and St. Paul's, in London, are in some degrees national or civic museums. The Galileo Museum in Florence, the Shakespeare Museum at Stratford, are good examples of the museums devoted to the memory of representative men, and the Monastery of St. Mark, in Florence, does as much as could be expected of any museum for the life of Savonarola. The Soane Museum in London, the Thorvaldsen Museum in Copenhagen, are similar in purpose and result, but they are rather biographical than historical. There are also others which illustrate the history of a race, as the Bavarian National Museum in Nuremberg.

The museums of fine art are the most costly and precious of all, since they contain the masterpieces of the world's greatest painters and sculptors. In Rome, Florence, Venice, Naples, Bologna, Parma, Milan, Turin, Modena, Padua, Ferrara, Brescia, Siennа, and Pisa; in Munich, Berlin, Dresden, Vienna, and Prague; in Paris, and many provincial cities of France; in London, St. Petersburg, Madrid, Copenhagen, Brussels, Antwerp, and The Hague, are great collections, whose names are familiar to us all, each the depository of priceless treasures of art. Many of these are remarkable only for their pictures and statuary, and might with equal right be called picture galleries; others abound in the minor products of artists, and are museums in the broader sense.

Chief among them is the Louvre, in Paris, with its treasures worth a voyage many times around the world to see; the Vatican, in Rome, with its three halls of antique sculptures, its Etruscans, Egyptian, Pagan, and Christian museums, its Byzantine gallery and its collection of medals; the Naples Museum (Musée di Studii) with its marvelous Pompeiian series; the Uffizi Museum in Florence, overflowing with paintings and sculptures, ancient and modern, drawings, engraved gems, enamels, ivories, tapestries, medals, and works of decorative art of every description.

D. Humphreys.

There are special collections on the boundary line between art and ethnology, the manner of best installation for which has scarcely yet been determined. The Louvre admits within its walls a museum of ship models (Musée de Marine). South Kensington includes musical instruments, and many other objects equally appropriate in an ethnological collection. Other art museums take up arms and armor, selected costumes, shoes, and articles of household use. Such objects, like porcelains, laces, medals, and metal work, appeal to the art museum administrator through their decorations and graceful forms. For their uses he cares presumably nothing. As a consequence of this feeling only articles of artistic excellence have been saved, and much has gone to destruction which would be of the utmost importance to those who are now studying the history of human thought in the past.

On the other hand, there is much in art museums which might to much better purpose be delivered to the ethnologist for use in his exhibition cases. There is also much which the art museums, tied as they often are to traditionary methods of installation, might learn from the scientific museums.

Many of the arrangements in the European art collections are calculated to send cold shivers down the back of a sensitive visitor. The defects of these arrangements have been well described by a German critic, W. Bürger.

> Our museums [he writes] are the veritable graveyards of arts, in which have been heaped up, with a tumulous-like promiscuousness, the remains which have been carried thither. A Venus is placed side by side with a Madonna, a satyr next to a saint. Luther is in close proximity to a Pope, a painting of a lady's chamber next to that of a church. Pieces executed for churches, palaces, city halls, for a particular edifice, to teach some moral or historical truth, designed for some especial light, for some well-studied surrounding, all are hung pellmell upon the walls of some noncommital gallery—a kind of posthumous asylum, where a people, no longer capable of producing works of art, come to admire this magnificent gallery of débris.

When a museum building has been provided, and the nucleus of a collection and an administrative staff are at hand, the work of museum-building begins, and this work, it is to be hoped, will not soon reach an end. A finished museum is a dead museum, and a dead museum is a useless museum. One thing should be kept prominently in mind by any organization which intends to found and maintain a museum, that the work will never be finished; that when the collections cease to grow, they begin to decay. A friend relating an experience in South Kensington, said: "I applied to a man who sells photographs of such edifices for pictures of the main building. He had none. 'What, no photographs of the South Kensington Museum!' I exclaimed, with some impatience. 'Why, sir,' replied the man mildly, 'you see the museum doesn't stand still long enough to be photographed.' And so indeed it seems," continued Mr. Conway, "and this constant erection of new buildings and of new decorations on those already erected, is the physiognomical expression of the new intellectual and æsthetic epoch which called the institution into existence, and is through it gradually climbing to results which no man can foresee."

My prayer for the museums of the United States and for all other similar agencies of enlightenment is this—that they may never cease to increase.

THE ORIGIN OF THE NATIONAL SCIENTIFIC AND EDUCATIONAL INSTITUTIONS OF THE UNITED STATES.

BY

GEORGE BROWN GOODE,

Assistant Secretary, Smithsonian Institution, in charge of the U. S. National Museum.

THE ORIGIN OF THE NATIONAL SCIENTIFIC AND EDUCATIONAL INSTITUTIONS OF THE UNITED STATES.[1]

By George Brown Goode,

Assistant Secretary, Smithsonian Institution, in charge of the U. S. National Museum.

"Early in the seventeenth century," we are told, "the great Mr. Boyle, Bishop Wilkins, and several other learned men proposed to leave England and establish a society for promoting knowledge in the new colony [of Connecticut], of which Mr. Winthrop,[2] their intimate friend and associate, was appointed governor."

"Such men," wrote the historian, "were too valuable to lose from Great Britain, and Charles the Second having taken them under his protection in 1661, the society was there established, and received the title of The Royal Society of London."[3]

For more than a hundred years this society was for our country what it still is for the British colonies throughout the world—a central and national scientific organization. All Americans eminent in science were on its list of Fellows, among them Cotton Mather, the three Winthrops, Bowdoin, and Paul Dudley, in New England; Franklin, Rittenhouse, and Morgan, in Pennsylvania; Banister, Clayton, Mitchell, and Byrd, in Virginia; and Garden and Williamson in the Carolinas, while in its Philosophical Transactions were published the only records of American research.[4]

[1] A paper presented before the American Historical Society at the meeting held in Washington in 1889, and revised and corrected by the author to July 15, 1890.

[2] John Winthrop, F. R. S. [1606–1676], elected governor of Connecticut in 1657.

[3] John Eliot, Biographical Dictionary of Eminent Characters in New England. Boston, 1809.

[4] The first meetings of the body of men afterwards organized as the Royal Society appear to have taken place during the Revolution and in the time of Cromwell; and as early as 1645, we are told by Wallace, weekly meetings were held of "divers worthy persons inquisitive into natural philosophy and other parts of human learning, and particularly of what has been called the new philosophy, or experimental philosophy," and it is more than probable that this assembly of philosophers was identical with the Invisible College, of which Boyle spoke in sundry letters written in 1646 and 1647. These meetings continued to be held, sometimes at the Bull-

It was not until long after the middle of the last century that any scientific society was permanently established in North America, although serious but fruitless efforts were made in this direction as early as 1743, when Benjamin Franklin issued his circular entitled A proposal for promoting useful knowledge among the British plantations in America, in which it was urged "that a society should be formed of *virtuosi* or ingenious men residing in the several colonies, to be called *The American Philosophical Society.*"

There is still in existence, in the possession of the Philosphical Society in Philadelphia, a most interesting letter from Franklin to Governor Cadwallader Colden, of New York, in which he tells of the steps which had already been taken for the formation of a scientific society in Philadelphia, and of the means by which he hoped to make it of great importance to the colonies.

Our forefathers were not yet prepared for the society, nor for the American Philosophical Miscellany which Franklin proposed to issue, either monthly or quarterly. There is no reason to believe that the society ever did anything of importance. Franklin's own attention was soon directed exclusively to his electrical researches, and his society languished and died.

Some twenty years later, in 1766, a new organization was attempted under the title of The American Society held at Philadelphia for Promoting Useful Knowledge.[1] Franklin, although absent in England, was elected its president, and the association entered upon a very promising career.

In the meantime the few surviving members of the first American Philosophical Society formed, under the old name, an organization which in many particulars was so unlike that proposed in 1743 that it might almost be regarded as new rather than a revival. Its membership included many of the most influential and wealthy colonists, and the spirited manner in which it organized a plan for the observation of the transit of Venus in 1769 gave it at once a respectable standing at home and abroad.

In 1769, after negotiations which occupied nearly a year, the two societies were united,[2] and The American Philosophical Society held at Philadelphia for Promoting Useful Knowledge has from that time until

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Head Tavern, in Cheapside, but more frequently at Gresham College, until 1660, when the first record book of this society was opened. Among the first entries is a reference to a design then entertained "of founding a college for the promoting of physico-mathematicall experimentall learning." Doctor Wilkins was appointed chairman of the society, and shortly after, the King, Charles II, having become a member, its regular meeting place was appointed to be in Gresham College.

[1] This name was adopted in 1768 to replace that first adopted in 1766, which was The American Society for Promoting and Propagating Useful Knowledge, held in Philadelphia.

[2] Some insight into the scientific politics of the time may be gained by reading the following extract from a letter addressed to Franklin by Doctor Thomas Bond, June

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now maintained an honorable position among the scientific organizations of the world.

The society at once began the publication of a volume of memoirs, which appeared in 1771 under the name of The American Philosophical Transactions.[1]

From 1773 to 1779 its operations were often interrupted. In the minutes of the meeting for December, 1774, appears the following remarkable note in the handwriting of Doctor Benjamin Rush, one of the secretaries, soon after to be one of the signers of the Declaration of Independence:

> The act of the British Parliament for shutting up the port of Boston, for altering the charters, and for the more impartial administration of justice in the Province of Massachusetts Bay, together with a bill for establishing Popery and arbitrary power in Quebec, having alarmed the whole of the American colony, the members of the American Philosophical Society, partaking with their countrymen in the distress and labors brought upon their country, were obliged to discontinue their meetings for some months until a mode of opposition to the said acts of Parliament was established, which we hope may restore the former harmony and maintain a perpetual union between Great Britain and the Americas.

This entry is especially interesting because it emphasizes the fact that among the members of this infant scientific society were many of the men who were most active in the organization of the Republic, and who, under the stress of the times, abandoned the quiet pursuits of science and devoted themselves to the national interests which were just coming into being.

Franklin was president from its organization until his death, in 1790. He was at the same time president of the Commonwealth of Pennsylvania and a member of the Constitutional Convention, and the eminence of its leader probably secured for the body greater prestige than would otherwise have been attainable. The society, in fact, soon assumed national importance, for, during the last decade of the century and for

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7, 1769: I long meditated a revival of our American Philosophical Society, and at length thought I saw my way clear in doing it; but the old party leaven split us for a time. We are now united, and with your presence may make a figure; but till that happy event I fear much will not be done. The assembly have countenanced and encouraged us generously and kindly; and we are much obliged to you for your care in procuring the telescope which was used in the late observations of the transit of Venus.

[1] A copy of the finished volume of the Transactions was presented to each member of the Pennsylvania assembly, accompanied by an address as follows: As the various societies which have of late years been instituted in Europe have confessedly contributed much to the more general propagation of knowledge and useful arts, it is hoped it will give satisfaction to the members of the honorable house to find that the province which they represent can boast of the first society and the first publication of a volume of Transactions for the advancement of the useful knowledge of this side of the Atlantic—a volume which is wholly American in composition, printing, and paper, and which, we flatter ourselves, may not be thought altogether unworthy of the attention of men of letters in the most improved parts of the world.

many years after, Philadelphia was the metropolis of American science and literature.

Directly after the Revolution a similar institution was established in Boston, the American Academy of Arts and Sciences, which was incorporated by the legislature of Massachusetts in 1780, and published its first memoirs in 1785. This, like the Philadelphia society, owed its origin to the efforts of a great statesman. We find the whole history in the memoirs of John Adams, a man who believed, with Washington, that scientific institutions are the best and most lasting protection of a popular government.

In a memorandum written in 1809 Mr. Adams gave his recollections of the circumstances which led to his deep and lasting interest in scientific foundations:

In traveling from Boston to Philadelphia, in 1774–75–76–77, I had several times amused myself at Norwalk, in Connecticut, with the very curious collection of birds and insects of American production made by Mr. Arnold;[1] a collection which he afterwards sold to Governor Tryon, who sold it to Sir Ashton Lever, in whose apartments in London I afterwards viewed it again. This collection was so singular a thing that it made a deep impression upon me, and I could not but consider it a reproach to my country that so little was known, even to herself, of her natural history.

When I was in Europe, in the years 1778–79 in the commission to the King of France, with Doctor Franklin and Mr. Arthur Lee, I had opportunities to see the King's collection and many others, which increased my wishes that nature might be examined and studied in my own country as it was in others.

In France, among the academicians and other men of science and letters, I was frequently entertained with inquiries concerning the Philosophical Society of Philadelphia, and with eulogiums on the wisdom of that institution, and encomiums on some publications in their transactions. These conversations suggested to me the idea of such an establishment in Boston, where I knew there was as much love of science, and as many gentlemen who were capable of pursuing it, as in any other city of its size.

In 1779 I returned to Boston on the French frigate *La Sensible*, with the Chevalier de la Luzerne and M. Marbois.[2] The corporation of Harvard College gave a public dinner in honor of the French ambassador and his suite, and did me the honor of an invitation to dine with them. At table in the Philosophy Chamber, I chanced to sit next to Doctor Cooper.[3] I entertained him during the whole of the time we were

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[1] Some local antiquary may make an interesting contribution to the literature of American museum work by looking up the history of this collection.

[2] The Chevalier Anne César de la Luzerne [1741–1821] was French minister to the United States from 1779 to 1783, afterwards minister to England. M. François de Barbé Marbois [1745–1837] was his secretary of legation, and after the return of his chief to France, was chargé d'affaires until 1785. For many interesting facts, not elsewhere accessible, concerning the career of these men in the United States, and their acquaintance with Adams, see John Durand's admirable New Materials for a History of the American Revolution. New York: Henry Holt & Co., 1889. 12mo, pp. i–vi, 1–310.

[3] Rev. Samuel Cooper, D. D. [1725–1783], an eminent patriot, long pastor of Brattle Street Church, in Boston, and a leading member of the corporation of Harvard. He was the first vice-president of the American Academy of Arts and Sciences.

The first president of the academy was James Bowdoin, afterwards governor of together with an account of Arnold's collections, the collection I had seen in Europe, the compliments I had heard in France upon the Philosophical Society of Philadelphia, and concluded with proposing that the future legislature of Massachusetts should institute an Academy of Arts and Sciences.

The doctor at first hesitated; thought it would be difficult to find members who would attend to it; but the principal objection was that it would injure Harvard College by setting up a rival to it that might draw the attention and affections of the public in some degree from it. To this I answered, first, that there were certainly men of learning enough that might compose a society sufficiently numerous; and secondly, that instead of being a rival to the university it would be an honor and an advantage to it. That the president and principal professors would, no doubt, be always members of it; and the meetings might be ordered, wholly or in part, at the college and in that room. The doctor at length appeared better satisfied, and I entreated him to propagate the idea and the plan as far and as soon as his discretion would justify. The doctor did accordingly diffuse the project so judiciously and effectually that the first legislature under the new constitution adopted and established it by law. Afterwards, when attending the convention for forming the constitution, I mentioned the subject to several of the members, and when I was appointed by the subcommittee to make a draft of a project of a constitution to be laid before the convention, my mind and heart was so full of this subject that I inserted the provision for the encouragement of literature in chapter 5, section 2. I was somewhat apprehensive that criticism and objections would be made to the section, and particularly that the "natural history" and the "good humor" would be stricken out; but the whole was received very kindly, and passed the convention unanimously, without amendment.[1]

Massachusetts, and the friend of Washington and Franklin, and a member of the Royal Society. He held the presidency from 1780 until his death in 1790. His descendant, the Hon. Robert C. Winthrop, was chosen to deliver the oration at the centennial anniversary of the organization of the society.

[1] The provision in the State constitution of which Mr. Adams speaks, was the following:

The encouragement of literature, etc. Wisdom and knowledge, as well as virtue diffused generally among the body of the people, being necessary for the preservation of their rights and liberties, and as these depend on spreading the opportunities and advantages of education in the various parts of the country, and among the different orders of the people, it shall be the duty of legislators and magistrates in all future periods of the Commonwealth, to cherish the interests of literature and the sciences, and all seminaries of them, especially the university at Cambridge, public schools, and grammar schools in the towns, to encourage private societies and public institutions, rewards and immunities for the promotion of agriculture, arts, sciences, commerce, trades, manufactures, and a natural history of the country; to countenance and inculcate the principles of humanity and general benevolence, public and private charity, industry and frugality, honesty and punctuality in their dealings, sincerity, good humor, and all social affections and generous sentiments among the people.

This feature of the constitution of Massachusetts, [writes Mr. Adams's biographer,] is peculiar, and in one sense original with Mr. Adams. The recognition of the obligation of a State to promote a higher and more extended policy than is embraced in the protection of the temporal interests and political rights of the individual, however understood among enlightened minds, had not at that time been formally made a part of the organic law. Those clauses since inserted in other State constitutions, which, with more or less of fullness, acknowledged the same principle, are all manifestly taken from this source.

The two societies are still institutions of national importance, not only because of a time-honored record and useful work, but on account of important general trusts under their control. Although all their meetings are held in the cities where they were founded, their membership is not localized, and to be a Member of the American Philosophical Society or a Fellow of the American Academy, is an honor highly appreciated by every American scientific man.

The Philosophical Society (founded before the separation of the colonies) copied the Royal Society of Great Britain in its corporate name, as well as in that of its transactions, and in its ideals and methods of work took it for a model.

The American Academy, on the other hand, had its origin "at a time when Britain was regarded as an inveterate enemy and France as a generous patron,"[1] and its founders have placed upon record the statement that it was their intention "to give it the air of France rather than that of England, and to follow the Royal Academy rather than the Royal Society."[2] And so in Boston the academy published Memoirs, while conservative Philadelphia continued to issue Philosophical Transactions.

In time, however, the prejudice against the motherland became less intense, and the academy in Boston followed the general tendency of American scientific workers, which has always been more closely parallel with that of England than that of continental Europe, contrasting strongly with the disposition of modern educational administrators to build after German models.

It would have been strange indeed if the deep-seated sympathy with France which our forefathers cherished had not led to still other attempts to establish organizations after the model of the French Academy of Sciences. The most ambitious of these was in connection with the Academy of Arts and Sciences of the United States of America, whose central seat was to have been in Richmond, Virginia, and whose plan was brought to America in 1788 by the Chevalier Quesnay de Beaurepaire. This project, we are told, had been submitted to the King of France and to the Royal Academy of Science, and had received an unqualified indorsement signed by many eminent men, among others by Lavoisier and Condorcet, as well as a similar paper from the Royal Academy of Paintings and Sculpture signed by Vernet and others. A large sum was subscribed by the wealthy planters of Virginia and by the citizens of Richmond, a building was erected, and one professor, Doctor Jean Rouelle, was appointed, who was also commissioned mineralogist in chief and instructed to make natural-history collections in America and Europe.

The population of Virginia, it proved, was far too scattered and rural to give any chance of success for a project which in its nature was only

[1] Letter of Manasseh Cutler to Doctor Jonathan Stokes, August 17, 1785.

[2] Idem.

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practicable in a commercial and intellectual metropolis, and the academy died almost before it was born.

"Quesnay's scheme was not altogether chimerical," writes H. B. Adams, "but in the year 1788 France was in no position, financial or social, to push her educational system in Virginia. The year Quesnay's suggestive little tract was published was the year before the French Revolution, in which political maelstrom everything in France went down. . . . If circumstances had favored it, the Academy of the United States of America, established at Richmond, would have become the center of higher education not only for Virginia, but for the whole South, and possibly for a large part of the North, if the academy had been extended, as proposed, to the cities of Baltimore, Philadelphia, and New York. Supported by French capital, to which in large measure we owe the success of our Revolutionary war, strengthened by French prestige, by liberal scientific and artistic associations with Paris, then the intellectual capital of the world, the academy at Richmond might have become an educational stronghold, comparable in some degree to the Jesuit influence in Canada, which has proved more lasting than French dominion, more impregnable than the fortress of Quebec."[1]

A scientific society was organized at Williamsburg during the Revolution, but in those trying times it failed for lack of attention on the part of its founders.

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[1] Copies of Quesnay's pamphlet are preserved in the Virginia State library at Richmond and in the Andrew D. White Historical library of Cornell University, as well as in a certain private library in Baltimore. A full account of this enterprise may be found in Herbert B. Adams's Thomas Jefferson and the University of Virginia, pp. 21–30, and other records occur in Mordecai's Richmond in By-gone Days (2d edition, pp. 198–208) and in Goode's Virginia Cousins, p. 57.

The building erected for the Academy of Sciences was the meeting place of the convention of patriots and statesmen who ratified in 1788 the Constitution of the United States, and subsequently was the principal theater of the city of Richmond.

The academy grounds, [writes R. A. Brock,] included the square bounded by Broad and Marshall and Eleventh and Twelfth streets, on the lower portion of which stood the Monumental Church and the medical college. The academy stood midway in the square fronting Broad street. L'Académie des Etats-Unis de l'Amérique was an attempt, growing out of the French alliance with the United States, to plant in Richmond a kind of French academy of the arts and sciences, with branch academies in Baltimore, Philadelphia, and New York. The institution was to be at once national and international. It was to be affiliated with the royal societies of London, Paris, Brussels, and other learned bodies in Europe. It was to be composed of a president, vice-president, six counsellors, a treasurer-general, a secretary, and a recorder, an agent for taking European subscriptions, French professors, masters, artists in chief attached to the academy, 25 resident and 175 nonresident associates, selected from the best talent of the Old World and the New. The academy proposed to publish yearly, from its own press in Paris, an almanac. The academy was to show its zeal for science by communicating to France and other European countries a knowledge of the natural products of North America. The museums and cabinets of the Old World were to be enriched by the specimens of the flora and fauna of a

Our forefathers in colonial times had their national universities beyond the sea, and all of the young colonists, who were able to do so, went to Oxford or Cambridge for their classical degrees, and to Edinburgh and London for training in medicine, for admission to the bar, or for clerical orders. Local colleges seemed as unnecessary as did local scientific societies.

Many attempts were made to establish local societies before final results were accomplished, and the beginnings of the national college system had a similar history.

In 1619 the Virginia Company of England made a grant of 10,000 acres of land for "the foundation of a seminary of learning for the English in Virginia," and in the same year the bishops of England, at the suggestion of the King, raised the sum of £1,500 for the encouragement of Indian education in connection with the same foundation. A beginning was made toward the occupation of the land, and George Thorpe, a man of high standing in England, came out to be superintendent of the university, but he and 340 other colonists (including all the tenants of the university) were destroyed by the Indians in the massacre of 1622.

The story of this undertaking is told by Professor H. B. Adams in the History of the College of William and Mary, in which also is given an account of the Academia Virginiensis et Oxoniensis, which was to have been founded on an island in the Susquehanna River, granted in 1624 for the founding and maintenance of a university, but was suspended on

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country as yet undiscovered by men of science. The promoter of this brilliant scheme was the Chevalier Alexander Maria Quesnay de Beaurepaire, grandson of the famous French philosopher and economist, Doctor Quesnay, who was the court physician of Louis XV. Chevalier Quesnay had served as a captain in Virginia, in 1777–78, in the war of the Revolution. The idea of founding the academy was suggested to him in 1778 by John Page, of Rosewell, then lieutenant governor of Virginia, and himself devoted to scientific investigation. Quesnay succeeded in raising by subscription the sum of 60,000 francs, the subscribers in Virginia embracing nearly 100 prominent names. The corner stone of the building, which was of wood, was laid with Masonic ceremonies July 8, 1786. Having founded and organized this academy under the most distinguished auspices, Quesnay returned to Paris and succeeded in enlisting in support of his plan many learned and distinguished men of France and England. The French revolution, however, put an end to the scheme. The academy building was early converted into a theater, which was destroyed by fire, but a new theater was erected in the rear of the old. This new building was also destroyed by fire on the night of December 26, 1811, when 72 persons perished in the flames. The Monumental church commemorates the disaster, and its portico covers the tomb and ashes of most of its victims. A valuable sketch of Quesnay's enlightened projection, chiefly drawn from his curious Mémoire concernant l'Académie des Sciences et Beaux-Arts des Etats-Unis d'Amérique, établie à Richmond, was published in The Academy, December, 1887, II, No. 9, pp. 403, 412, by Doctor Herbert B. Adams, of Johns Hopkins University. A copy of Quesnay's rare Mémoire is in the library of the State of Virginia. Quesnay complains bitterly that all his letters relating to his service in the American Army had been stolen from a pigeonhole in Governor Henry's desk and his promotion thus prevented.

account of the death of its projector, and of King James I, and the fall of the Virginia Company.

Soon after, in 1636, came the foundation of Harvard, then in 1660 William and Mary, Yale in 1701, the College of New Jersey in 1746, the University of Pennsylvania in 1751, Columbia in 1754, Brown in 1764, Dartmouth in 1769, the University of Maryland in 1784, that of North Carolina in 1789–1795, that of Vermont in 1791, and Bowdoin (the college of Maine) in 1794.

When Washington became President, one hundred years ago, there were no scientific foundations within this Republic save the American Academy in Boston; and, in the American Philosophical Society, Bartram's Botanic Garden, the private observatory of Rittenhouse, and Peale's Natural History Museum, Philadelphia.

Washington's own inclinations were all favorable to the progress of science; and Franklin, who would have been Vice-President but for his age and weakness, Adams, the Vice-President, and Jefferson, Secretary of State, were all in thorough sympathy with the desire of their chief to "promote as objects of primary importance institutions for the general diffusion of knowledge." All of them were fellows of the American Philosophical Society, and the President took much interest in its proceedings. The records of the society show that he nominated for foreign membership the Earl of Buchan, president of the Society of Scottish Antiquaries, and Doctor James Anderson.

Washington's mind was scientific in its tendencies, and his letters to the English agriculturists (Young, Sinclair, and Anderson) show him to have been a close student of physical geography and climatology. He sent out with his own hand, while President, a circular letter to the best informed farmers in New York, New Jersey, Pennsylvania, Maryland, and Virginia, and having received a considerable number of answers, prepared a report on the resources of the Middle Atlantic States, which was the first of the kind written in America, and was a worthy beginning of the great library of agricultural science which has since emanated from our Government press.

In a letter to Arthur Young, dated December 5, 1791, he manifested great interest in the Hessian fly, an insect making frightful ravages in the wheat fields of the Middle States, and so much dreaded in Great Britain that the importation of wheat from America was prohibited.[1] It was very possibly by his request that a committee of the Philosophical Society prepared and printed an elaborate and exhaustive report, and since its chairman was Washington's Secretary of State, it was practically

[1] In an article recently published by Professor C. V. Riley, he sustains the popular belief and tradition that *Cecidomya* was introduced about the time of the Revolution, and probably by Hessian troops. He gives interesting details concerning the work of the committee of the American Philosophical Society, and a review of recent controversies upon this subject. See Canadian Entomologist, XX, p. 121.

a governmental affair, the precursor of subsequent entomological commissions, and of our Department of Economic Entomology.[1]

The interest of Washington in the founding of a national university, as manifested in the provisions of his last will and testament, are familiar to all, and I have been interested to learn that his thoughts were earnestly fixed upon this great project during all the years of the Revolutionary war. It is an inspiring thought that, during the long and doubtful struggle for independence, the leader of the American arms was looking forward to the return of peace, in anticipation of an opportunity to found in a central part of the rising empire an institution for the completing of the education of youths from all parts thereof, where they might at the same time be enabled to free themselves in a proper degree from local prejudices and jealousies.

Samuel Blodget, in his Economica, relates the history of the beginning of a national university.

As the most minute circumstances are sometimes interesting for their relation to great events [he wrote], we relate the first we ever heard of a national university: it was in the camp at Cambridge, in October 1775, when major William Blodget went to the quarters of general *Washington*, to complain of the ruinous state of the colleges, from the conduct of the militia quartered therein. The writer of this being in company with his friend and relation, and hearing general Greene join in lamenting the then ruinous state of the eldest seminary of Massachusetts, observed, *merely to console the company of friends*, that to make amends for these injuries, after our war, he hoped, we should erect a noble national university, at which the youth of all the world might be proud to receive instruction. What was thus pleasantly said, Washington immediately replied to, with that inimitably expressive and truly interesting look for which he was sometimes so remarkable: "*Young man you are a prophet! inspired to speak what I feel confident will one day be realized.*" He then detailed to the company his impressions, that all North America would one day become united; he said, that a colonel Byrd,[2] of Virginia, he believed, was the first man who had pointed out the best central seat [for the capital city], *near to the present spot*, or about the falls of the Potomack. General Washington further said, that a Mr. Evans[3] had expressed the same opinion, with many other gentlemen, who from a

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[1] Before the organization of the Department of Agriculture, another step in economic entomology was taken by the General Government in the publication of an official document on silk worms:

1828. | Mease, James. | 20th Congress, | 18th Session | [Doc. No. 226] Ho. of Reps. | Silk-worms. | ——— | Letter | from | James Mease, | transmitting a treatise on the rearing of silk-worms, | by Mr. De Hozze, of Munich, | with plates, etc., etc. | ——— | February 2, 1828.—Read and referred to the Committee on Agriculture. | —— | Washington: | Printed by Gales and Seaton | 1828. | 8°. pp. 1–108.

[2] Probably the third William Byrd [1728–1777], the son of the author of Westover Papers. He was colonel of the Second Virginia Regiment in 1756, and perhaps was in camp with Washington on the present site of the capital, when he became so deeply impressed with the eligibility of the site for a national city.

[3] Perhaps Lewis Evans, the geographer, who in 1749 published a map of the central colonies, including Virginia. Professor Winsor tells me that there are copies of this map in the possession of Harvard University, in the library of the Pennsylvania Historical Society, and one in the Faden collection in the Library of Congress. Professor Josiah D. Whitney says that the legend on it, "All great storms begin to leeward," is, so far as he knows, the first expression of that scientific opinion.

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cursory view of a chart of North America, received this natural and truly correct impression. The look of general Washington, the energy of his mind, his noble and irresistible eloquence, all conspired, so far to impress *the writer* with these subjects, that if ever he should unfortunately become insane, it *will* be from his anxiety for the *federal city* and NATIONAL UNIVERSITY.[1]

In another part of the same book Mr. Blodget describes a conversation with Washington, which took place after the site of the capital had been decided upon, in which the President "stated his opinion, that there were four or five thousand inhabitants in the city of Washington, and until congress were comfortably accommodated, it might be premature to commence a seminary. * * * He did not wish to see the work commenced until the city was prepared for it; but he added, that he hoped he had not omitted to take such measures as would at all events secure the entire object in time, even if its merits should not draw forth from every quarter the aid it would be found to deserve," alluding, of course, to the provisions in his own will. "He then," continues Blodget, "talked again and again, on Mr. Turgot's and Doctor Price's calculations of the effect of compound interest, at which, as he was well versed in figures, he could acquit himself in a masterly manner."[2]

Concerning the fate of the Potomac Company, a portion of whose stock was destined by Washington as a nucleus for the endowment of a university, it is not necessary now to speak. The value of the bequest was at the time placed at £5,000 sterling, and it was computed by Blodget that had Congress kept faith with Washington, as well as did the legislature of Virginia in regard to the endowment of Washington College, his donation at compound interest would in twelve years (1815) have grown to $50,000, and in twenty-four years (1827) to $100,000, an endowment sufficient to establish one of the colleges in the proposed university.

Madison, when a member of the Constitutional Convention in 1787, probably acting in harmony with the wishes of Washington, proposed as among the powers proper to be added to those of the General Legislature, the following:

To establish a university.

To encourage, by premiums and provisions, the advancement of useful knowledge and the discussion of science.[3]

That he never lost his interest in the university idea is shown by his vigorous appeal while President, in his message of December, 1810, in which he urged the importance of an institution at the capital which would "contribute not less to strengthen the foundations than to adorn the structure of our system of government."

Quite in accord with the spirit of Madison's message was a letter in the Pennsylvania Gazette of 1788,[4] in which it was argued that the new form of government proposed by the framers of the Constitution could not succeed in a republic, unless the people were prepared for it by an

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[1] Economica, p. 22.

[2] Idem., Appendix, p. ix.

[3] Madison Papers, I, pp. 354, 577.

[4] See Appendix A.

education adapted to the new and peculiar situation of the country, the most essential instrument for which should be a Federal university. Indeed, the tone of this article, to which my attention has recently been directed by President Welling, was so harmonious with that of the previous and subsequent utterances of Madison as to suggest the idea that he, at that time a resident of Philadelphia, may have been its author. It is more probable, however, that the writer was Benjamin Rush, who in 1787 issued an Address to the people of the United States,[1] which began with the remark that there is nothing more common than to confound the terms of American Revolution with those of the late American war.

"The American war is over," he said, "but this is far from being the case with the American Revolution. On the contrary, nothing but the first act of the great drama is closed. It remains yet to establish and perfect our new forms of government, and to prepare the principles, morals, and manners of our citizens for these forms of government after they are established and brought to perfection."[2]

And then he went on to propose a plan for a national university, of the broadest scope, with post-graduate scholarships, a corps of traveling correspondents, or fellows, in connection with the consular service, and an educated civil service, organized in connection with the university work.

In Economica, the work just quoted, printed in 1806, the first work on political economy written in America, Blodget referred to the national university project as an accepted idea, held in temporary abeyance by legislative delays.

Blodget urged upon Congress various projects which he thought to be of national importance, and among the first of these was To erect, or at least to point out, the place for the statue of 1783, and either to direct or permit the colleges of the university formed by Washington to commence around this statue after the manner of the Timoleonteon of Syracuse.[3]

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[1] See Appendix B.

[2] The Society of Sons of the American Revolution, recently organized, and composed of descendants of Revolutionary soldiers and patriots, has for one of its objects "to carry out Washington's injunction 'to promote as objects of primary importance institutions for the diffusion of knowledge,' and thus to create an enlightened public opinion."

[3] 1806 Blodget, Samuel, jr., Economica : | A Statistical Manual | for the | United States of America. | = | .... The legislature ought to make the people happy | Aristotle on government | = | .... "Felix qui potuit rerum cognoscere causas" | = | City of Washington : | Printed for the author. | = | 1806, 128 i–viii, 1–202 i–xiv.

The certificate of copyright is in this form:

Be it remembered that * * * Samuel Blodget, junior, hath deposited in this office, the title of a book the right whereof he claims as author, but for the benefit in trust for the free education fund of the university founded by George Washington in his last will, etc.

In intimate connection with his plan for a university was that of Washington for a military academy at West Point. He had found during the Revolution a great want of engineers, and this want caused Congress to accept the services of numerous French engineers to aid our country in its struggle for independence.

At the close of the Revolution, Washington lost no time in commending to Virginia the improvement of the Potomac and James rivers, the junction by canal of Chesapeake Bay and Albemarle Sound of North Carolina. He soon after proceeded to New York to see the plans of General Schuyler to unite the Mohawk with the waters of Lake Ontario, and to Massachusetts to see the plans of the Merrimac Navigation Company.

It was the want of educated engineers for work of this kind that induced Generals Washington, Lee, and Huntington and Colonel Pickering, in the year 1783, to select West Point as a suitable site for a military academy, and at that place such an institution was essayed, under the law of Congress, in 1794. But from the destruction of the building and its contained books and apparatus by fire, the academy was suspended until the year 1801, when Mr. Jefferson renewed the action of the law, and the following year, 1802, a United States Corps of Engineers and Military Academy was organized by law and established at West Point, with General Jonathan Williams, the nephew of Franklin and one of the vice-presidents of the Philosophical Society, at its head, and the United States Military Philosophical Society was established with the whole Engineer Corps of the Army for a nucleus.

This society had for its object "the collecting and disseminating of military science." Its membership during the ten years of its existence included most of the leading men in the country, civilians as well as officers in the Army and Navy. Meetings were held in New York and Washington, as well as in West Point, and it seems to have been the first national scientific society.[1]

The Patent Office also began under Washington, the first American patent system having been founded by act of Congress April 10, 1790.

On the 8th of January, 1790, President Washington entered the Senate Chamber, where both Houses of Congress were assembled, and addressed them on the state of the new nation. In the speech of a few minutes, which thus constituted the first annual message to Congress,

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[1] At least three fascicles of Extracts from the minutes of the United States Military Society were printed—one for the stated meeting, October 6, 1806 [4°, 14 pp.]; one for an occasional meeting at Washington, January 30, 1808 [4°, pp. 1–23 (1)]; and one for an occasional meeting at New York, December 28, 1809 [4°, pp. 1–22]. The manuscript records, in four volumes, are said to be in the possession of the New York Historical Society.

I am indebted to Colonel John M. Wilson, United States Army, Superintendent of the Military Academy, and to General J. C. Kelton, United States Army, for courteous and valuable replies to my letters of inquiry.

about a third of the space was given to the promotion of intellectual objects—science, literature, and arts. The following expression may perhaps be regarded as the practical origination of our patent system:

I can not forbear intimating to you the expediency of giving effectual encouragement, as well to the introduction of new and useful inventions from abroad, as to the exertions of skill and genius in producing them at home.

This, of course, was in direct pursuance of the constitutional enactment, bethought and inserted toward the closing days of the convention in September, 1787, empowering Congress with such authority. Each House, the Senate on the 11th and the Representatives on the 12th, sent a cordial response to the President's address, reciting the particulars of his discourse, and promising, especially to his suggestions for encouragement of science and arts, "such early attention as their respective importance requires·" and the lower House proceeded rapidly with the work. January 15 it was resolved that the various measures indicated by the President should be referred to select committees, respectively, and on the 25th such a committee was formed to consider the encouragement of the useful arts. It consisted of Edanus Burke, of South Carolina, a justice of the supreme court of that State, and native of Ireland; Benjamin Huntington, of Connecticut, and Lambert Cadawalader, of New Jersey. On the 16th of February Mr. Burke reported his bill, which passed to its second reading the following day. It was copiously discussed and amended in Committee of the Whole, particularly March 4, when "the clause which gives a party a right to appeal to a jury from a decision of referees, it was moved should be struck out." After a good deal of pointed and profitable remark as to the true sphere and function of juries the motion for striking out was carried.

The next day, March 5, the bill was ordered to be engrossed, and on the 10th, after third reading, it passed and was carried to the Senate. Here, in a few days, it was referred to a committee of which Charles Carroll, of Maryland, was chairman, and reported back the 29th of March, where it passed, with twelve amendments, on the 30th. On the 8th of April it went forward with the signatures of Speaker and Vice-President to the President, who approved it April 10, 1790.[1] The first patent was granted on the 31st of the following July to Samuel Hopkins, of Vermont, for making pot and pearl ashes; and two more during that year.[2]

Thomas Jefferson, Secretary of State at this period, under which Department especially the patent system grew up for more than half its first century, took so keen an interest in its aim and workings, and gave such searching personal attention to the issue of the several patents, that he has been quite naturally reputed as the father of our Patent Office, and

[1] Statutes at Large, I, pp. 109–112.

[2] Among the treasures of the National Museum is a patent dated 1796, signed by Washington as President and Pickering as Secretary of State.

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it seems to have been supposed that the bill itself creating it proceeded from his own suggestion. But by a comparison of dates this appears hardly possible. Jefferson returned from Europe to Norfolk and Monticello toward the end of 1789, his mind deeply occupied with the stirring movements of revolution abroad. During the winter months he was debating whether he should accept the charge of the State Department, offered him by Washington; making his way by slow stages from Virginia to New York; receiving innumerable ovations; paying his last visit to the dying Franklin, and he only reached the seat of government March 21, when the legislative work on this act was practically finished. More than to any other individual, probably, the American patent system looks for its origin to the Father of the Country.[1]

Jefferson took great pride in it, and gave personal consideration to every application that was made for patents during the years between 1790 and 1793, while the power of revision and rejection granted by that act remained in force. It is a matter of tradition, handed down to us from generation to generation, that when an application for a patent was made he would summon Mr. Henry Knox, of Massachusetts, who was Secretary of War, and Mr. Edmund Randolph, of Virginia, who was Attorney-General, these officials being designated by the act, with the Secretary of State, a tribunal to examine and grant patents; and that these three distinguished officials would examine the application critically, scrutinizing each point of the specification and claims carefully and vigorously. The result of this examination was that, during the first year, a majority of the applications failed to pass the ordeal, and only three patents were granted. Every step in the issuing of a patent was taken with great care and caution, Mr. Jefferson thinking always to impress upon the minds of his officers and the public that it was a matter of no ordinary importance.

The subsequent history of the office is very interesting, especially since it contains a record of Mr. Jefferson's vigorous opposition to the change effected by the act of 1793, which, he held, by a promiscuous granting of exclusive privileges would lead to the creation of monopoly in the arts and industries, and was against the theory of a popular government, and would be pernicious in its effects.

In 1812 a building was put up for the accommodation of the office, but this was destroyed in 1836, and with it most of the records which would be necessary for a proper understanding of the early history of American invention.

In the Patent Office building, and with it destroyed, there was gathered a collection of models, which was sometimes by courtesy called the American Museum of Art, and which afforded a precedent for the larger collection of models and natural products, which remained under

[1] The foregoing paragraphs concerning the history of the Patent Office were kindly supplied by Mr. Edward Farquhar, for many years its assistant librarian.

the custody of the Commissioner of Patents until 1858, when it was transferred to the Smithsonian Institution, and became a part of the present National Museum.

In 1836 the patent system was reorganized, and most of the methods at present in use were put in operation. As it now stands, it is one of the most perfect and effective in the world, and the Patent Office, judged by the character of the work it performs, although, perhaps, not strictly to be classed among the scientific institutions, is nevertheless entitled to such a place by reason of its large and admirable corps of trained scientific experts serving on the staff of examiners.[1]

The Administration of John Adams, beginning in 1797, was short and turbulent. Political strife prevented him from making any impression upon our scientific history; but it requires no research to discern the attitude of the man who founded the American Academy and who drew up the articles for the encouragement of literature and science in the constitution of Massachusetts.

Jefferson, as Vice-President, taking little part in the affairs of the Administration, was at liberty to cultivate the sciences. When he came to Philadelphia to be inaugurated Vice-President, he brought with him a collection of the fossilized bones of some large quadruped, and the manuscript of a memoir upon them, which he read before the American Philosophical Society, of which he had been elected president the preceding year.

"The spectacle of an American statesman coming to take part as a central figure in the greatest political ceremony of our country and bringing with him an original contribution to science is certainly," as Luther has said, "one we shall not soon see repeated."[2]

In 1801 began the Administration most memorable in the history of American science. The President of the United States was, during the eight years of his office, president of the American Philosophical Society as well, and was in touch with all the intellectual activities of the period. He wrote to a correspondent, "Nature intended me for the tranquil pursuits of science by rendering them my supreme delight;" and to another he said, "Your first letter gives me information in the line of natural history, and the second promises political news; the first is my passion, the last is my duty, and therefore both desirable."

"At times of the fiercest party conflict," says Luther, "when less happily constituted minds would scarcely have been able to attend to

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[1] See Official Gazette, United States Patent Office, XII, No. 15, Tuesday, October 9, 1877; also articles in Appleton's and Johnson's Cyclopædias.

The history of the Patent Office has never been written; a full account of its work and of its influence upon the progress of American invention is greatly to be desired.

[2] See Jefferson, A Memoir on the Discovery of Certain Bones of a Quadruped, of the Clawed kind, in the Western Part of Virginia, in the American Philosophical Transactions, IV, p. 246 (March 10, 1797); also F. B. Luther, Jefferson as a Naturalist, in the Magazine of American History, April, 1885, pp. 379-390.

the routine duties of life, we find him yielding to that subtle native force which all through life was constantly drawing him away from politics to science."

Thus, during these exciting weeks in February, 1801, when Congress was vainly trying to untangle the difficulties arising from the tie vote between Jefferson and Burr, when every politician at the capital was busy with schemes and counterschemes, this man, whose political fate was balanced on a razor's edge, was corresponding with Doctor Wistar in regard to some bones of the mammoth which he had just procured from Shawangunk, in New York. Again, in 1808, when the excitement over the Embargo was highest, and when every day brought fresh denunciations of him and his policy, he was carrying on his geological studies in the White House itself. Under his direction upward of 300 specimens of fossil bones had been brought from the famous Big Bone Lick and spread in one of the large unfinished rooms of the Presidential Mansion. Doctor Wistar was asked to come to Philadelphia and select such as were needed to complete the collection of the Philosophical Society. The exploration of the lick was made at the private expense of Jefferson through the agency of General William Clarke, the western explorer, and this may fairly be regarded as the beginning of American governmental work in paleontology.

His scientific tendencies led to much criticism, of which the well-known lines by William Cullen Bryant, in The Embargo, afford a very mild example.[1] He cast all calumny aside with the remark "that he who had nothing to conceal from the press had nothing to fear from it," and calmly went on his way. The senior members of his Cabinet were James Madison, a man of the most enlightened sympathy with science, and Gallatin, one of the earliest American philologists; while one of his strongest supporters in Congress was Samuel Latham Mitchill, a mighty promoter of scientific interests in his native State, whom Adams wittily describes as "chemist, botanist, naturalist, physician, and politician, who supported the Republican party because Jefferson was its leader, and Jefferson because he was a philosopher."

During this administration the project for a great national institution of learning was revived by Joel Barlow. In 1800, when Barlow was the American minister in Paris, he said in a letter to Senator Baldwin:

> I have been writing a long letter to Jefferson on quite another subject. . . . It is about learned societies, universities, public instruction, and the advantages you now have for doing something great and good if you will take it up on proper principles. If you will put me at the head of the Institution there proposed, and give it that

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[1] Go, wretch, resign the Presidential chair;
Disclose thy secret measures, foul or fair.
Go, search with curious eyes for hornèd frogs
'Mid the wild wastes of Louisianian bogs,
Or where the Ohio rolls his turbid stream
Dig for huge bones, thy glory and thy theme.

support which you ought to do, you can't imagine what a garden it would make of the United States: I have great projects, and only want the time and means for carrying them into effect.[1]

M. Dupont de Nemours was also corresponding with Jefferson upon the same subject, and his work, Sur l'Éducation Nationale dans les États-Unis, published in Paris in 1800, was written at his request.[2]

Barlow returned to the American States in 1805, and almost his first public act after his arrival, we are told, was to issue a prospectus in which he forcibly and eloquently depicted the necessity and advantages of a national scientific institution.

This was to consist of a central university at or near the seat of government, and, as far as might seem practicable or advisable, other universities, colleges, and schools of education, either in Washington or in other parts of the United States, together with printing presses for the use of the institution, laboratories, libraries, and apparatus for the sciences and the arts, and gardens for botany and agricultural experiments.

The institution was to encourage science by all means in its power, by correspondence, by premiums and by scholarships, and to publish schoolbooks at cost of printing.

The Military and Naval Academies, the Mint, and the Patent Office were to be connected with the university, and there was also to be a general depository of the results of scientific research and of the discoveries by voyages and travels, actually the equivalent of a national museum.

"In short," wrote Barlow, "no rudiment of knowledge should be below its attention, no height of improvement above its ambition, no corner of an empire beyond its vigilant activity for collecting and diffusing information."[3]

The editor of the National Intelligencer, the organ of the Administration in 1806, commented favorably upon the plan of Barlow.

This gentleman [he wrote], whose mind has been enlarged by extensive observation, by contemplating man under almost every variety of aspect in which he appears, and whose sentiments have been characterized by an uniformly zealous devotion to liberty, has most justly embraced the opinion that the duration as well as perfection of republicanism in this country will depend upon the prevalence of correct information, itself dependent upon the education of the great body of the people. Having raised himself, as we understand, to a state of pecuniary independence, he has returned to his native country, with a determination of devoting his whole attention

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[1] Todd, Life and Letters of Joel Barlow, p. 208.

[2] Adams, Jefferson and the University of Virginia, p. 49 *et seq.*

[3] See text of prospectus in Appendix C to this paper, or in National Intelligencer, Washington, 1806, August 1 and November 24. The original publication, of which there is a copy in the Congressional Library, recently brought to my notice by Mr. Spofford, is a pamphlet, anonymously published, with the date of Washington, 24th January, 1806.

Prospectus | of a | National Institution, | to be | established | in the | United States | = | Washington City: | Printed by Samuel H. Smith | —— | 1806— 8°, pp. 1–44.

James H. Linsley

and labors to those objects which are best calculated to improve its state of society, its science, literature, and education. The disinterested exertions of such a man merit the national attention.[1]

Barlow's prospectus, we are told, was circulated throughout the country, and met with so favorable a response that in 1806 he drew up a bill for the incorporation of the institution, which Mr. Logan, of Philadelphia, introduced in the Senate, which passed to a second reading, was referred to a committee which never reported, and so was lost.

Barlow's National Institution resembled more closely the House of Salomon in The New Atlantis of Bacon than it did the eminently practical university project of Washington. It would be interesting to know to what extent President Jefferson was in sympathy with Barlow. The mind which a few years later directed the organization of the University of Virginia could scarcely have approved all the features of the Kalorama plan. He was undoubtedly at this time anxious that a national university should be founded, as is shown by his messages to Congress in 1806 and 1808,[2] though it is probable that he wished it to be erected in some convenient part of Virginia, rather than in the city of Washington. The project for transplanting to America the faculty of the College of Geneva, which, but for the opposition of Washington, would probably have been attempted in 1794, had reference rather to the formation of a State university, national in influence, than to a central Federal institution.[3]

Although Barlow's plan was, in its details, much too elaborate for the times, the fundamental ideas were exceedingly attractive, and led to very important and far-reaching results.

Barlow expected, of course, that his institution should be established and maintained at Government cost. This was soon found to be impracticable, and those who were interested in the intellectual advancement of the capital soon had recourse to the idea of beginning the work at private expense, relying upon Government aid for its future advancement.

Barlow's classmate, Josiah Meigs, his friend and neighbor Thomas Law, aided by Edward Cutbush, Judge Cranch, and other citizens of Washington, proceeded forthwith to attempt that which the politicians dared not.

The essential features of Barlow's plan were:

(1) The advancement of knowledge by associations of scientific men; and

(2) The dissemination of its rudiments by the instruction of youth.[4]

To meet the first of these requirements they organized the Columbian Institute for the Promotion of Arts and Sciences, in 1819; and for the second, the Columbian College, incorporated in 1821. Most of the prominent members of the Columbian Institute were also among the friends

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[1] National Intellingencer, November 24, 1806.

[2] Henry Adams, History of the United States, 1805–1809, I, pp. 346, 347; II, p. 365.

[3] Idem., pp. 45, 46.

[4] The Old Bachelor, by William Wirt, p. 186.

and supporters of the college. Doctor Josiah Meigs, the friend and classmate of Barlow, the president of the institute from 1819 to 1821, was an incorporator and a member of the first faculty of the college.[1]

Doctor Edward Cutbush, the founder of the Columbian Institute, was also a professor, as well as Doctor Thomas Sewall, Doctor Alexander McWilliams, and Judge William Cranch, and in publications made at the time these men distinctly proposed to realize the aspirations of Washington for the creation of a great national university at the seat of the Federal Government. It was in this cause President Monroe gave to the Columbian College his public support as President of the United States. At a later day, when an hour of need overtook the college, John Quincy Adams became one of its saving benefactors.[2]

The donation of $25,000 made to the Columbian College in 1832 was preceded by a report from the Committee in House of Representatives on the District of Columbia. That report may be found in Reports of committees, first session Twenty-second Congress (1831–32), III, Report No. 334.

After reciting the early history of the college the report proceeds as follows:

Few institutions present as strong claims to the patronage of Government, as that, in behalf of which the forementioned memorial has been presented. [The report is made in answer to a memorial of the president and trustees of the college, asking Congress to make a donation to the college 'from the sale of public lots or from such other source as Congress may think proper to direct.'] Its location near the seat of Government, its salubrious middle climate, and other advantages, and the commendable efforts of its present trustees and professors to sustain it, justly entitle it to public benificence.

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[1] I am indebted to Doctor James C. Welling, president of the Columbia University, for much important information concerning this and other matters discussed in the present paper.

[2] James C. Welling, The Columbian University, Washington, 1889, p. I. The following letter, written by President Monroe in 1821, indicates that the public men of the day were not unwilling that the institution should be regarded as one of national scope:

WASHINGTON, *March 28, 1821.*

SIR: I avail myself of this mode of assuring you of my earnest desire that the college which was incorporated by an act of Congress at the last session, by the title of The Columbian College in the District of Columbia, may accomplish all the useful purposes for which it was established; and I add, with great satisfaction, that there is good reason to believe that the hopes of those who have so patriotically contributed to advance it to its present stage will not be disappointed.

Its commencement will be under circumstances very favorable to its success. * * * The act of incorporation is well digested, looks to the proper objects, and grants the powers well adapted to their attainment. The establishment of the institution within the Federal District, in the presence of Congress, and of all the departments of the Government, will secure to the young men who may be educated in it many important advantages; among which, the opportunity which it will afford them of hearing the debates in Congress, and in the Supreme Court, on important subjects, must be obvious to all.

With these peculiar advantages, this institution, if it receives hereafter the proper encouragement, *cannot fail to be eminently useful to the nation.* Under this impression, I trust that such encouragement will not be withheld from it.

I am, sir, with great respect, your very obedient servant,

JAMES MONROE.

The Columbian Institute was granted the use of rooms in the Capitol building under the present Congressional Library Hall, which became a center of the scientific and literary interests of Washington, and its annual meetings were held in the Hall of the House of Representatives, where Southard, Clay, Everett, Meigs, and Adams delivered addresses upon matters of science and political economy to large assemblages of public men. In 1819, Josiah Meigs, its president, writing to Doctor Daniel Drake, of Cincinnati, said:

I have little doubt that this Congress will, before they rise, give the Institute a few acres of ground for our building and for a Botanic Garden. Mr. Barlow made great efforts to obtain this object eight or ten years ago—he could do nothing—but prejudices which *then* were of the *density* of a thunder cloud are now as *tenuous* as the tail of a Comet.[1]

The supreme legislative power of the United States over persons and property within the District of Columbia, is unquestioned. Congress has repeatedly made grants of portions of the public lands to seminaries of learning situated within the limits of States and Territories, where such lands lie. The constitution having thus confided to the care of the National Legislature, the rights and interests of the people of the District of Columbia, and Congress having made liberal donations out of the national domain to promote the great cause of education in all the other districts within which the General Government has exclusive jurisdiction, it would seem to be cruel injustice to refuse the small boon now recommended. These considerations, induce the hope that the proposed donation will be exempt from all opposition, not founded in doubts of the just claim to patronage of the institution for the benefit of which it is designed. And these claims, it is fully believed, will stand the test of the severest scrutiny.

The report from which the above extracts are taken was made February 27, 1832 (to accompany House bill No. 422), by Mr. Thomas, of Maryland (on behalf of the Committee on the District of Columbia), in answer to memorial of the trustees and the president of the Columbian College.

On the ground granted by Congress, a botanical garden was established by the society in 1822 or 1823 with the cooperation of the State Department and the consular service. In 1829 the society applied to Congress for pecuniary aid, which was not granted.[2]

The Columbian University was also an applicant for Government aid, which it received to the amount of $25,000 in 1832, on the ground that

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[1] Life of Josiah Meigs, p. 102.

[2] The original members of the Columbian Institute were: Hon. John Quincy Adams; Colonel George Bomford, U. S. A.; Doctor John A. Brereton, U. S. A.; Doctor Edward Cutbush, U. S. N.; Asbury Dickins, esq.; Joseph Gales, jr., esq.; Doctor Henry Huntt; Thomas Law, esq.; Edmund Law, esq.; Doctor George W. May; Alexander McWilliams, esq.; William Winston Seaton, esq.; Samuel H. Smith, esq.; William Thornton, esq.; Hon. Roger C. Weightman.

Among the later members were Doctor Joseph Lovell, U. S. A.; Colonel Isaac Roberdeau; Doctor Thomas Sewell; Judge William Cranch; Hon. Henry Clay; Hon. John McLean; Hon. Richard Rush; Hon. S. L. Southard; Hon. William Wirt; Doctor W. S. W. Ruschenberger, U. S. N.; Hon. J. M. Berrien; Hon. John C. Calhoun; Rev. Obadiah B. Brown, and Rev. William Staughton.

The minutes of the Columbian Institute are not to be found. The treasurer's book is in the National Museum.

it was an institution of national importance, organized by private individuals to do work legitimately within the domain of governmental responsibilities.[1]

The Columbian College received nearly one-third of its original endowment from the Government of the United States. Of the remainder, perhaps one-half was contributed by men like President Adams, whose sole interest in it was a patriotic one.

During Jackson's Presidency all ideas of centralization, even in scientific matters, appear to have fallen into disfavor, and the Columbian Institute and the Columbian College were forced to abandon their hopes for governmental aid. The institute languished and dropped out of existence, while the college, under the fostering care of a church organization (which finally dropped it in 1846), and through the beneficence of individuals, one of whom, a citizen of Washington, gave it property to the value of $200,000, has grown to be a university in name and scope, and is included among the thirteen "foundations comprising groups of related faculties, colleges, or schools," enumerated in the Report of the Commissioner of Education for 1886–87.

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[1] This appropriation was made on the strength of a report by Senator Barbour, of Virginia, chairman of the Committee on the District of Columbia, in which, after alluding to the long-recognized "utility of a central literary establishment" and to the failures of the recommendations of Washington and Madison, he gave a brief history of the enterprise, which was as follows:

At length a few enterprising and patriotic individuals attempted to achieve, by voluntary donations, that which it had been supposed could be effected only by the power of Congress.

Their efforts were crowned with distinguished success. One individual in particular, the Rev. Luther Rice, with an unwearied industry and an unyielding perseverance which prompted him to traverse every part of the Union in pursuit of aid to this beneficent object, contributed principally to that success.

The funds thus acquired were faithfully and judiciously applied to the object. * * * Application was made to Congress for an act of incorporation, which passed February 9, 1821. This, however, was all the aid which Congress dispensed.

The accompanying document shows that there have been expended on this institution $80,000, $50,000 only have been procured; and, as a consequence, the institution is embarrassed with a debt to the amount of $30,000. * * * Under these circumstances, the individuals who have thus generously devoted themselves to the promotion of this establishment, and who have disinterestedly pledged their independence upon the success of the college, present themselves to Congress, with a view to obtain their protection by a small pecuniary grant. * * *

The committee, in reviewing the peculiar circumstances which characterize the origin of this establishment, its progress, and the great benefits it promises to society, are of opinion that the application is reasonable. It cannot be doubted, had such an establishment grown up, under similar circumstances, in either of the states, it would receive the helping hand of its Legislature. Congress stands in the same relation to this establishment, from its exclusive power of legislation within the District.

Report of Mr. Barbour, from the Committee on the District of Columbia, to whom was referred the memorial of the trustees of the Columbian College. April 19, 1824. Senate, Eighteenth Congress, first session (67). pp. 80–83

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Although it has not since 1832 made any claims for Government aid, nor assumed to be in any way a ward of the nation, its early history is significant, on account of its connection with the project for a national university, which has been for more than a century before the people. The Government has since established in Washington City the National Deaf-Mute College, which it still maintains, and the Howard University, intended primarily for the freedman but open to all.

The founders of the Columbian Institute and the Columbian University were building better than they knew, for they were not only advancing knowledge in their own day and generation, but they were educating public opinion for a great opportunity, which soon came in the form of a gift to the nation from beyond the sea in the form of the Smithson bequest.

The story of the Smithsonian Institution is a remarkable one. Smithson was a graduate of the University of Oxford, a fellow of the Royal Society, a chemist and mineralogist of well-recognized position. The friend and associate of many of the leading scientific men of England, he found it advisable, for reasons connected with his family history, to pass most of his life upon the Continent. A man of ample fortune, he associated with men of similar tastes, and died in 1829, leaving in trust to the United States property now amounting in value to nearly three-quarters of a million of dollars to establish at the national capital "an institution for the increase and diffusion of knowledge among men." No one has been able to explain why he did this. He had, so far as we know, no friend or correspondent in the United States, and had made known to no one his intention of establishing an institution of learning in the New World.[1]

It is more than probable, however, that he knew Barlow when American minister in Paris, and that the prospectus of the National Institution or the treatise by Dupont de Nemours may have attracted his attention. He was aware of the failure of the attempts to obtain national support at the start for scientific uses, and conceived the idea of founding, with his own means, an organization which should, he foresaw, grow into national importance. Anyone who will take the pains to compare the criticisms and objections to Barlow's project, as set forth in Wirt's essay in The Old Bachelor,[2] with those which were urged in Congress and the public press in opposition to the acceptance of the Smithson bequest thirty years later, can not fail to be greatly impressed by the similarity of tone and argument.

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[1] The only suggestion which has ever been offered is that by Mr. W. J. Rhees, in his history of James Smithson and his Bequest, in which he calls attention to the fact that in the library of Smithson was a copy of Travels through North America, published in 1807 by Isaac Weld, secretary of the Royal Society, in which he describes the city of Washington, and refers to it prophetically as likely some time to become the intellectual and political center of one of the greatest nations of the world.

[2] The Old Bachelor, p. 171. Baltimore: F. Lucas, jr. Small 8vo, pp. 1–235.

The Smithsonian Institution, with its dependencies and affiliations, corresponds perhaps more closely at the present time to Barlow's National Institution than any organization existing elsewhere in the world. The names of its three secretaries—Henry, the physicist (in office from 1846 to 1878); Baird, the naturalist (Assistant Secretary from 1850 to 1878, Secretary, 1878–1887); and Langley, the astronomer, suggest in a few words the main features of its history.

Recurring to Jefferson's presidency, it should be noted that its most important scientific features were the inception of the system of scientific surveys of the public domain, and the organization of the Coast Survey. The first was most peculiarly Jefferson's own, and was the outcome of more than twenty years of earnest endeavor.

The apathy of the British Government in colonial times in the matter of explorations of the American continent is inexplicable. Halley, the philosopher and mathematician, was in charge of a fruitless expedition in 1699; and Ellis, in 1746, explored Hudson Bay under Government auspices, searching for a northwest passage.

The first inland exploring expedition under Government auspices seems to have been that of Governor Spotswood, of Virginia, who in 1724, accompanied by a party of young colonists, made an excursion to the summit of the Blue Ridge for the purpose of ascertaining what lay beyond.

Nothing else was done in colonial days, although it would appear that Jefferson, and doubtless others as well as he, had in mind the importance of exploring the great Northwest. In the recently published life of Matthew Fontaine Maury, the story is told of his grandfather, the Rev. James Maury, an Episcopal clergyman and instructor of youth in Walker parish, Albemarle County, Virginia, who numbered among his pupils three boys who afterwards became Presidents of the United States and five signers of the Declaration of Independence. He was a quiet thinker—a serene old man who gave the week to contemplative thought and to his school, and Sunday to the service of the sanctuary. In 1756 he was already dazzled by the rising glory of the new country. He was intensely interested in the great Northwest. The Missouri was a myth at that time. Cox had ascended the Mississippi to the falls of St. Anthony, and reported the existence of such a stream, but all beyond was shrouded in mystery.

> "But see," said the aged clergyman, pointing with trembling finger and eager eye to the map of the North American Continent—"see, there must be a large river in that direction: mountains are there, and beyond them there must be a stream to correspond with the vast river on this side of the chain." And by a process of reasoning based on physical geography, he pointed out to his pupils (Thomas Jefferson among them) the existence and line of the river as accurately as Le Verrier did the place of Neptune in the firmament, and predicted that a great highway to the West would some day be opened in this direction. [1]

It would appear that Jefferson never forgot the suggestion of his venerable teacher. While minister of the United States in Paris, in 1785, he

[1] Life of Matthew Fontaine Maury," by Mrs. D. F. M. Corbin, London, 1888, p. 6.

became acquainted with John Ledyard, of Connecticut, a man of genius, of some science, and of fearless courage and enterprise, who had accompanied Captain Cook on his voyage to the Pacific. "I suggested to him," writes Jefferson, "the enterprise of exploring the western part of our continent by passing through St. Petersburg to Kamchatka, and procuring a passage thence in some of the Russian vessels to Nootka Sound, whence he might make his way across the continent to the United States." He proceeded to within 200 miles of Kamchatka, and was there obliged to take up his winter quarters, and when preparing in the spring to resume his journey, he was arrested by an officer of the Empress of Russia, and carried back in a closed carriage to Poland. "Thus," says Jefferson, "failed the first attempt to explore the western part of our northern continent."

In a letter to Bishop Madison, dated Paris, July 19, 1788, Jefferson tells the story of Ledyard's failure, and of his departure on an expedition up the Nile. "He promises me," continues Jefferson, "if he escapes through his journey, he will go to Kentucky and endeavor to penetrate westwardly to the South Sea." Ledyard died in Africa.

The proposed expedition of Ledyard, though undertaken at the instance of the American minister in Paris, can scarcely be regarded as a governmental effort. It is of interest, however, as leading up to the second attempt, which also was inspired and placed on foot by Jefferson.

In 1792, [writes Jefferson,] I proposed to the American Philosophical Society, that we should set on foot a subscription to engage some competent person to explore those regions in the opposite direction—that is, by ascending the Missouri, crossing the Stony Mountains, and descending the nearest river to the Pacific.[1]

Captain Meriwether Lewis, being then stationed at Charlottesville on the recruiting service, warmly solicited me to obtain for him the execution of that object. I told him that it was proposed that the person engaged should be attended by a single companion only, to avoid exciting alarm among the Indians. This did not deter him, but Mr. André Michaux, a professed botanist, author of the Flora Boreali-Americana, and of the Histoire des Chênes de l'Amérique, offering his services, they were accepted. He received his instructions, and when he had reached Kentucky in the prosecution of his journey he was overtaken by an order from the minister of France, then at Philadelphia, to relinquish the expedition and to pursue elsewhere the botanical inquiries on which he was employed by the Government, and thus failed the second attempt to explore that region.[2]

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[1] Jefferson does not mention in this connection the well-known fact that he himself became personally responsible for raising the sum of 1,000 guineas from private sources to secure the sending out of this expedition.

[2] The late Doctor Asa Gray, in a letter written to me shortly before his death, remarks: "I have reason to think that Michaux suggested to Jefferson the expedition which the latter was active in sending over to the Pacific. I wonder if he put off Michaux for the sake of having it in American hands."

I think it is sufficiently evident from what has been written, that the project had been considered by Jefferson long before Michaux came into America. A statement parallel to that of Jefferson is found in the brief biography of Michaux prefixed by Professor C. S. Sargent, to his reprint of the Journal of André Michaux, published

It is related by Jefferson, in his Memoranda of Conversations, that Judge Breckenridge, of Kentucky, told him in 1800, that Michaux was not only a botanical agent of the French, but a political emissary, and that he held a commission as commissary for an expedition against the Spaniards, planned by Genet, in connection with a plot to gain possession of the eastern Mississippi Valley for France.[1]

In 1803, [continues Jefferson,] the act of establishing trading houses with the Indian tribes being about to expire, some modifications of it were recommended to Congress by a confidential message of January 18, and an extension of its views to the Indians on the Missouri. In order to prepare the way, the message proposed

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in the Proceedings of the American Philosophical Society, XXVI, No. 129, p. 4: The French government was anxious at this time to introduce into the royal plantations the most valuable trees of eastern North America, and Michaux was selected for this undertaking. He was instructed to explore the territory of the United States, to gather seeds of trees, shrubs, and other plants, and to establish a nursery near New York for their reception, and afterwards to send them to France, where they were to be planted in the Park of Rambouillet. He was directed also to send game birds from America with a view to their introduction into the plantations of American trees. Michaux, accompanied by his son, then fifteen years old, arrived in New York in October, 1785. Here, during two years, he made his principal residence, establishing a nursery, of which all trace has now disappeared, and making a number of short botanical journeys into New Jersey, Pennsylvania, and Maryland. The fruits of these preliminary explorations, including twelve boxes of seeds, five thousand seedling trees, and a number of live partridges, were sent to Paris at the end of the first year.

Michaux's first visit to South Carolina was made in September, 1787. He found Charleston a more suitable place for his nurseries, and made that city his headquarters during the rest of his stay in America.

Michaux's journeys in this country after his establishment in Charleston are detailed in the Journal [printed in the place already referred to]. They cover the territory of North America from Hudson's Bay to the Indian river in Florida, and from the Bahama islands to the banks of the Mississippi river. His ambition to carry out his instructions was equaled only by his courage and industry. The history of botanical exploration records no greater display of fortitude and enthusiam in the pursuit of knowledge, than Michaux showed in his journey to the headwaters of the Savannah river in December, 1788, when his zeal was rewarded by the discovery of *Shortia* or in the return from his visit to Hudson's Bay. The hardship of his last journey even did not satisfy his cravings for adventure and discovery; and shortly after his return he laid before the American Philosophical Society a proposition to explore the unknown region which extended beyond the Missouri. His proposition was well received. The sum of five thousand dollars was raised by subscription to meet the expenses of the journey; all arrangements were made and he was about to start when he was called upon by the Minister of the French Republic, lately arrived in New York, to proceed to Kentucky, to execute some business growing out of the relations between France and Spain with regard to the transfer of Louisiana.

It was this suggestion of Michaux, no doubt, [says Sargent in concluding this reference,] which led Mr. Jefferson, who had regarded it with great favor, to send a few years later the first transcontinental expedition to the shores of the Pacific.

Professor Sargent, like Doctor Gray, has evidently not been in possession of the history of Jefferson's early interest in this matter.

[1] Jefferson's Writings, ed. T. J. Randolph, IV, pp. 513, 514.

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sending an exploring party to trace the Missouri to its source, to cross the highlands, and follow the best water communication which offered itself from thence to the Pacific Ocean. Congress approved the proposition and voted a sum of money for carrying it into execution. Captain Lewis, who had then been near two years with me as private secretary, immediately renewed his solicitation to have the direction of the party.

In his life of Lewis, prefixed to the history of the expedition, Jefferson gives in full an account of Lewis's preparation for the expedition, including his instruction in astronomical observation by Andrew Ellicott, and also a full text of the instructions, signed by him, addressed to Lewis and his associate, Captain William Clarke. Captain Lewis left Washington on the 5th of July, 1803, and proceeded to Pittsburg. Delays of preparation, difficulties of navigation down the Ohio, and other obstructions retarded his arrival at Cahoki until the season was so far advanced that he was obliged to wait until the ice should break up in the beginning of spring. His mission accomplished, he returned to St. Louis on the 23d of September, 1806.

Never, [says Jefferson,] did a similar event excite more joy through the United States. The humblest of its citizens had taken a lively interest in the issue of the journey, and looked forward with impatience for the information it would furnish. The anxiety, too, for the safety of the corps had been kept in a state of excitement by lugubrious rumors circulated from time to time on uncertain authorities, and uncontradicted by letters or other direct information, from the time they had left the Mandan towns on their ascent up the river in April of the preceding year, 1805, until their actual return to St. Louis.

The second expedition toward the West was also sent out during Jefferson's Administration, being that under the command of General Zebulon M. Pike, who was sent to explore the sources of the Mississippi River and the western parts of Louisiana, continuing as far west as Pikes Peak, the name of which still remains as a memorial of this enterprise.[1]

The expedition of Lewis and Clarke was followed in due course and in rapid succession by others, some geographical, some geological, some for special researches, and some more comprehensive in character.

To those who are in the least degree familiar with the history of American exploration the names of Long, Cass and Schoolcraft, Bonneville, Nicollet, Frémont, Sitgreaves, Wizlizenus, Foster and Whitney, Owen, Stansbury, Abert, Marcy, Stevens, Gunnison, Beckwith, Whipple, Williamson, Parke, Pope, Emory, Bartlett, Bryan, Magraw, Johnston, Campbell, Warren, Twining, Ives, Beale, Simpson, Lander, McClellan, Mullan, Raynolds, Heap, Jones, Ruffner, Ludlow, Maguire, Macomb, and Stone will bring up the memory of much adventurous exploration

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[1] It is a matter of history that Alexander Wilson, the ornithologist, was anxious to be appointed the naturalist of Pike's expedition, and Jefferson has been warmly abused for not gratifying his desire. It should be borne in mind that at this time Wilson was a man whose reputation had not yet been achieved, and also that it is quite possible that in those days, as in the present, the projectors of such enterprises were often hindered by lack of financial opportunity.

and a vast amount of good scientific work; while to mention Hayden, Wheeler, King, and Powell is to leave the field of history and to call up the early stages of the development of that magnificent organization, the United States Geological Survey, which is still in the beginning of its career of usefulness.[1]

The history of the Coast Survey began with the earliest years of the century. It has been thought by some that the idea originated with Albert Gallatin, and by others that it was due to Professor Robert Patterson,[2] while Hassler, whose name is so intimately associated with its early history, seems to have supposed that it was suggested by his own advent, in 1805, bringing with him from Switzerland a collection of mathematical books and instruments.[3]

Passing by the question as to who was the originator of the idea, with the simple remark that it is doubtful whether such an enterprise should not have for long years been in the minds of many Americans, it may be

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[1] The United States Geological Survey was organized March 3, 1879, and Clarence King was appointed its first director. Major J. W. Powell, his successor, was appointed March 18, 1881.

[2] The committee of twenty, appointed in 1857 by the American Association for the Advancement of Science to report upon the history and progress of the Coast Survey, made the following statement:

It is believed that the honor of first suggesting a geodetic survey of the American coast, is due to the elder Professor Patterson, of Philadelphia; who, as early as the year 1806, availed himself of his intimacy with the President, Mr. Jefferson, and the gentlemen who formed his cabinet, to impress them with the feasibility and policy of the measure. (Report on the History and Progress of the American Coast Survey up to the year 1858, by the Committee of Twenty, appointed by the Association for the Advancement of Science, at the Montreal meeting, August, 1857 (pp. 1–126), p. 23.)

[3] I arrived in this country in October, 1805, having relinquished my public station in my native country, Switzerland, foreseeing the turn of political events which have since come to pass, and from a taste for a rural life with completely different views and means quite sufficient for them, but which I have failed to claim. Having arrived in Philadelphia, the late Professor Patterson, Mr. Garnet, of New Brunswick, and several other gentlemen, on seeing the books, mathematical instruments, etc., I had brought with me for my private enjoyment, were so kind as to show me some attention. I had occasion to show them, in conversation, by the scientific publications of Europe, that I had been engaged in an extensive survey of Switzerland, which was interrupted by the revolution. Professor Patterson sent to President Jefferson an account of my former life, which I furnished at his request; and Mr. Clay, the Representative to Congress from Philadelphia, before setting off for Congress, in 1806, asked me if I should be willing to take a survey of the coast, to which I assented. (Letter published in the New York American, probably in February, 1827. Principal Documents Relating to the Survey of the Coast of the United States since 1816, published by F. R. Hassler, Superintendent of the Survey. New York: William Van Norton, printer, 1834, Octavo, pp. 1–180, I–III: folding map. Second Volume of the Principal Documents Relating to the Survey of the Coast of the United States, from October, 1834, to November, 1835. Published by F. R. Hassler, Superintendent of the Survey. New York: William Van Norton, printer, 1835. Octavo, pp. 1–156, I–III (1).)

said that, without doubt, the early organization of the survey was due to the scientific wisdom and political foresight of Jefferson, who realized that within a few years the country would be involved in a war with Great Britain, and that a thorough knowledge of the coast was essential, not only to the prosperity of the nation in time of peace, but still more to its safety in case of invasion. At that time the only charts available for our mariners were those in The Atlantic Neptune of Colonel Des Barres, and the old hydrographic charts issued by the Dutch, French, and English Governments. Jefferson realized that American seamen were less familiar with many portions of their own coast than were the European navigators, and he appreciated fully the importance of having a knowledge of this kind far more accurate than that which was possessed by any foreigner. "With the clear and bold perception which always distinguishes men of genius when they are trusted in times of danger with the destiny of nations, the President recommended the survey of the home coast with all the aid of the more recent discoveries in science;" and in his annual message to Congress, in the year 1807, proposed the establishment of a national survey, for the purpose of making a complete chart of the coast with the adjacent shoals and soundings.

In response to this recommendation, Congress made an appropriation of $50,000 for the purpose of carrying out the provision of the following law:

AN ACT to provide for surveying the Coasts of the United States.

Be it enacted, etc., That the President of the United States shall be, and he is hereby, authorized and requested to cause a survey to be taken of the coasts of the United States, in which shall be designated the islands and shoals, with the roads or places of anchorage, within twenty leagues of any part of the shores of the United States; and also the respective courses and distances between the principal capes, or head lands, together with such other matters as he may deem proper for completing an accurate chart of every part of the coasts within the extent aforesaid. (Act of February 10, 1807.)

By the direction of the President, Albert Gallatin, Secretary of the Treasury, addressed a circular letter to American men of science, requesting their opinion as to the character of the plan to be adopted.

In the circular of the Secretary of the Treasury, the work to be performed was defined as consisting of three distinct parts, as follows:

(1) The ascertainment by a series of astronomical observations of the position of a few remarkable points on the coast, and some of the light-houses placed on the principal capes, or at the entrance of the principal harbors, appear to be the most eligible places for that purpose, as being objects particularly interesting to navigators, visible at a great distance, and generally erected on spots on which similar buildings will be continued so long as navigation exists.

(2) A trigonometrical survey of the coast between those points of which the positions shall have been astronomically ascertained; in the execution of which survey, the position of every distinguishable permanent object should be carefully designated; and temporary beacons be erected at proper distances on those parts of the coast on which such objects are really to be found.

(3) A nautical survey of the shoals and soundings of the coast, of which the trigonometrical survey of the coast itself, and the ascertained position of the light-houses, and other distinguishable objects, would be the basis; and which would therefore depend but little on any astronomical observations made on board the vessels employed on that part of the work.

This circular letter was submitted to thirteen scientific men, and in response thirteen plans were received at the Treasury Department. A commission, composed of the experts from whom answers had been received, was formed. They met at Professor Patterson's, in Philadelphia, and the plan which they finally selected was then proposed by Ferdinand Rudolph Hassler, at that time, and for several years thereafter, professor in the Military Academy at West Point.

Nothing was done to secure definitely the execution of this plan until 1811, when Hassler was sent to Europe to procure the necessary instruments and standards of measure for the proposed work. He was detained as an alien in London during the entire war with England, and until 1815, when he returned to the United States, having, as a matter of course, far exceeded the limits of his appropriation, with a large claim against the Government for indemnification.[1]

I have been unable to ascertain the exact date of the appointment of Hassler as the Superintendent of the Coast Survey, although it was thoroughly understood at the time of the acceptance of his plan in 1807 that it was to be carried out under his direction.

It was not until August, 1816, that the contract was signed with the Government which authorized Hassler to proceed with his work. In 1817 a beginning was made in the bay and harbor of New York, but Congress failed to provide for its continuance, and it was soon suspended, and in 1818, before the Superintendent had the opportunity to publish a report upon the results of his last year's labor, Congress, on the plea "that the little progress hitherto made in the work had caused general dissatisfaction," ordered its discontinuance by repealing the law under which the Superintendent had been appointed, and providing that no one should be employed in the survey of the coast except officers of the Army and Navy. This was practically a discontinuance of the work, because there was no one in America but Hassler who was capable of directing it.

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[1]An interesting reminiscence of his career in this period is contained in the diary of John Quincy Adams for July, 1815, where there is described an interview by himself, with Mr. Gallatin, at that time United States minister in London, in which the latter spoke of Hassler, who had just left them.

"That is a man of very great merit. He was sent by the Government to Europe to procure the instruments for the general survey of our coast, but he has outrun his time and his funds, and his instruments cost eight hundred pounds sterling more than was appropriated for them; and he is embarrassed now about getting back to America. I have engaged Messrs. Baring to advance the money for the instruments, and he is to go for his own expenses upon his own credit. He has procured an excellent set of instruments." Adams's Memoirs, III, p. 248.

The circulars elicited by Hassler's plan are printed in the Transactions of the American Philosophical Society for 1812, II.

MATTHEW FONTAINE MAURY.

Immediately after being thus legislated out of office he was appointed one of the astronomers to represent the United States in the settlement of the Canadian boundary.

From 1819 to 1832 attempts were made at various times by the Navy Department to survey several portions of the coast. A few detached surveys were made, but no general systematic work was attempted, and the result was not on the whole creditable. In 1828 the Hon. S. L. Southard, of New Jersey, at that time Secretary of the Navy, in response to resolutions of inquiry from the House of Representatives, admitted that the charts produced by the Navy were unreliable and unnecessarily expensive, and declaring also that the plan which had been employed was desultory and unproductive, recommended that the provisions of the law of 1807 should be resumed.

In 1832 Congress passed an act reorganizing the surveys on the old plan.

AN ACT to carry into effect the act to provide for a survey of the Coasts of the United States.

[SEC. 1.] *Be it enacted, etc.*, That for carrying into effect the act entitled "An act to provide for surveying the coasts of the United States," approved on the 10th day of February, 1807, there shall be, and hereby is, appropriated a sum not exceeding twenty thousand dollars, to be paid out of any money in the Treasury not otherwise appropriated; and the said act is hereby revived, and shall be deemed to provide for the survey of the coasts of Florida in the same manner as if the same had been named therein.

[SEC. 2.] That the President of the United States be, and he is hereby, authorized, in and about the execution of the said act, to use all maps, charts, books, instruments, and apparatus, which now or hereafter may belong to the United States, and employ all persons in the land and naval service of the United States, and such astronomers and other persons as he shall deem proper.

Hassler was now again appointed Superintendent of the Coast Survey, and held his position until his death in 1843, the work for a short time, at first, being assigned to the Treasury Department, and in 1834 transferred to the Navy Department, and in 1836 again retransferred to the Treasury, where it has since remained, its status being finally definitely settled by act of Congress passed in 1843, shortly before the appointment of Alexander Dallas Bache, as the successor of the first Superintendent of the Survey.

At the time of Hassler's death the survey had been extended from New York, where it was begun, eastward to Point Judith, and southward to Cape Henlopen.

It should be mentioned that in 1825, during the period of the suspension of activity, Hassler presented to the American Philosophical Society a memoir on the subject of the survey, which contained a full account of the plan which he had adopted, a description of his instruments, and a history of what had been accomplished up to 1817. "This memoir," wrote Professor Henry in 1845, "was received with much favor by competent judges abroad, and the commendation bestowed upon it was of no little importance in the wakening of sentiments of national pride, which had considerable influence in assisting the passage of the act authorizing the renewal of the survey in 1832."

With the appointment of Bache as Superintendent in 1843, the Survey entered upon a new period of prosperity, the discussion of which is not within the province of this paper, and it seems appropriate to close this notice of the origin and early history of the organization by quoting from the first report of his successor an estimate of the value of Hassler's services.

The coast survey [wrote Bache] owes its present form, and perhaps its existence, to the zeal and scientific ability of the late superintendent, who devoted the energies of a life to it; and who, but for its interruption at a period when he was in the prime of manhood, and its suspension for nearly fifteen years, might have seen its completion. The difficult task of creating resources of practical science for carrying on such a work upon a suitable scale, required no common zeal and perseverence for its accomplishment, especially at a time (1807) when our country was far from having attained her present position in scientific acquirement, and when public opinion was hardly sufficiently enlightened to see the full advantages of thoroughness in executing the work. For his successful struggle against great difficulties, his adopted country will, no doubt, honor his memory as the pioneer of a useful national undertaking.[1]

The history of the Coast Survey under the successive superintendentships of Bache [1843–1867], Peirce [1867–1874], Patterson [1874–1881], and Hilgard [1881–1887], would make a volume in itself. Under its present Director, Professor Mendenhall, it is growing into renewed vigor and efficiency.

The Coast Survey was the last of the great scientific enterprises begun in Jefferson's Administration. If the Sage of Monticello were now living, what delight he would feel in the manifold scientific activities of the nation. The enlightened policy of our Government in regard to scientific and educational institutions is doubtless to a considerable degree due to his abiding influence.

Nowhere in all the long course of Mr. Jefferson's great career [writes Henry Adams] did he appear to better advantage than when in his message of 1806 he held out to the country and the world that view of his ultimate hopes and aspirations for natural development, which was, as he then trusted, to be his last bequest to mankind. Having now reached the moment when he must formally announce to Congress that the great end of relieving the nation from debt was at length within reach, and with it the duty of establishing true republican government was fulfilled, he paused to ask what use was to be made of the splendid future thus displayed before them. Should they do away with the taxes? Should they apply them to the building up of armies and navies? Both relief from taxation and the means of defence might be sufficiently obtained without exhausting their resources, and still the great interests of humanity might be secured. These great interests were economical and moral; to supply the one, a system of internal improvement should be created commensurate with the magnitude of the country; "by these operations new channels of communication will be opened between the States, the lines of

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[1] Report of Alexander Dallas Bache, Superintendent of the Coast Survey.

separation will disappear, their interests will be identified, and their union cemented by new and indissoluble ties." To provide for the other, the higher education should be placed among the objects of public care; "a public institution can alone supply those sciences which, though rarely called for, are yet necessary to complete the circle, all the parts of which contribute to the improvement of the country and some of them to its preservation." A national university and a national system of internal improvement were an essential part, and indeed the realization and fruit, of the republican theories which Mr. Jefferson and his associates put in practice as their ideal of government.[1]

Madison's Administration, which began in 1809, though friendly to science, was not characterized by any remarkable advances (except that the Coast Survey was actually organized for work under Hassler, after his return from Europe, in 1816). The war of 1812 and the unsettled state of public affairs were not propitious to the growth of learned institutions.

Monroe became Chief Magistrate in 1817. He, like Madison, was a friend and follower of Jefferson, and in the atmosphere of national prosperity scientific work began to prosper, and there was a great accession of popular interest, and State geological surveys began to come into existence. Schoolcraft and Long led Government expeditions into the West; the American Geological Society and the American Journal of Science were founded.

The city of Washington began to have intellectual interests, and public-spirited men organized the Columbian Institute and the Columbian University.

Monroe was not actually acquainted with science, but was in hearty sympathy with it. When he visited New York, in 1817, he visited the New York Institution, and was received as an honorary member of the Literary and Philosophical Society, and in his reply to the address of Governor Clinton, its president, he remarked that "the honor, glory, and prosperity of the country were intimately connected with its literature and science, and that the promotion of knowledge would always be an object of his attention and solicitude."

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[1]Adams's Life of Gallatin, pp. 349, 350. Henry Adams in this admirable biography has shown that Gallatin was one of Jefferson's strongest supporters in plans for the public enlightenment, and that he had an ambition of his own for the education of all citizens, without distinction of classes.

I had another favorite object in view [Gallatin writes], in which I have failed. My wish was to devote what may remain of life to the establishment, in this immense and fast-growing city [New York], of a general system of rational and practical education fitted for all and gratuitously opened to all. For it appeared to me impossible to preserve our democratic institutions and the right of universal suffrage unless we could raise the standard of *general* education and the mind of the laboring classes nearer to a level with those born under more favorable circumstances. I became accordingly the president of the council of a new university, originally established on the most liberal principles. But finding that the object was no longer the same, that a certain portion of the clergy had obtained the control, and that their object, though laudable, was special and quite distinct from mine, I resigned at the end of one year rather than to struggle, probably in vain, for what was nearly unattainable. Life of Gallatin, p. 648.

The most important new enterprise was in the direction of organizing a national meteorological service.

The first move was made by Josiah Meigs, who was in 1814 appointed Commissioner of the General Land Office. With the exception of Franklin,[1] he was perhaps the earliest scientific meteorologist in America, having, while living in the Bermudas from 1789 to 1794, made a series of observations which he communicated to the Royal Society.[2]

In 1817, or before he began to advocate Congressional action for the establishment of meteorological registers in connection with the Land Office, writing to Doctor Daniel Drake, in 1817, he said:

> If my plan be adopted, and the *Registers* be furnished with the requisite Instruments for *Temperature*, *Pressure*, *Rain*, *Wind*, etc., . . . we may in a course of years know more than we shall be able to know on any other plan (p. 82).
>
> Without some system of this kind, our Country may be occupied for ages, and We the people of the United States be as ignorant on this subject as the *Kickapoos* now are, who have occupied a part of it for ages past (p. 82).

In 1817 he also issued a circular to the registrars of the land offices of the several States calling upon them to take regularly certain observations and make monthly official reports upon all meteorological phenomena.

In 1819 a cooperative movement was begun under the direction of Doctor Joseph Lovell, Surgeon-General of the Army, in connection with the medical officers at the principal military posts, by whom reports were made at the end of each month upon the temperature, pressure, and moisture of the air, the amount of rain, the direction and force of the wind, the appearance of the sky, and other phenomena.

The Land Office circular was a remarkable one, and led to the extensive system of Patent Office observations, the results of which, published in connection with those of the War Department and the Smithsonian in 1859, formed the foundation of scientific meteorology in the United States.

In 1839 a most admirable paper by the French geologist, J. N. Nicollet, an Essay on Meteorological Observations, was published under the direction of the Bureau of Topographical Engineers. Some years later the lake system of meteorological observations was established by the Engineer Department, under the direction of Captain (afterwards General) George G. Meade. This included a line of stations extending from the western part of Lake Superior to the eastern part of Lake Ontario.

In 1835 a system of observations had been established under the direction of the board of regents of the University of the State of New York, the points of observation being at the academies of the State; and in 1837 the legislature of Pennsylvania made an appropriation of $4,000 for instru-

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[1] See Benjamin Franklin's Meteorological Imaginations and Conjectures, in the Memoirs of the Literary and Philosophical Society of Mansfield.

Communications made at Passy (France), in 1784, and reported in the Pennsylvania Packet (in Congressional Library) of July 18, 1786.

[2] Life of Josiah Meigs, p. 27.

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ments for use in meteorological observations, which were continued until about 1847. Those of New York were kept up until 1865 or later.

In the meantime the idea of the preannouncement of storms by telegraph was suggested in 1847 by W. C Redfield, the discoverer of the law of storms, while Lieutenant Maury, from 1851 onward, and especially at the International Meteorological Conference (held at his instance in Belgium in 1853), was promoting the establishment of a system of agricultural meteorology for farmers and of daily weather reports by telegraph.[1]

In February, 1855, Leverrier obtained the sanction of the Emperor of France for the creation of an extensive organization for the purpose of distributing weather intelligence, though it was not till 1860 that he felt justified in making his work international.[2] In 1861 and in 1862 a similar organization was begun in England, under Admiral Fitzroy, which was extended a little later to India.

In the meantime all the essential features for the prediction of meteorological phenomena were in existence in the Smithsonian Institution as early as 1856, having grown up as the result of an extensive series of tabulations of observations recorded by volunteer observers in all parts of the country.

The following historical notes on weather telegraphy, prepared by Professor Cleveland Abbe in 1871,[3] give a summary of the progress of this work:

However frequently the idea may have been suggested of utilizing our knowledge by the employment of the electric telegraph, it is to Professor Henry and his assistants in the Smithsonian Institution that the credit is due of having first actually realized this suggestion.

The practical utilization of the results of scientific study is well known to have been in general greatly furthered by the labors of this noble Institution, and from the very beginning Professor Henry has successfully advocated the feasibility of telegraphic storm warnings. The agitation of this subject in the United States during the years 1830–1855, may be safely presumed to have stimulated the subsequent action of the European meteorologists. It will be interesting to trace the gradual realization of the earlier suggestions of Redfield and Loomis, in the following extracts from the annual Smithsonian Reports of the respective years:

1847. The extended lines of telegraph will furnish a ready means of warning the more northern and eastern observers to be on the watch for the first appearance of an advancing storm.

1848. As a part of the system of meteorology, it is proposed to employ, as far as our funds will permit, the magnetic telegraph in the investigation of atmospherical phenomena. . . . The advantage to agriculture and commerce to be derived from a knowledge of the approach of a storm by means of the telegraph, has been frequently referred to of late in the public journals; and this we think is a subject deserving the attention of the Government.

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[1] Maury's Life, p. 77.

[2] Scott, Storm Warnings, London, 1883.

[3] American Journal of Science, July, 1871.

1849. Successful applications have been made to the presidents of a number of telegraph lines to allow us at a certain period of the day the use of the wires for the transmission of meteorological intelligence. . . . as soon as they [certain instructions, etc.] are completed, the transmission of observations will commence. [It was contemplated to constitute the telegraph operators the observers.]

1850. This map [an outline wall map] is intended to be used for presenting the successive phases of the sky over the whole country at different points of time, as far as reported.

1851. Since the date of the last report the system particularly intended to investigate the nature of American storms immediately under the care of the Institution, has been continued and improved.

The system of weather reports thus inaugurated continued in regular operation until 1861, when the disturbed condition of the country rendered impossible its further continuance. Meanwhile, however, the study of these daily morning reports had led to such a knowledge of the progress of our storms, that in the Report for 1857, Professor Henry writes:

1857. We are indebted to the National Telegraph Line for a series of observations from New Orleans to New York and as far westward as Cincinnati, which have been published in the Evening Star of this city.

We hope in the course of another year to make such an arrangement with the telegraph lines as to be able to give warnings on the eastern coast of the approach of storms, since the investigations which have been made at the Institution fully indicate the fact that as a general rule the storms of our latitude pursue a definite course.

It would seem, therefore, that nothing but the disturbances of the late war prevented our having had ten years ago a valuable system of practical storm warnings. Even before peace had been proclaimed, Professor Henry sought to revive the systematic daily weather reports, and in August, 1864, at the meeting of the North American Telegraph Association (see their published Report of Proceedings), a paper was presented by Professor Baird, on behalf of the Smithsonian Institution, requesting the privilege of the use of the telegraph lines, and more especially in order to enable Professor Henry "to resume and extend the Weather Bulletin, and to give warning of important atmospheric changes to our seaboard." In response to this communication it was resolved, "That this Association recommend . . . . to pass free of charge, . . . brief meteorological reports, . . . for the use and benefit of the Institution."

On the communication of this generous response, preparations were at once made for the laborious undertaking, and the inauguration of the enterprise was fixed for the year 1865. In January of that year, however, occurred the disastrous fire which so seriously embarrassed the labors of the Smithsonian Institution for several following years: it became necessary to indefinitely postpone this meteorological work, which indeed had through its whole history been carried on with most limited financial means, and was quite dependent upon the liberal cooperation of the different telegraph companies.

It will thus be seen that without material aid from the Government, but through the enlightened policy of the telegraph companies, and with the assistance of the munificent bequest of James Smithson, "for the increase and diffusion of knowledge," the Smithsonian Institution, first in the world, organized a comprehensive system of telegraphic meteorology, and has thus given first to Europe and Asia, and now to the United States, that most beneficent national application of modern science, the Storm Warnings.

In the report of the Smithsonian Institution for 1858 it is stated:

An object of much interest at the Smithsonian building is a daily exhibition on a large map of the condition of the weather over a considerable portion of the

United States. The reports are received about ten o'clock in the morning, and the changes on the maps are made by temporarily attaching to the several stations pieces of card of different colors to denote different conditions of the weather as to clearness, cloudiness, rain, or snow. This map is not only of interest to visitors in exhibiting the kind of weather which their friends at a distance are experiencing, but is also of importance in determining at a glance the probable changes which may soon be expected.[1]

In a still earlier report Professor Henry said:

We are indebted to the National Telegraph line for a series of observations from New Orleans to New York, and as far westward as Cincinnati, Ohio, which have been published in the "Evening Star," of this city. These reports have excited much interest, and could they be extended farther north, and more generally to the westward, they would furnish important information as to the approach of storms. We hope in the course of another year to make such an arrangement with the telegraph lines as to be able to give warning on the eastern coast of the approach of storms, since the investigations which have been made at the Institution fully indicate the fact that as a general rule the storms of our latitude pursue a definite course.[2]

In 1868, Cleveland Abbe, then director of the Cincinnati Observatory, revived the Smithsonian idea of meteorological forecasts, and suggested to the Cincinnati Chamber of Commerce that Cincinnati should be made the headquarters of meteorological observation for the United States, "for the purpose of collecting and comparing telegraphic weather reports from all parts of the land and making deductions therefrom." His proposals were favorably received, and he began, September 1, 1869, to issue the Weather Bulletin of the Cincinnati Observatory, which he continued until, in January, 1871, he was summoned to Washington to assist in organizing the national meteorological service, with which he has ever since been identified.

The Smithsonian meteorological system continued its functions until it was finally consigned to the custody of the Chief Signal Officer of the Army. Like all the efforts of this Institution, this work was in the direction of supplementing and harmonizing the work of all others, and attention was especially devoted to preparing and distributing blank forms in this direction, calculating and publishing extensive papers for systematizing observations, introducing standard instruments, collecting all public documents, printed matter, and manuscript records bearing on the meteorology of the American Continent, submitting these materials for scientific discussion, and publishing their results. The Smithsonian work was, during its whole existence, under the immediate personal direction of Professor Henry, assisted by Professor Arnold Guyot, who, in 1850, prepared and published an exhaustive series of directions for meteorological observations, intended for the first-class observers cooperating with the Smithsonian Institution.

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[1] Thirteenth Annual Report of the Secretary of the Smithsonian Institution, p. 32. (1858.)

[2] Twelfth Annual Report of the Secretary of the Smithsonian Institution, 1857, p. 26; also Twentieth Annual Report of the Secretary of the Smithsonian Institution, 1865, pp. 54-57.

The seeds planted by the army in 1819 began to bear perfect fruit fifty years later, when, by act of Congress, in 1870, the Secretary of War was authorized to carry into effect a scheme for "giving notice by telegraph and signals of the approach and force of storms," and the organization of a meteorological bureau adequate to the investigation of American storms, and their preannouncement along the Northern lakes and the seacoast was, under the auspices of the War Department, intrusted to the Chief Signal Officer of the Army, Brigadier-General Albert J. Myer, and a division, created in his office, was designated as the Division of telegrams and reports for the benefit of commerce.

By a subsequent act of Congress, approved June 10, 1872, the Signal Service was charged with the duty of providing such stations, signals, and reports as might be found necessary for extending its research in the interest of agriculture. In 1873, the work of the bureau of the division having been eminently successful, and its successes having been recognized abroad as well as in this country, Congress, by a further act, authorized the establishment of signal-service stations at the light-houses and life-saving stations on the lake seacoasts, and made provision for connecting them with telegraph lines or cables, "to be constructed, maintained, and worked under the direction of a chief signal officer of the Army, or the Secretary of War and the Secretary of the Treasury," and in this year also was begun the publication of a monthly Weather Review, summarizing in a popular way all its data showing the result of its investigations, as well as presenting these in graphic weather charts.

In 1874 the entire system of Smithsonian weather observation in all parts of the United States was transferred by Professor Henry to the Signal Service. A few months previously, at the proposal of the Chief Signal Officer, in the International Congress of Meteorologists convened at Vienna, the system of world-wide cooperative simultaneous weather observations, since then so extensively developed, was inaugurated, and began to contribute its data to the Signal Office records. It is unnecessary to trace further the history of the beginning of the meteorological work of the Signal Service, but I doubt not that everyone at all familiar with its subsequent history, under the leadership of Generals Hazen and Greely, will agree with the opinion of Judge Daly, the president of the American Geographical Society, when he said that "nothing in the nature of scientific investigation by the National Government has proved so acceptable to the people, or has been so productive in so short a time of such important results, as the establishment of the Signal Service Bureau."[1]

The sixth President, John Quincy Adams, a man of culture broad and deep, found the presidency of the American Academy of Arts and Sciences

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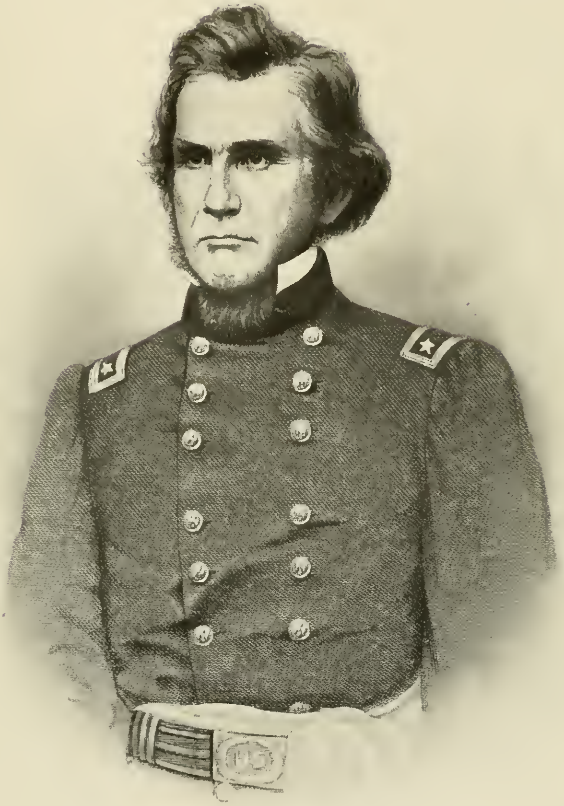
[1] 1883, History of the United States Signal Service, with catalogue of its exhibit as the International Fisheries Exhibition. London, 1883; Washington City, 1883; octavo, pp. 1–28.



O. M. Mitchel

so congenial to his tastes and sympathies that he did not hesitate to say that he prized it more highly than the chief magistracy of the nation. He considered his most important achievement to be the Report on Weights and Measures, prepared for Congress in 1818, and was justly proud of it, for it was a very admirable piece of scientific work, and is still considered the most important treatise on the subject ever written.

John Quincy Adams revived Washington's national university project, and made battle valiantly for an astronomical observatory.

In his first message to Congress afterwards, he said:

> Among the first, perhaps the very first, instrument for the improvement of the condition of men is knowledge, and to the acquisition of much of the knowledge adapted to the wants, the comforts, and enjoyments of human life public institutions and seminaries of learning are essential. So convinced of this was the first of my predecessors in this office, now first in the memory, as, living, he was first in the hearts, of our country, that once and again in his addresses to the Congresses with whom he cooperated in the public service he earnestly recommended the establishment of seminaries of learning, to prepare for all the emergencies of peace and war a national university and a military academy. With respect to the latter, had he lived to the present day, in turning his eyes to the institution at West Point he would have enjoyed the gratification of his most earnest wishes; but in surveying the city which has been honored with his name he would have seen the spot of earth which he had destined and bequeathed to the use and benefit of his country as the site for an university still bare and barren.[1]

And again:

> Connected with the establishment of an university, or separate from it, might be undertaken the erection of an astronomical observatory, with provision for the sup-

[1] John Quincy Adams, in his diary for November, 1825, describes an interview with his Cabinet, and the discussion which followed the reading of his message before it was finally revised for sending to Congress.

"Mr. Clay wished to have the recommendations of a National University . . . struck out . . . The University, Mr. Clay said, was entirely hopeless, and he thought there was something in the constitutional objection to it. . . . I concurred entirely in the opinion that no projects absolutely impracticable ought to be recommended; but I would look to a practicability of a longer range than a simple session of Congress. General Washington had recommended the Military Academy more than ten years before it was obtained. The plant may come late, though the seed should be sown early. And I had not recommended a University—I had referred to Washington's recommendations, and observed they had not been carried into effect."

Such opinions as these of Mr. Clay were evidently very much at variance with those of John Quincy Adams and of his illustrious father, whose action in the constitutional convention of Massachusetts has already been referred to, and at variance as well, it would seem, with the opinion of the early Republicans, as with those of the Federalists. The views of Washington and Madison, as well as those of Jefferson and Barlow, on these subjects have already been referred to.

Mr. Adams, in commenting upon an address delivered by Edward Everett before the Columbian Institute, January 16, 1830, remarks:

I regretted to hear . . . a seeming admission that the power of giving encouragement to literature and science was much greater at least in the State Governments than in that of the Union. Memoirs of John Quincy Adams VIII, p. 171.

port of an astronomer, to be in constant attendance of observation upon the phenomena of the heavens, and for the periodical publications of his observations. It is with no feeling of pride as an American that the remark may be made that on the comparatively small territorial surface of Europe there are existing upward of 130 of these light-houses of the skies, while throughout the whole American hemisphere there is not one. If we reflect a moment upon the discoveries which in the last four centuries have been made in the physical constitution of the universe by the means of these buildings and of observers stationed in them, shall we doubt of their usefulness to every nation? And while scarcely a year passes over our heads without bringing some new astronomical discovery to light, which we must fain receive at second hand from Europe, are we not cutting ourselves off from the means of returning light for light while we have neither observatory nor observer upon our half of the globe and the earth revolves in perpetual darkness to our unsearching eyes?

This appeal was received with shouts of ridicule; and the proposal "to establish a light-house in the skies" became a common byword which has scarcely yet ceased to be familiar. So strong was public feeling that, in the year 1832, in reviving an act for the continuance of the survey of the coast, Congress made a proviso, that "nothing in the act should be construed to authorize the construction or maintenance of a permanent astronomical observatory.[1]

Nothing daunted, Mr. Adams continued the struggle, and while a member of the House of Representatives, after his presidential term had expired, he battled for the observatory continually and furiously. An oration delivered by him in Cincinnati in 1843, closed with these words:

Is there one tower erected to enable the keen-eyed observer of the heavenly vault to watch from night to night through the circling year the movement of the starry heavens and their unnumbered worlds? Look around you; look from the St. John to the Sabine; look from the mouth of the Neversink to the mouth of the Columbia, and you will find not one! or if one, not of our creation.

A correspondent of the London Athenæum, writing from Boston in May, 1840, spoke at length of the dearth of observatories in the United States, and of the efforts of John Quincy Adams to form a national astronomical establishment in connection with the Smithson bequest. The letter is of great interest as showing the state of opinion on scientific matters in America just half a century ago.

BOSTON, *May, 1840*.

One of the prominent subjects of discussion among our *savans* . . . is the establishment of *Observatories* of a character suitable to our standing as a civilized nation, and still more to our exigencies as a practical, and especially as a commercial community. I verily believe that the yearly damage and destruction along our coast,

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[1] It is interesting to know that in 1827, Mr. James Courtenay, of Charleston, published a pamphlet, an urgent plea for the establishment of a naval observatory. I am indebted to Mr. William A. Courtenay for the opportunity to examine this rare tract, which has the following title:

1827. Courtenay, James. An | Inquiry | into | the Propriety | of | establishing | a | National Observatory. | = | By James Courtenay, | of Charleston, South Carolina | = | – | Charleston, Printed by W. Riley, 125 Church street | — | 1827. 8° pp. 1–24.

for want of the securities which such institutions would supply, out-balances, beyond comparison, all it would cost to establish and maintain them in every principal city of the land. It is partly a sort of electioneering economy which leaves things thus, and which has heretofore refused or neglected to fit out Exploring Expeditions; to accumulate national treasures of art and science, and facilities for their prosecution; and generally to pursue a system of "in-breeding and cherishing," as Milton has it, "in a great people, the seeds of virtue and public civility;"—excepting always what is done for the diffusion of elementary popular education. This education, to be sure, and this diffusion of it, we are taught to regard as necessaries in our moral and social being,—the "staff of public life" among us. And we are right. It is so. But there are many other things which we have *not* been taught to appreciate as they deserve, and the value of which we have gradually to grope our way to. Their day, however, will come; though it cannot be expected that either a government or a people, so youthful, so hurried, so fluctuating, can reach at once to the graces and the "fair humanities" of the old world. Remember that "The United States" are only some half-century old; and remember what we have been obliged to do and to suffer meanwhile, and under what circumstances. But, as I said before, the time is coming, if not come, when the heart of the nation shall acknowledge what is the high duty and destiny of a country like this; and *then*, I need not tell you, all is accomplished. Congress and the government must always represent the general, as well as the political character of the nation. It will be refined, scientific, public-spirited, or otherwise, as are the people. At this moment, as at all times, the representative and the represented, bear this relation to each other as intimately as might be expected from the nature of our institutions: and hence, from the signs which have appeared in the legislative bodies, I derive hope, and feel authorized to say what I have said of the advance, throughout our community, of what may be called the graceful and genial system of civilization, as distinguished from the practical and hard. This subject of observatories is quite in point. True, nothing has yet been done, but then a good deal has been said; and that is much: it is, in fact, *doing* much, in a case like this. It was something for Congress to bear being told what they had neglected, and patiently to discuss the subject.

The principal agent in bringing the subject forward has been Ex-President Adams, who, as you may be aware, is still an M. C., at the age of between seventy and eighty, and one of the halest and hardiest men in that body. His spirit is equal to his iron constitution. He spares himself no labour. So well is this understood, that it has been of late rather a practice to select the old gentleman for special burthens; and there are many matters of legislative action, which he really understands better, or knows better at least how to explore and determine, than any member of the House. Thus the Observatory business came upon him, at least indirectly; for, to some extent, he brought it on himself. You are, no doubt, familiar with the history of the great Smithsonian Bequest. When that business came before Congress, and especially as it was not a party one, all eyes were turned on Mr. Adams, and he was appointed Chairman of the Committee. In this capacity he has made sundry Reports: the last and ablest reviews the whole subject. In this he labours to show what general appropriation ought to be made of the fund—for that is not yet determined—and then to sustain a special recommendation, which is, to devote the income for about ten years to an *Observatory*, to be founded on national land, at Washington, "adapted to the most effective and continual observations of the phenomena of the heavens, and to be provided with the necessary, best, and most perfect instruments and books, for the periodical publication of the said observations, and for the annual composition and publication of a Nautical Almanack." The details of the plan may be omitted. Many, however, of the statistics connected with them, are new to us here, and of interest, including a Report on the British establishments, furnished on request by the Astronomer Airy. To a greater extent these may be familiar to English readers, but perhaps not wholly so. I hope they do not know, for example, how much we deserve, as compared with other nations, the caustic strictures and lectures of Mr. Adams, who really gives us no quarter, being resolved not to spoil the child by sparing the rod, but rather to provoke us to find a remedy for the evils he describes. You yourself adverted, not long since, to the state of things among us, but only in general terms. The facts are these:—They have a small Observatory in process of erection at Tuscaloosa, Alabama, for the use of the University in that place. Professor Hopkins, of Williams' College, Massachusetts, has a little establishment of the sort, and *this* is about all in that State,—all in New England! The only other establishment in the United States, known to me, is that in the Western Reserve College, Ohio, under the charge of Professor Loomis. Nothing of the kind at our national seat of government, or anywhere near it! Even Harvard University, "with all its antiquity, revenue, science, and renown," *has* thus far failed, though it appears that they are breaking ground at Cambridge; a house or houses having been purchased and fitted up, and one of our "savans" is already engaged in a series of magnetic and other observations. Now, how stands the case on your side the water? Why, in the British islands alone, there are observatories at the Universities of Cambridge and Oxford—at Edinburgh and Glasgow, in Scotland—and at Dublin and Armagh, in Ireland,—all receiving some patronage from the government—to say nothing of an observatory at the Cape of Good Hope; or of the establishments on the various remote and widely separated dependencies of the British Empire, including Van Diemen's Land, for the furnishing of which, we understand, arrangements have been made, in connexion with Captain Ross's expedition. In France, I believe, the provision is not less ample. On this part of the subject, Mr. Adams merely remarks, that the history of the Royal Observatory of that country would show the benefits conferred on mankind by the slightest notice bestowed by the rulers on the pursuit of knowledge: and that "the names of the four Cassinis would range in honourable distinction by the side of Flamsteed, Bradley, and Maskelyne."

Special reference is of course made to Greenwich, and Mr. Adams takes much pains to show how much that institution has done for science and for man. After recapitulating how by preserving observations we are indebted for a fixed standard for the measurement of *time*,—how, by the same science, man has acquired, so far as he possesses it, a standard for the measurement of *space*,—he observes, that the minutest of these observations contribute to the "increase and diffusion of knowledge" (the expressed object in Smithson's bequest). As to the more *brilliant*, we are reminded of an observation of Voltaire, that if the whole human race could be assembled from the creation of man to *his* time, in the gradation of genius, *Isaac Newton would stand at their head;* and the discoveries of Newton were the results of calculations, founded on the observations of others—of Copernicus, Tycho Brahe, Kepler, and Flamsteed. Greenwich has been considered rather an expensive establishment (among us), but Mr. Adams shows that, though costly, it has not been profitless.

Not to enter further into details of European countries, it appears that there are about one hundred and twenty *Observatories in continental Europe;* and that the most magnificent of them all has been lately founded by the Czar in the vicinity of his capital;—an enterprise sufficiently glorious, Mr. Adams observes, for the sovereign of such an empire; but the merit of which is vastly enhanced by the fact of its being undertaken and accomplished in such a latitude and climate:—"a region so near the pole, that it offers to the inspection of the human eye only a scanty portion of the northern hemisphere, with an atmosphere so chilled with cold and obscured with vapours, that it yields scarcely sixty days in the year when observation of the heavenly bodies is practicable." This last fact, it must be allowed, is rather an aggravation, or ought to be, to us republicans, *some* among whom affect to be special despisers of the bigoted Nicholas, and all his works. It seems, too, that *Mehemet Ali* has come forward as the patron of philosophical inquiry.

Sam L Mitchill

Thus matters stand at present, and Mr. Adams strongly urges prompt, practical action; and this scheme, with some modifications, and after our customary delays and discussions (in Congress) will be carried into execution, at least to a respectable extent. I am the more inclined to the opinion as it has been made clear in the progress of discussion that the establishments referred to *need* not be so enormously expensive as they generally are. In this matter we have been misled and discouraged by your own example, among others. We found that Cambridge Observatory cost £20,000, and that, among the instruments, the price of the mural circle alone was over £1,000, to say nothing of an equatorial telescope at £750, or a transit instrument at £600, and that as to Greenwich, the annual expenses, including salaries, repairs, and printing, exceeded £3,000. Now, this may be "sport for you," but it knocked our calculations on the head. Our ideas are not yet enlarged to that extreme point. To be sure, we can spend money for Florida wars; nay, for better things—for internal improvements—for bridges over the Ohio river (St. Louis), or for market-houses and meeting-houses of most liberal dimensions—for whatever, in a word, is practicable—as *we* understand it—and especially so much of it as private enterprise can execute without calling in government aid:—but ask for the adornments and muniments of art and science, in the ornamental or even in the scholar-like way, and it must be acknowledged the "sovereign people" move slow: they button their breeches' pockets and begin to "calculate." As to the Observatories, however, the case is better, for we find that much can be done at small expense. An establishment, of the merely *useful* kind, may be set up for a trifle. Not that Mr. Adams proposes to establish the National Observatory on such a scale. On the contrary, he thinks the Smithson Fund should be devoted to it for the present, and that not less than ten years of the income will be required. A more explicit estimate is also added, but it will be sufficient to observe that it comprises, besides a salary of $3,600 for the astronomer, funds for the compensation of four assistants, at $1,500 each, and two labourers, each at $600: for the purchase and procurement of instruments, $30,000; of which $20,000 might be applied for an assortment of the best instruments to be procured, and $10,000 for a fund, from the interest of which other instruments may be from time to time procured, and for repairs: for the library, $30,000; being $10,000 for first supply, and $20,000 for a fund for an income of $1,200 a year: and finally $30,000 for a fund, from the income of which, $1,800 a year, shall go to defray the expense of the yearly publication of the observations and of a Nautical Almanac.

It was the idea of Mr. Adams, in his later days, that the Smithson bequest, or at least its income for ten years, should be applied to the foundation of a national observatory and the publication of the Nautical Almanac, and he only abandoned it when an observatory had actually been established under the Navy Department in connection with the department of charts and instruments.

The establishment of an observatory had indeed been prominent in the minds of Washington and Jefferson, and was definitely proposed in Barlow's plan for a national institution, as well as in the project for a coast survey, submitted in 1837, in which it was proposed that there should be two observatories, formed at a fixed point, around which the survey, and particularly the nautical part of it, should be referred; their situation preferably to be in the State of Maine or lower Louisiana, since from them every celestial object observable, from the Tropics to the Arctic Circle and within about 20 degrees of longitude could be observed. Still, however, since various considerations might occasion the desire of placing one of these observatories in the city of Washington, just as observatories had been placed in the principal capitals of Europe, as a national object of scientific ornament, as well as a means for nourishing science in general, Hassler conceded that it might there be placed, since it would then be the proper place for the deposit of the standards of weights and measures, which also makes a special part the collection of instruments. James Monroe, when Secretary of State, in 1812, strongly urged upon Congress the establishment of an observatory, urging, first, the necessity of establishing a first meridian for the continent, and, in the second place, the fact that every enlightened nation had already established such an institution of learning. The immediate occasion for the intervention of the Secretary of State was the memorial of William Lambert, of Virginia, which was presented at various times from 1810 to 1821, and was accompanied by an elaborate report in 1822.

The action of Congress during the Adams Administration has been referred to. In 1830 Mr. Branch, of North Carolina, Secretary of the Navy under Jackson, strongly urged the establishment of an observatory for general astronomical purposes.

The beginning of the observatory seems to have been actually made on Capitol Hill during Mr. Adams's Administration, under instruction of Astronomers Lambert and Elliott, employed by Congress to determine the longitude of Washington. The President, in his diary of 1825, described a visit to Capitol Hill in company with Colonel Roberdeau, and spoke of witnessing an observation of the passage of the sun over the meridian, made with a small transit instrument. This instrument was very probably the one obtained by Hassler in Europe in 1815, which he never was permitted to use in connection with the Coast Survey work, and which passed into the hands of Lieutenant Wilkes in 1834, when it was placed in the small observatory, erected at his own expense, about a thousand feet north of the Dome of the Capitol.

It was at this establishment, which was known as the Naval Depot of Instruments, that the 5-foot transit was used, mainly for the purpose of reading the naval chronometer. When Wilkes went to sea with his expedition in 1837, Lieutenant James M. Gilliss became superintendent of the depot, and having obtained a 42-inch astronomical telescope, commenced a series of observations on the culmination of the moon and stars. In 1842 the establishment of a permanent depot of charts and instruments was authorized by Congress, and although the establishment of an observatory was not authorized in the bill, every effort was made by Lieutenant Gilliss and others interested in his work to secure suitable accommodations for astronomical work, and his plans having been approved by President Tyler, work was begun on the Naval Observatory, now known as the National Observatory.

There can be little doubt that the excellence of the work done by Gilliss himself, with his limited opportunrties, did much to hasten the establishment of the observatory, and there is in this connection a traditional history. Encke's comet appeared in 1842, and was promptly observed by him. He read a paper concerning it before the National Institute. Senator Preston, an enthusiastic member of that organization, was present at the meeting. When Gilliss, still a very young man, shortly afterwards made a visit to the Senate committee room, the Senator remarked to him: "If you are the one who gave us notice of the comet, I will do all I can to help you."

A week afterwards a bill passed the Senate and House without formal discussion. The appropriation was $25,000, and although it was expressly for the establishment of a depot of charts and instruments, the report of the committee which had secured it was so emphatically in favor of astronomical, meteorological, and magnetic work that the Secretary of the Navy felt justified in assuming that Congress had sanctioned the broadest project for an observatory. Gilliss was at once sent abroad to obtain instruments and plans, while Lieutenant Matthew F. Maury was placed in charge of the depot, and when the observatory was completed in 1844 became its superintendent.

Maury's attitude toward astronomical work has been severely criticised, and, I think, misunderstood. He was, first of all, an enthusiastic officer of the Navy; second, an astronomer, and he deemed it appropriate that the chief effort of the office should be directed toward work which had a direct professional bearing. Although not neglecting astronomy (for under his direction two volumes of astronomical observations were published), his own attention, and oftentimes that of almost the entire office was devoted to hydrographic subjects. The work which he had accomplished was of the greatest practical importance to navigation, and nothing of a scientific nature up to that time accomplished in America received such universal attention and praise from abroad.

His personal popularity and his influence were very great, and the necessity for the maintenance of a national observatory was not in his day fully appreciated by the public. It is not at all impossible that, indirectly, through his meteorological and hydrographic work, he may have done more for the ultimate and permanent welfare of the National Observatory than could have been possible through exclusive attention to work of a purely astronomical character.

In 1861 Gilliss again became the Superintendent, and under his direction the Observatory took rank among the first in the world.

Before leaving the subject of the Observatory, reference should be made to astronomical work almost national in character accomplished in colonial days at Philadelphia under the direction of the American Philosophical Society, by which a committee of thirteen was appointed to make observations upon the transit of Venus in 1769.

Three temporary observatories were built, one in Philadelphia, one at Norristown, and one at Cape Henlopen. Instruments were imported from England, one of them a reflecting telescope with a Dollond micrometer, purchased in London by Doctor Franklin with money voted by the assembly of Pennsylvania. The transit was successfully observed and an elaborate report was published.

This enterprise is worthy of mention because it was the first serious astronomical work ever undertaken in this country. Being under the auspices of the only scientific society then in existence, it was in some sense a national effort. Had not the Revolution taken place, it would undoubtedly have resulted in the establishment of a well-equipped observatory in this country under the auspices of the home government. Doctor Thomas Ewing, the provost of the University of Pennsylvania, who seems to have been the first to propose the observations of 1769, and under whose direction they were carried on, visited London a few years later, and while there made interest with Lord North, the prime minister, and with Mr. Maskelyne, the astronomer royal, for the establishment of an observatory in Philadelphia, and that his efforts gave great promise of success may be shown by the letter here presented, addressed to him by Mr. Maskelyne in 1775:

GREENWICH, *August 4, 1775.*

SIR: I received your late favor, together with your observations of the comet of 1770, and some [copies] of that of 1769, for which I thank you. I shall communicate [them] to the Royal Society, as you give me leave. In the present unhappy situation of American affairs, I have not the least idea that anything can be done toward erecting an observatory at Philadelphia, and therefore can not think it proper for me to take a part in any memorial you may think proper to lay before my Lord North at present. I do not mean, however, to discourage you from presenting a memorial from yourself. Were an observatory to be erected in that city, I do not know any person there more capable of taking care of it than yourself. Should Lord North do me the honor to ask my opinion about the utility of erecting an observatory at Philadelphia, I should then be enabled to speak out, being always a well-wisher to the promotion of science. You did not distinguish whether the times of your observations were apparent or mean time.

I am, your most humble servant,

N. MASKELYNE.

Rev. Dr. EWING,
No. 25 Ludgate street.

In this connection mention should be made of the extended astronomical work done from 1763 to 1767, by Charles Mason, an assistant of Maskelyne, and Jeremiah Dixon, while surveying the boundary line between Pennsylvania and Maryland, and especially of the successful measurement by them of a meridian of latitude. Mason was a man of high scientific standing, but, though he became a citizen of Philadelphia, where he died in 1787, little is known of him beyond the record of his scientific work. He had been one of the observers of a transit of Venus at the Cape of Good Hope in 1761, and it was no doubt he who inspired the American Philosophical Society to its effort in 1769.

Another event in the Adams Administration was the beginning of the National Botanic Garden. The foundation of such an institution was one of the earliest of the projects for the improvement of the capital. Washington decided that it should be closely connected with the

Samuel George Morton

National University, on the site now occupied by the National Observatory, and stipulated that, should this site not be found available, another spot of ground, appropriated on the early maps to a marine hospital, might be substituted. The Columbian Institute, already referred to, had begun the formation of an arboretum as early as 1822, and in 1829 applied unsuccessfully to Congress for an appropriation to reimburse it for its expenditures. There was, however, no definite foundation until 1852, when the numerous living plants which had been brought back by the Wilkes Exploring Expedition in the Pacific, and which had for several years been kept in greenhouses adjoining the Patent Office, in which the natural-history collections of the expedition were kept, were removed to the present site of the Botanical Garden on the south side of Pennsylvania avenue just west of the Capitol. This garden was first under the direction of Mr. W. D. Brackenridge, who had been the horticulturist of the Wilkes Expedition. Mr. Brackenridge was succeeded by Mr. William R. Smith, a pupil of the Kew Botanical Garden, who has since been in charge of the establishment, and through whose industry it has been developed into a most creditable institution, which, it is hoped, may in time have an opportunity to exhibit its merits in a more suitable and less crowded locality.

Under Jackson, from 1829 to 1837, notwithstanding the remarkable commercial prosperity and an almost equal advance in literature, science did not prosper, and of actual progress there is little to record. The Coast Survey was reorganized under its original Superintendent, Hassler, in 1832, and Featherstonehaugh, an English geologist, made, in 1834, a reconnoissance in the elevated region between the Missouri and the Red River.

Van Buren's Administration, which began in 1837 and ended in 1841, presents more points of interest, for although the country was in a state of financial depression, his Cabinet was composed of extremely liberal and public-spirited men. Poinsett as Secretary of War, Kennedy as Secretary of the Navy, and other public men did much to promote science.

The United States Exploring Expedition was sent out under Captain Charles Wilkes, on a voyage of circumnavigation. Although published in an extremely limited edition, the magnificent volumes of its report are among the classics of scientific exploration.

The Wilkes Expedition was the first of the series of naval explorations which have contributed largely to science—Lynch's Dead Sea Expedition, Gilliss's Naval Astronomical Expedition to Chile, Herndon and Gibbons's Exploration of the Valley of the Amazons, Page's Paraguay Expedition, the Cruise of the Dolphin, Perry's Japan Expedition, Rogers's North Pacific Exploring Expedition, and the various expeditions made under the Hydrographic Office and the Coast Survey.

In 1840 two important national societies were founded—the National Institution for the Promotion of Science, and the American Society of Geologists and Naturalists—the one an association with a great membership, scientific and otherwise, including a large number of Government officials; the other composed exclusively of professional naturalists.

The purpose of each was the advancement of the scientific interests of the nation, which seemed more likely to receive substantial aid now that the money bequeathed by Smithson was lying in the Treasury vaults, waiting to be used.

The National Institution under the leadership of Joel R. Poinsett, of South Carolina, then Secretary of War, assisted by General J. J. Abert, F. A. Markoe, and others, had a short but brilliant career, which endured until the close of the Tyler Administration, and had an important influence on public opinion, bringing about in the minds of the people and of Congress a disposition to make proper use of the Smithson bequest, and which also did much to prepare the way for the National Museum. The extensive collections of the National Institution, and those of the Wilkes Expedition and other Government surveys were in time merged with those of the Smithsonian Institution, and having been greatly increased at the close of the Centennial Exposition, began in 1879 to receive substantial support from Congress.

The Society of Geologists was not so prominent at the time, but it has had a longer history, for in 1850 it became the American Association for the Advancement of Science. Although it dated its origin from 1840, it was essentially a revival and continuation of the old American Geological Society, organized September 6, 1819, in the philosophical room of Yale College, and in its day a most important body. Its members, following European usage, appended to their names the symbols M. A. G. S., and among them were many distinguished men, for at that time almost every one who studied any other branch of science cultivated geology also.

The American Association prepared the way for the National Academy of Sciences, which was established by Congress in 1863, having for its first president Alexander Dallas Bache, who in his presidential address at the second meeting of the American Association, twelve years before, had pointed out the fact that "an institution of science supplementary to existing ones is much needed to guide public action in reference to scientific matters,"[1] and whose personal influence was very potent in bringing that institution into existence. In advocating before Congress the plan for the National Academy of Sciences, Senator Sumner avowedly followed the lead of Joel Barlow, the projector of the National Institution in 1806.[2]

[1] Proceedings of the American Association for the Advancement of Science, 1851, pp. 6, 48.

[2] The idea of an Academy of Sciences with unlocalized membership and, like the Royal Society and the French Academy, holding advisory relations with the General Government, appears to have been present in the minds of many of the early statesmen. Washington, in his project for a great national university, doubtless intended to include everything of this kind. Joel Barlow and Thomas Jefferson at the begin-

The system of national scientific organizations thus inaugurated is still expanding. Within the past few years there have sprung into existence a considerable number of learned societies devoted to special subjects, usually with unlocalized membership, and holding meetings from year to year in different cities. Among these are those named below:

The American Anatomical Society.
The American Dialect Society.
The American Folk-lore Society.
The American Geographical Society (of New York) and the National Geographic Society (of Washington).
The American Geological Society.
The American Historical Association.
The American Institute of Mining Engineers.
The American Meteorological Society.
The American Metrological Society.
The American Oriental Society.
The American Ornithologists' Union.
The American Philological Association.
The American Physiological Society.
The American Society of Naturalists.
The American Society for Psychical Research.
The Archæological Institute of America.
The Botanical Club of the American Association.
The Franklin Institute.

That the organization of such societies has been so long delayed was perhaps due to the fact that during the first six decades of the century the number of scientific investigators was comparatively small, and scientific work of original character was confined to a few of the large cities, so that local organizations, supplemented by the annual summer meetings of the American Association for the Advancement of Science, answered all needs. Since the close of the civil war, and of the period of ten years which elapsed before our country was restored to commercial prosperity, and indeed before it had begun to fully feel the effects of the great scientific renaissance which originated in 1859 with the publication of Darwin's Origin of Species, there has been a great increase in the number of persons whose time is chiefly devoted to original scientific work.

Nothing has contributed so materially to this state of affairs as the passage by Congress in 1862 of the bill, introduced by the Hon. Justin S. Morrill, of Vermont, to establish scientific and industrial educational institutions in every State, supplemented in 1887 by the Hatch bill for the founding of the agricultural experiment stations.[1] The movement was at first unpopular among American educators, but after a quarter of

ning of the century were engaged in correspondence "about learned societies, universities, and public instruction." John Adams in a letter to Cutler, dated Quincy, May 1, 1802, referred to a scheme for the establishment of a national academy of arts and sciences, in which Mitchill, of New York, was interested, and which was to come up for discussion at a meeting in that city in the following month. (Life of Manasseh Cutler, II, p. 87.)

[1] See Appendix D, and also A. C. True's A Brief Account of the Experiment Station Movement in the United States, United States Department of Agriculture, Experiment Station Bulletin No. 1, 1889, pp. 73–78.

a century of trial the land-grant college system has not only demonstrated its right to exist, but is by many regarded as forming one of the chief strongholds of our national scientific prosperity.[1]

One of the most important effects of the movement has been to stimulate the establishment of State scientific schools and universities, and every one of the forty-two Commonwealths has already a university or a college performing, or intended to perform, university functions.

It is worthy of remark that with six exceptions every State has in less than twenty years of its admission had a State college or university of its own. Only twelve have delayed more than ten years, and fifteen have come into the Union already equipped. Ten of these were colonies and original States. All but one of the remainder were those admitted in 1889, for each of our four new States was provided with the nucleus of a State university before it sought admission to the Union. Twenty-eight of the State and Territorial universities had their origin in land grants from the General Government other than those for agricultural and mechanical colleges.[2]

The completeness of the State system of scientific educational institutions is in marked contrast with that of the scientific societies in the same States, organized by the direct action of the people rather than by government.

Academies of science bearing the names of the States of our confederation and often sanctioned by their laws, may be regarded as in some sense national. Although nearly all of our States have historical societies, only twelve of the forty-two have academies of science, or organizations which are their equivalent. That there should be in 1889 thirty States without academies of science, and fourteen States and Territories in which

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[1] The following statements were made in a report of the committee of the House of Representatives, March 3, 1886:

The act appropriating script to the amount of 30,000 acres for eacn Senator and Representative in Congress for the endowment of colleges for the benefit of agriculture and the mechanic arts, which was passed in 1862, has been fruitful. Some of the States endowed single colleges while others divided the gift between two or three. There were 17,430,000 acres of script and land granted, and the fund arising from their sales is \$7,545,405. This has been increased by gifts from the States and from benevolent individuals of grounds, buildings, and apparatus to the amount of \$5,000,000 more. And the last reports show that these colleges employed more than 400 professors, and had under instruction more than 4,000 students. This donation of the public funds has been eminently profitable for the Government and the country. Many thousands of young men educated in science have already gone out from their colleges to engage in the practical duties of life, and the provision is made for sending out a continued succession of these for all future time. And as science is not limited by State boundaries, it makes but little difference for the common good which of these institutions or States these graduates come from; their attainments are for the common good.

[2] See Appendix E, and also F. W. Blackmar's History of Federal and State Aid to Higher Education, etc., Washington, 1890.

Albert J. Myer

there are no scientific societies of any description whatever, is a noteworthy fact.[1]

During Van Buren's Presidency, the Department of Agriculture had its formal beginning.

The chief promoter of this idea was Henry L. Ellsworth, of Connecticut, Commissioner of Patents, whose efforts culminated twenty-six years later in the establishment of a department, and, after another period of twenty-six years, in the elevation of the head of that Department to the dignity of a Cabinet officer. Ellsworth began work by distributing seeds and plants for experimental culture, acquiring these without expense, and sending them out under the franks of friendly Congressmen. After three years (in 1839) Congress recognized the value of the work in this direction by appropriating $1,000 from the Patent Office fund to enable him to collect and distribute seeds, to collect agricultural statistics, and to make agricultural investigations. Appointed by Jackson in 1836, Ellsworth served through the two successive terms of Van Buren and Tyler, and in his nine years of official work his devotion to the interests of agriculture produced excellent results, and placed the service on a firm foundation. Though Newton was in name the first Commissioner of Agriculture, Ellsworth deserves to be kept in memory as the real founder of the Department.

The appropriations at first were insignificant, and occasionally, as in 1841, 1842, and 1846, Congress seems to have forgotten to make any provision whatever for the work, which consequently went forward under difficulties. In 1853 the first appropriation directly for agriculture was made, in 1855 the whole amount up to that time withdrawn for this purpose from the Patent Office fund was reimbursed, and from that time on the money grants became yearly larger, and the work was allowed slowly to expand. The seed work increased, and in 1856 a propagating garden

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[1] The following is a list of those already in existence:

State academies of science, etc., 1890 —

California.—The California Academy of Sciences, San Francisco, 1854.

Columbia.—The Affiliated Scientific Societies of Washington City; the Philosophical Society, 1871; the Anthropological Society, 1879; the Biological Society, 1880; the Chemical Society, 1889; the National Geographic Society, 1888.

Connecticut. The Connecticut Academy of Arts and Sciences, 1799.

Indiana.—The Indiana Academy of Sciences, 1885.

Iowa.—The Iowa Academy of Sciences, Iowa City, 1875.

Kansas.—The Kansas Academy of Science, Topeka, 1868.

Maryland.—The Maryland Academy of Sciences, Baltimore, 1822.

Massachusetts.—The American Academy of Arts and Sciences, Boston, 1780.

Minnesota.—The Minnesota Academy of Natural Sciences, Minneapolis, 1873.

Missouri.—The St. Louis Academy of Science, St. Louis, 1857.

New York.—The New York Academy of Science, New York City, 1817.

Pennsylvania.—The American Philosophical Society, Philadelphia, 1743.

Wisconsin.—Wisconsin Academy of Arts, Science, and Letters, Madison, 1870.

was begun. The Agricultural Report, which began in 1841, and was until 1862 printed as a part of that of the Patent Office, became yearly more extensive, and showed a general average annual growth in value. In 1854 work in economic entomology began, with the appointment of Townend Glover to investigate and report upon the habits of insects injurious and beneficial to agriculture. In 1855 the chemical and botanical divisions were inaugurated.

David P. Holloway, of Indiana, the thirteenth Commissioner of Patents, was instrumental in effecting a most important reform in the scientific administration of the Government. In his first annual report, made in January, 1862, he advocated enthusiastically the creation of a department of the productive arts, to be charged with the care of agriculture and all the other industrial interests of the country, and he was so far successful that on May 15 Congress established the Department of Agriculture. The first Commissioner was Isaac Newton, who had been for a year or more superintendent of the agricultural division of the Patent Office. From 1862 to 1889 there were six Commissioners: Newton (1862–1867), Capron (1867–1871), Watts (1871–1877), Le Duc (1877–1881), Loring (1881–1885), and Colman (1885–1889), and under the administration of each important advances were made, and the value of the work became yearly greater. Buildings were erected, a chemical laboratory established, the departments of animal industry, economic ornithology and mammalogy, pomology, vegetable pathology, silk culture, microscopic, forestry, and experiment stations were added, and the system of publications greatly extended. The Department, as now organized, is one of the most vigorous of our national scientific institutions, and with its powerful staff and close affiliations with the forty-six State agricultural experiment stations, manned as they are by nearly four hundred trained investigators, it has possibilities for the future which can scarcely be overestimated.[1]

The term of the ninth President was too short to afford matter for

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[1] The first agricultural experiment station under that specific designation in the United States was established at Middletown, Connecticut, in 1875, by the joint action of Mr. Orange Judd, the trustees of the university at Middletown, and the State legislature, with Professor W. O. Atwater as director, and was located in the Orange Judd Hall of Natural Science. The example was speedily followed elsewhere, so that in 1880 there were four, and in 1886 some seventeen of these institutions in fourteen States. The appropriation by Congress of $15,000 per annum to each of the States and Territories which have established agricultural colleges, or agricultural departments of colleges, has led to the establishment of new stations or the increased development of stations previously established under State authority, so that there are to-day forty-six stations in the United States. Several of these have substations working under their management. Every State has at least one station, several have two. one has three, and Dakota has set the Territories an example by establishing one within her boundaries.

These forty-six stations employ nearly four hundred men in the prosecution of experimental inquiry. The appropriation by the United States Government for the current year, for them and for the Office of Experiment Stations in this Department, comment. It should be mentioned, however, that General Harrison published in Cincinnati, in 1838, A Discourse on the Aborigines of the Valley of the Ohio, and was the only President, except Jefferson and John Quincy Adams, who has ever produced a treatise upon a scientific theme.

In 1841 John Tyler, of Virginia, became President. His period of administration was a stormy one, and the atmosphere of Washington at that time was not favorable for scientific progress. During this Administration, however, important reforms took place in the organization of the Navy, which resulted in great benefit to science. These were largely the result of the interest of Hon. A. P. Upshur, Secretary of the Navy, at whose instance President Tyler abolished the existing Board of Naval Commissioners and vested the authority formerly exercised by them in separate bureaus. To many of the pressing necessities for reform of the service, Lieutenant Maury had called attention in his essays, published in the Southern Literary Messenger, under the title of Scraps from a Lucky Bag, and over the signature of Harry Bluff. As a result of this movement, experiments in applying steam to war vessels were actively prosecuted, and the first bill was passed for the establishment at Annapolis of the United States Naval Academy, finally accomplished in 1845, and a little later (in 1848) the position of the professors of mathematics in the Navy was dignified and improved, and their numbers limited, with manifest advantage to the scientific service of the Government.[1]

Indirectly, the reorganization of the Navy had a powerful influence in the development of the Coast Survey, which was reorganized in 1843–44, with Alexander Dallas Bache as its superintendent, for this new system afforded ample means to that organization for ascertaining the topography of this coast and making contributions to the science of ocean physics.

Another enterprise was the sending of the Frémont exploring expedition to California and Oregon. It is interesting to know that Captain Frémont was appointed the leader of this expedition against the indig-

is $600,000. The several States appropriate about $125,000 in addition, making the sum total of about $725,000 given from public funds the present year for the support of agricultural experiment stations in the United States.

Of all the scientific enterprises which the Government has undertaken, [wrote Secretary Colman,] scarcely any other has impressed its value upon the people and their representatives in the State and national legislatures so speedily and so strongly as this. The rapid growth of an enterprise for elevating agriculture by the aid of science, its espousal by the United States Government, its development to its present dimensions in the short period of fourteen years, and, finally, the favor with which it is received by the public at large, are a striking illustration of the appreciation on the part of the American people of the wisdom and the usefulness of calling the highest science to the aid of the arts and industries of life.

[1] The names of W. A. Chauvenet, J. H. C. Coffin, Mordecai Yarnall, Joseph Winlock, Simon Newcomb, Asaph Hall, William Harkness, and J. R. Eastman are a few of those to be found on this list of astronomers and mathematicians.

nant protests of the topographical engineers, who insisted that a graduate of West Point should be chosen.[1]

The final establishment of the Naval Observatory took place also at this time. The history of this enterprise from the scientific standpoint, has already been discussed, but it may be well to note that it derived its chief political support from Mr. Upshur, then Secretary of the Navy.[2]

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[1] The secret history of this appointment is told as follows by Doctor Silas Reed, of Boston, in Lyon G. Tyler's Letters and Times of the Tylers (II, p. 696):

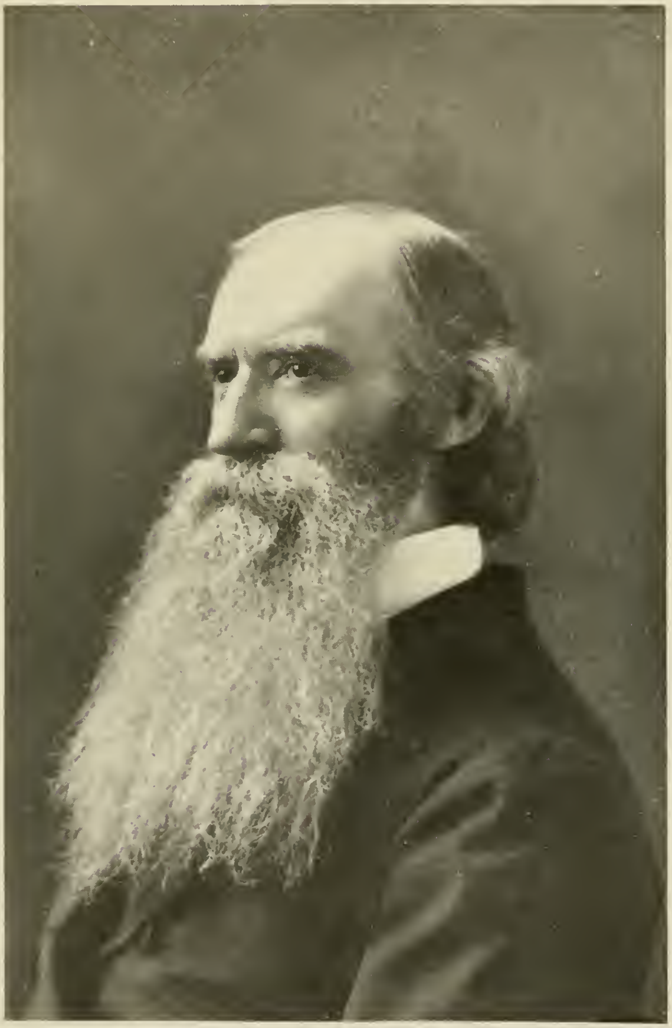
I called upon Mr. Tyler the next day, and found him about as well pleased over the result as I was, as it constituted a triumph that had never been achieved before (nor since), as shown by the annals of the Senate. While in this pleasant mood, the President asked me if I could not suggest some means by which he might soften the asperities of Senator Benton towards him and his administration. In an instant the thought flashed through my mind as to how he could best accomplish his wish. I said, "You have it in your power to touch his heart through his domestic affections. Six months ago his pride was humbled by the marriage of his highly educated daughter, Jessie, to a mere lieutenant of the United States engineer corps, and he refused them his house. I have just learned that lately he invited them to return to his home, and know they have done so. Now you have a chance to gladden the senator's pride, and by so doing serve both yourself and the country, by taking Lieutenant Frémont by the hand, and giving him a chance to rise in the world by appointing him to head an expedition to explore the Rocky Mountains and some part of the Pacific coast."

Mr. Tyler thought it might stir an excitement with the higher grade officers of the engineer corps (as it did), and that he might not be fully competent to execute the high duties entrusted to him. I replied that these objections need not prevent his appointment, for Lieutenant Frémont had spent the last two years aiding the eminent French scientist, Nicolet in taking the hydrography of the valley of the Mississippi, and must be familiar with all instruments and modes of using them in such an expedition. And even if he should not prove judicious in selecting scientific men suitable for that part of his corps, he would have the able assistance of Colonel Benton and his talented wife to fall back upon; and that Senator Benton, on the return of Mr. Frémont, would receive, examine, and present his report to the Senate, and take great pride in making an eloquent speech of it (as he did), and thus cause the American reader to examine and well consider its instructive contents—all of which events took place, and the report of his first, if not his second, expedition gained sufficient notoriety to insure its republication in Germany.

At the close of our interview, the President, in his most earnest manner, said: "I will at once appoint Lieutenant Frémont to the head of such an expedition, and start him off this spring, so that the country may know as soon as possible what to say and believe of that vast and unknown region, and I shall learn how much effort to expend in striving to acquire it by purchase from Mexico by the time that Texas can be annexed."

Frémont made ready to start from St. Louis with his expedition as soon as there was green grass to subsist his animals upon, with an outfit of fifty to sixty men, after leaving Independence, Missouri, he moved up the Platte river and its north branches to the old "South Pass," and thence to the head waters of Snake (or Lewis) river, and down it and the Columbia river to Astoria, thus avoiding Mexican Territory, but kept close along its northern border until after he entered Oregon Territory.

[2] Letters and Times of the Tylers, by Lyon Gardner Tyler, II, p. 387.



J. S. Newberry

To this period belongs also the promotion of experiments with the electric telegraph by our Government. The line from Washington to Baltimore was erected by means of an appropriation of $30,000, the passage of which was warmly urged by the President, who fifteen years later wrote the following letter, full of historical reminiscences:

SHERWOOD FOREST, *September 1, 1858.*

To his Honor the mayor, and to the Honorable the Common Council of the City of New York:

GENTLEMEN: In consequence of my absence from this place, I did not receive until to-day your polite invitation to be present at the festivities of to-day, and the municipal dinner to be given to Cyrus W. Field, Esq., and others at the Metropolitan Hotel to-morrow, in commemoration of the laying of the "Atlantic Cable." To be present, therefore, at the time appointed is a thing impossible. All that I can do is to express my cordial concurrence with you in according all praise to those through whose indomitable energy this great work has been accomplished.

When, in 1843, a modest and retired gentleman, the favored child of science, called upon me at the executive mansion, to obtain from me some assurance of my cooperation with him in procuring from Congress a small appropriation to enable him to test his great invention; and when at an after-day I had the satisfaction of placing my signature in approval of the act making an appropriation of $30,000 to enable him to connect Washington with Baltimore by his telegraph wire; and when at a still later day I had the pleasure, from the basement of the Capitol, to exchange greetings with the Chief-Justice of the United States, who was at the Baltimore end of the line, I confess that it had not entered my mind that not only was lightning to become the messenger of thought over continents of dry lands, but that the same all pervading agent was to descend into the depths of the ocean, far below the habitations of living things, and over those fathomless depths to convey, almost in the twinkling of an eye, tidings from nation to nation, and continent to continent. To the great inventor of this, the greatest invention, is due the laurel wreath that can never wither, and to those that have given it a habitation and a home in the waters of the great deep all praise is due.

With sentiments of high consideration, I have the honor to be, most respectfully and truly yours, etc.,

JOHN TYLER.

President Polk served from 1845 to 1849. During this period was organized the Smithsonian Institution, which, though it bears the name of a private citizen and a foreigner, has been for nearly half a century one of the principal rallying points of the scientific workers of America. It has also been intimately connected with very many of the most important scientific undertakings of the Government.

Many wise and enlightened scholars have given to the Smithsonian Institution the best years of their lives, and some of the most eminent scientific men of our country have passed their entire lifetime in work for its success. Its publications, six hundred and seventy in number, which when combined make up over one hundred dignified volumes, are to be found in every important library in the world, and some of them, it is safe to say, on the working table of every scientific investigator in the world who can read English.

Through these books, through the reputation of the men who have worked for it and through it, and through the good accomplished by its system of international exchange, by means of which within the past thirty-eight years 1,262,114 packages of books and other scientific and literary materials have been distributed to every region of the earth, it has acquired a reputation at least as far-reaching as that of any other institution of learning in the world.

No one has been able to show why Smithson selected the United States as the seat of his foundation. He had no acquaintances in America, nor does he appear to have had any books relating to America except two. Rhees quotes from one of these, Travels through North America, by Isaac Weld, secretary of the Royal Society, a paragraph concerning Washington, then a small town of five thousand inhabitants, in which it is predicted that "the Federal city, as soon as navigation is perfected, will increase most rapidly, and that at a future day, if the affairs of the United States go on as prosperously as they have done, it will become the grand emporium of the West, and rival in magnitude and splendor the cities of the old world."

Inspired by a belief in the future greatness of the new nation, realizing that while the needs of England were well met by existing organizations such as would not be likely to spring up for many years in a new, poor, and growing country, he founded in the new England an institution of learning, the civilizing power of which has been of incalculable value. Who can attempt to say what the condition of the United States would have been to-day without this bequest?

In the words of John Quincy Adams:

> Of all the foundations of establishments for pious or charitable uses which ever signalized the spirit of the age, or the comprehensive beneficence of the founder, none can be named more deserving the approbation of mankind.

The most important service by far which the Smithsonian Institution has rendered to the nation from year to year since 1846—intangible, but none the less appreciable—has been its constant cooperation with the Government, public institutions, and individuals in every enterprise, scientific or educational, which needed its advice, support, or aid from its resources.

There have been, however, material results of its activities, the extent of which can not fail to impress anyone who will look at them; the most important of these are the library and the museum, which have grown up under its fostering care.

The library has been accumulated without aid from the Treasury of the United States; it has, in fact, been the result of an extensive system of exchanges, the publications of the institution having been used to obtain similar publications from institutions of learning in all parts of the world.

In return for its own publications the Institution has received the great collection of books which form its library.

This library, consisting of more than a quarter of a million volumes and parts of volumes, has for over twenty years been deposited at the Capitol as a portion of the Congressional Library, and is constantly being increased. In the last fiscal year nineteen thousand titles were thus added to the national collection of books.

Chiefly through its exchange system the Smithsonian had, in 1865, accumulated about forty thousand volumes, largely publications of learned societies, containing the record of the actual progress of the world in all that pertains to the mental and physical development of the human family, and affording the means of tracing the history of at least every branch of positive science since the days of revival of letters until the present time.

The books, in many cases presents from old European libraries, and not to be obtained by purchase, formed even then one of the best collections of the kind in the world.

The danger incurred from the fire of that year, and the fact that the greater portion of these volumes, being unbound and crowded into insufficient space, could not be readily consulted, while the expense to be incurred for this binding, enlarged room, and other purposes connected with their use threatened to grow beyond the means of the Institution, appear to have been the moving causes which determined the regents to accept an arrangement by which Congress was to place the Smithsonian library with its own in the Capitol, subject to the right of the Regents to withdraw the books on paying the charges of binding, etc. Owing to the same causes (which have affected the Library of Congress itself) these principal conditions, except as regards their custody in a fireproof building, have never been fulfilled.

The books are still deposited chiefly in the Capitol, but though they have now increased from 40,000 to fully 250,000 volumes and parts of volumes, forming one of the most valuable collections of the kind in existence, they not only remain unbound, but in a far more crowded and inaccessible condition than they were before the transfer. It is hardly necessary to add that these facts are deplored by no one more than by the Librarian of Congress.

The purchasing power of the publications of the Institution, when offered in exchange, is far greater than that of money, and its benefit is exerted chiefly in behalf of the National Library, and also, to a considerable extent, in behalf of the National Museum.

The amount expended during the past forty years from the private fund of the Institution in the publication of books for gratuitous distribution has been $350,000, a sum nearly half as great as the original Smithson bequest.

These publications have had their influence for good in many ways, but, in addition to this, a library much more than equal in value to the outlay has, through their buying power, come into the possession of the nation.

In addition to all this, a large amount of material has been acquired for the Museum by direct expenditure from the private fund of the Smithsonian Institution. The value of the collections thus acquired is estimated to be more than equal to the whole amount of the Smithsonian bequest.

The early history of the Museum was much like that of the library. It was not until 1858 that it became the authorized depository of the scientific collections of the Government, and it was not until after 1876 that it was officially recognized as the National Museum of the United States.

But for the provident forethought of the organizers of the Smithsonian Institution the United States would probably still be without even a reputable nucleus for a national museum or a scientific library.

For nearly half a century the Institution has been the object of the watchful care of many of America's most enlightened public men. Vice-Presidents Fillmore and Dallas, and Roger B. Taney, Salmon P. Chase, Morrison R. Waite, and Melville W. Fuller, Chief Justices of the United States, have in succession occupied the Chancellor's chair. George Bancroft, John C. Breckinridge, Lewis Cass, Rufus Choate, Samuel S. Cox, Schuyler Colfax, Garrett Davis, Jefferson Davis, Stephen A. Douglas, William H. English, William P. Fessenden, James A. Garfield, Hannibal Hamlin, Henry W. Hilliard, George P. Marsh, James M. Mason, Justin S. Morrill, Robert Dale Owen, James A. Pearce, William C. Preston, Richard Rush, General W. T. Sherman, Lyman Trumbull, and William A. Wheeler have been at various times leaders in the deliberations of the Board of Regents.

The representatives of science on the Board, Professor Agassiz, Professor Bache, Professor Coppee, Professor Dana, General Delafield, Professor Felton, Professor Gray, Professor McLean, General Meigs, President Porter, General Totten, and Dr. Welling, have usually held office for long periods of years, and have given to its affairs the most careful attention and thought.

The relation of the Smithsonian Institution to the Government has been unique and unparalleled elsewhere. No one will question the assertion that the results of its work have been far wider than those which its annual reports have ever attempted to show forth.

During the administration of Van Buren and the succeeding ones, governmental science, stimulated by Bache, Henry, and Maury, scientific administrators of a new and more vigorous type than had been previously known in Washington, rapidly advanced, and prior to 1861 the institutions then existing had made material progress.

ELIPHALET NOTT.

Those of more recent growth, such as the Army Medical Museum, founded in 1862;[1] the Bureau of Education, founded in 1867;[2] the Fish Commission, founded in 1870;[3] the Bureau of Ethnology, founded in 1879,[4] although not less important than many of those already discussed, are so recent in origin that the events connected with their development have not passed into the domain of history.

The material results of the scientific work of the Government during the past ten years undoubtedly surpass in extent all that had been accomplished during the previous hundred years of the independent existence of the nation. With this recent period the present paper has no concern, for it has been written from the standpoint of Carlyle, who, in Sartor Resartus, states his belief that "in every phenomenon the beginning remains always the most notable moment."

It is nevertheless very encouraging to be assured that the attitude of our Government toward scientific and educational enterprises is every year becoming more and more in harmony with the hopes of the founders of our Republic, and in accord with the views of such men as Washington, Franklin, Jefferson, John Adams, Madison, Monroe, John Quincy Adams, Gallatin, and Rush.

It is also encouraging to know that the national attitude toward science is the subject of constant approving comment in Europe. Perhaps the most significant recent utterance was that of Sir Lyon Playfair in his address before the British Association for the Advancement of Science, at the Aberdeen meeting. He said:

> On September 14, 1859, I sat on this platform and listened to the eloquent address and wise counsel of the Prince Consort. At one time a member of his household, it was my privilege to cooperate with this illustrious prince in many questions relating to the advancement of science. I naturally, therefore, turned to his presidential address to see whether I might not now continue those counsels which he then gave with all the breadth and comprehensiveness of his masterly speeches. I found, as I expected, a text for my own discourse in some pregnant remarks which he made upon the relation of Science to the State. They are as follows: "We may be justified in hoping . . . that the Legislature and the State will more and more recognize the claims of science to their attention, so that it may no longer require the begging-box, but speak to the State like a favored child to its parent, sure of his paternal solicitude for its welfare; that the State will recognize in science one of its elements of strength and prosperity, to foster which the clearest dictates of self-interest demand."
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> This opinion, in its broadest sense, means that the relations of science to the State should be made more intimate because the advance of science is needful to the public weal.

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[1] See J. S. Billings, Medical Museums, with Special Reference to the Army Medical Museum at Washington. President's address, delivered before the Congress of American Physicians and Surgeons, September 20, 1888.

[2] See the eighteen annual reports of the Commissioner of Education.

[3] See G. Brown Goode, The Status of the United States Fish Commission in 1884, etc., Washington, 1884.

[4] See the six annual reports of the Bureau, and the Smithsonian reports, 1879–1888.

The importance of promoting science as a duty of statecraft was well enough known to the ancients, especially to the Greeks and Arabs, but it ceased to be recognised in the dark ages, and was lost to sight during the revival of letters in the fifteenth and sixteenth centuries. Germany and France, which are now in such active competition in promoting science, have only publicly acknowledged its national importance in recent times. Even in the last century, though France had its Lavoisier and Germany its Leibnitz, their Governments did not know the value of science. When the former was condemned to death in the Reign of Terror, a petition was presented to the rulers that his life might be spared for a few weeks in order that he might complete some important experiments, but the reply was, "The Republic has no need of savants." Earlier in the century the much-praised Frederick William of Prussia shouted with a loud voice, during a graduation ceremony in the University of Frankfort, "An ounce of mother-wit is worth a ton of university wisdom." Both France and Germany are now ashamed of these utterances of their rulers, and make energetic efforts to advance science with the aid of their national resources. More remarkable is it to see a young nation like the United States reserving large tracts of its national lands for the promotion of scientific education. In some respects this young country is in advance of all European nations in joining science to its administrative offices. Its scientific publications . . . . are an example to other Governments. The Minister of Agriculture is surrounded with a staff of botanists and chemists. The Home Secretary is aided by a special Scientific Commission to investigate the habits, migrations, and food of fishes, and the latter has at his disposal two specially-constructed steamers of large tonnage.

In the United Kingdom we are just beginning to understand the wisdom of Washington's farewell address to his countrymen, when he said: "Promote as an object of primary importance institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinion, it is essential that public opinion should be enlightened."

APPENDIX A.

PLAN OF A FEDERAL UNIVERSITY.

[From the Pennsylvania Gazette, 1788. Quoted in the Massachusetts Centinel, Saturday, November 29, 1788.]

"Your government cannot be executed. It is too extensive for a republick. It is contrary to the habits of the people," say the enemies of the Constitution of the United States. However opposite to the opinions and wishes of a majority of the citizens of the United States these declarations and predictions may be, they will certainly come to pass, unless the people are prepared for our new form of government, by an education adapted to the new and peculiar situation of our country.—To effect this great and necessary work, let one of the first acts of the new Congress be, to establish within the district to be allotted for them, a FEDERAL UNIVERSITY into which the youth of the United States shall be received after they have finished their studies, and taken degrees in the colleges of their respective States. In this University let those branches of literature only be taught, which are calculated to prepare our youth for civil and publick life. These branches should be taught by means of lectures, and the following arts and sciences should be the subject of them:

1. The principles and forms of government, applied in a particular manner to the explanation of every part of the constitution and laws of the United States, together with the laws of nature and nations, which last should include everything that relates to peace, war, treaties, ambassadors, and the like.

2. History, both ancient and modern, and chronology.

3. Agriculture in all its numerous and extensive branches.

4. The principles and practice of manufactures.

5. The history, principles, objects, and channels of commerce.

6. Those parts of mathematicks which are necessary to the division of property, to finance, and to the principles and practice of war—for there is too much reason to fear that war will continue, for some time to come, to be the unchristian mode of deciding disputes between christian nations.

7. Those parts of natural philosophy and chemistry, which admit of an application to agriculture, manufacture, commerce, and war.

8. Natural history, which includes the history of animals, vegetables, and fossils. To render instruction in these branches of science easy, it will be necessary to establish a museum, as also a garden, in which not only all the shrubs, etc., but all the forest trees of the United States should be cultivated. The great Linnæus, of Upsal enlarged the commerce of Sweden, by his discoveries in natural history. He once saved the Swedish navy by finding out the time in which a worm laid its eggs, and recommending the immersion of the timber, of which the ships were built, at that season wholly under water. So great were the services this illustrious naturalist rendered his country by the application of his knowledge to agriculture, manufactures, and commerce, that the present King of Sweden pronounced an eulogium upon him from his throne, soon after his death.

9. Philology, which should include, besides rhetorick and criticism, lectures upon the construction and pronunciation of the English language. Instruction in this branch of literature will become the more necessary in America, as our intercourse must soon cease with the bar, the stage, and the pulpits of Great Britain, from whence we receive our knowledge of the pronunciation of the English language. Even modern English books should cease to be the models of stile in the United States. The present is the age of simplicity in writing in America. The turgid stile of Johnson—the purple glare of Gibbon, and even the studied and thickset metaphours of Junius, are all equally unnatural, and should not be admitted into our country. The cultivation and perfection of our language becomes a matter of consequence when viewed in another light. It will probably be spoken by more people in the course of two or three centuries, than ever spoke any one language at one time since the creation of the world. When we consider the influence which the prevalence of only *two* languages, viz, the English and the Spanish, in the extensive regions of North and South America, will have upon manners, commerce, knowledge, and civilization, scenes of human happiness and glory open before us, which elude from their magnitude the utmost grasp of the human understanding.

10. The German and French languages should be taught in this University. The many excellent books which are written in both these languages upon all subjects, more especially upon those which relate to the advancement of national improvements of all kinds, will render a knowledge of them an essential part of the education of a legislator of the United States.

11. All those athletick and manly exercises should likewise be taught in the University, which are calculated to impart health, strength, and elegance to the human body.

To render the instruction of our youth as easy and extensive as possible in several of the above-mentioned branches of literature, let four young men of good education and active minds be sent abroad at the publick expense, to collect and transmit to the professors of the said branches all the improvements that are daily made in Europe, in agriculture, manufactures, and commerce, and in the arts of war and practical government. This measure is rendered the more necessary from the distance of the United States from Europe, by which means the rays of knowledge strike the United States so partially, that they can be brought to a useful focus, only by employing suitable persons to collect and transmit them to our country. It is in this manner that the northern nations of Europe have imported so much knowledge from their southern neighbors, that the history of the agriculture, manufactures, commerce, revenues, and military art of *one* of these nations will soon be alike applicable to all of them.

Besides sending four young men abroad to collect and transmit knowledge for the benefit of our country, *two* young men of suitable capacities should be employed at the publick expense in exploring the vegetable, mineral, and animal productions of our country, in procuring histories and samples of each of them, and in transmitting them to the professor of natural history. It is in consequence of the discoveries made by young gentlemen employed for these purposes, that Sweden, Denmark, and Russia have extended their manufactures and commerce, so as to rival in both the oldest nations in Europe.

Let the Congress allow a liberal salary to the Principal of this University. Let it be his business to govern the students, and to inspire them by his conversation, and by occasional publick discourses, with federal and patriotick sentiments. Let this Principal be a man of extensive education, liberal manners, and dignified deportment.

Let the Professors of each of the branches that have been mentioned, have a moderate salary of 150 or 200 pounds a year, and let them depend upon the number of their pupils to supply the deficiency of their maintenance from their salaries. Let each pupil pay for each course of lectures two or three guineas.

Let the degrees conferred in this University receive a new name, that shall designate the design of an education for civil and publick life. Should this plan of a federal University, or one like it be adopted, then will begin the golden age of the United States. While the business of education in Europe, consists in lectures upon the ruins of Palmyra and the antiquities of Herculaneum; or in dispute about Hebrew points, Greek particles, or the accent and quantity of the Roman language, the youth of America will be employed in acquiring those branches of knowledge which increase the convenience of life, lessen human misery, improve our country, promote population, exalt the human understanding, and establish domestick, social, and political happiness.

Let it not be said, "that this is not the *time* for such a literary and political establishment. Let us first restore publick credit, by funding or paying our debts—let us regulate our militia—let us build a navy—and let us protect and extend our commerce. After this, we shall have leisure and money to establish a University for the purposes that have been mentioned." This is false reasoning. We shall never restore publick credit—regulate our militia—build a navy—or revive our commerce, until we remove the ignorance and prejudices, and change the habits of our citizens, and this can never be done until we inspire them with federal principles, which can only be effected by our young men meeting and spending two or three years together in a national University, and afterwards disseminating their knowledge and principles through every county, town, and village of the United States. Until this is done—Senators and Representatives of the United States, you will undertake to make bricks without straw. Your supposed union in Congress will be a rope of sand. The inhabitants of Massachusetts began the business of government by establishing the University of Cambridge, and the wisest kings in Europe have always found their literary institutions the surest means of establishing their power, as well as of promoting the prosperity of their people.

These hints for establishing the Constitution and happiness of the United States upon a permanent foundation, are submitted to the friends of the federal government, in each of the States, by a private CITIZEN OF PENNSYLANIA.

THOMAS NUTTALL.

APPENDIX B.

ADDRESS TO THE PEOPLE OF THE UNITED STATES, BY BENJAMIN RUSH, M. D., 1787.

[Reprinted from Niles's Principles and Acts of the Revolution in America, pp. 234–236.]

There is nothing more common, than to confound the terms of *American Revolution* with those of *the late American war.* The American war is over: but this is far from being the case with the American revolution. On the contrary, nothing but the first act of the great drama is closed. It remains yet to establish and perfect our new forms of government; and to prepare the principles, morals, and manners of our citizens, for these forms of government, after they are established and brought to perfection.

The confederation, together with most of our state constitutions, were formed under very unfavorable circumstances. We had just emerged from a corrupted monarchy. Although we understood perfectly the principles of liberty, yet most of us were ignorant of the forms and combinations of power in republics. Add to this, the British army was in the heart of our country, spreading desolation wherever it went: our resentments, of course, were awakened. We deserted the British name, and unfortunately refused to copy some things in the administration of justice and power, in the British government, which have made it the admiration and envy of the world. In our opposition to monarchy, we forgot that the temple of tyranny has two doors. We bolted one of them by proper restraints; but we left the other open, by neglecting to guard against the effects of our own ignorance and licentiousness. Most of the present difficulties of this country arise from the weakness and other defects of our governments.

My business at present shall be only to suggest the defects of the confederation. These consist—1st. In the deficiency of coercive power. 2d. In a defect of exclusive power to issue paper money and regulate commerce. 3d. In vesting the sovereign power of the United States in a single legislature: and, 4th. In the too frequent rotation of its members.

A convention is to sit soon for the purpose of devising means of obviating part of the two first defects that have been mentioned. But I wish they may add to their recommendations to each state, to surrender up to congress their power of emitting money. In this way, a uniform currency will be produced, that will facilitate trade, and help to bind the states together. Nor will the states be deprived of large sums of money by this means, when sudden emergencies require it; for they may always borrow them, as they did during the war, out of the treasury of congress. Even a loan office may be better instituted in this way, in each state than in any other.

The two last defects that have been mentioned, are not of less magnitude than the first. Indeed, the single legislature of congress will become more dangerous, from an increase of power, than ever. To remedy this, let the supreme federal power be divided, like the legislatures of most of our states, into two distinct, independent branches. Let one of them be styled the council of the states and the other the assembly of the states. Let the first consist of a single delegate—and the second, of two, three, or four delegates, chosen annually by each state. Let the president be chosen annually by the joint ballot of both houses; and let him possess certain powers, in conjunction with a privy council, especially the power of appointing most of the officers of the United States. The officers will not only be better, when appointed this way, but one of the principal causes of faction will be thereby removed from congress. I apprehend this division of the power of congress will become more necessary, as soon as they are invested with more ample powers of levying and expending public money.

The custom of turning men out of power or office, as soon as they are qualified for it, has been found to be absurd in practice. Is it virtuous to dismiss a general—a physician—or even a domestic, as soon as they have acquired knowledge sufficient to be useful to us, for the sake of increasing the number of able generals, skillful physicians—and faithful servants? We do not. Government is a science, and can never be perfect in America, until we encourage men to devote not only three years, but their whole lives to it. I believe the principal reason why so many men of abilities object to serving in congress, is owing to their not thinking it worth while to spend three years in acquiring a profession, which their country immediately afterwards forbids them to follow.

There are two errors or prejudices on the subject of government in America, which lead to the most dangerous consequences.

It is often said, "that the sovereign and all other power is seated *in* the people." This idea is unhappily expressed. It should be—"all power is derived *from* the people," they possess it only on the days of their elections. After this, it is the property of their rulers; nor can they exercise or resume it, unless it be abused. It is of importance to circulate this idea, as it leads to order and good government.

The people of America have mistaken the meaning of the word sovereignty: hence each state pretends to be *sovereign*. In Europe, it is applied only to those states which possess the power of making war and peace—of forming treaties, and the like. As this power belongs only to congress, they are the only *sovereign* power in the United States.

We commit a similar mistake in our ideas of the word independent. No individual state, as such, has any claim to independence. She is independent only in a union with her sister states in congress.

To conform the principles, morals, and manners of our citizens, to our republican forms of government, it is absolutely necessary, that knowledge of every kind should be disseminated through every part of the United States.

For this purpose, let congress, instead of laying out a half million of dollars, in building a federal town, appropriate only a fourth of that sum, in founding a federal university. In this university let everything connected with government, such as history—the law of nature and nations—the civil war—the municipal laws of our country—and the principles of commerce—be taught by competent professors. Let masters be employed, likewise, to teach gunnery—fortification—and everything connected with defensive and offensive war. Above all, let a professor of, what is called in the European universities, economy, be established in this federal seminary. His business should be to unfold the principles and practice of agriculture and manufactures of all kind, and to enable him to make his lectures more extensively useful, congress should support a traveling correspondent for him, who should visit all the nations of Europe, and transmit to him, from time to time, all the discoveries and improvements that are made in agriculture and manufactures. To this seminary, young men should be encouraged to repair, after completing their academical studies in the colleges of their respective states. The honors and offices of the United States should, after a while, be confined to persons who had imbibed federal and republican ideas in this university.

For the purpose of diffusing knowledge, as well as extending the living principle of government to every part of the United States—every state—city—county—village—and township in the union should be tied together by means of the post-office. This is the true nonelectric wire of government. It is the only means of conveying heat and light to every individual in the federal commonwealth. "Sweden lost her liberties," says the abbe Raynal, "because her citizens were so scattered, that they had no means of acting in concert with each other." It should be a constant injunction to the postmasters, to convey newspapers free of all charge for postage. They are not only the vehicles of knowledge and intelligence, but the sentinels of the liberties of our country.

The conduct of some of those strangers, who have visited our country, since the peace, and who fill the British papers with accounts of our distresses, shows as great a want of good sense, as it does of good nature. They see nothing but the foundations and walls of the temple of liberty; and yet they undertake to judge of the whole fabric.

Our own citizens act a still more absurd part, when they cry out, after the experience of three or four years, that we are not proper materials for republican government. Remember, we assumed these forms of government in a hurry, before we were prepared for them. Let every man exert himself in promoting virtue and knowledge in our country, and we shall soon become good republicans. Look at the steps by which governments have been changed, or rendered stable in Europe. Read the history of Great Britain. Her boasted government has risen out of wars and rebellions that lasted above six hundred years. The United States are traveling peaceably into order and good government. They know no strife—but what arises from the collision of opinions; and, in three years, they have advanced further in the road to stability and happiness, than most of the nations of Europe have done, in as many centuries.

There is but one path that can lead the United States to destruction; and that is their extent of territory. It was probable to effect this, that Great Britain ceded to us so much waste land. But even this path may be avoided. Let but one new state be exposed to sale at a time; and let the land office be shut up, till every part of this new state be settled.

I am extremely sorry to find a passion for retirement so universal among the patriots and heroes of the war. They resemble skillful mariners who, after exerting themselves to preserve a ship from sinking in a storm, in the middle of the ocean, drop asleep as soon as the waves subside, and leave the care of their lives and property, during the remainder of the voyage, to sailors without knowledge or experience. Every man in a republic is public property. His time and talents—his youth—his manhood—his old age—nay more, his life, his all, belong to his country.

Patriots of 1774, 1775, 1776—heroes of 1778, 1779, 1780! come forward! your country demands your services!—Philosophers and friends of mankind, come forward! your country demands your studies and speculations! Lovers of peace and order, who declined taking part in the late war, come forward! your country forgives your timidity and demands your influence and advice! Hear her proclaiming, in sighs and groans, in her governments, in her finances, in her trade, in her manufactures, in her morals, and in her manners, "THE REVOLUTION IS NOT OVER!"

APPENDIX C.

PROSPECTUS OF A NATIONAL INSTITUTION TO BE ESTABLISHED IN THE UNITED STATES.

By JOEL BARLOW, 1806.

[Reprinted from a defective copy of Barlow's pamphlet in the Congressional Library, supplemented by the reprint in the National Intelligencer of 1806, and a manuscript copy in the possession of Doctor J. C. Welling.]

The project for erecting a university at the seat of the federal government is brought forward at a happy moment, and on liberal principles. We may therefore reasonably hope for an extensive endowment from the munificence of individuals, as well as from government itself. This expectation will naturally lead us to enlarge our ideas on the subject, and to give a greater scope to its practical operation than has usually been contemplated in institutions of a similar nature.

Two distinct objects, which, in other countries have been kept asunder, may and ought to be united; they are both of great national importance; and by being embraced in the same Institution they will aid each other in their acquisition. These are the advancement of knowledge by associations of scientific men, and the dissemination of its rudiments by the instruction of youth. The first has been the business of learned corporations, such as the Royal Society of London and the National Institute of France; the second is pursued by collections of instructors, under the name of universities, colleges, academies, etc.

The leading principle of uniting these two branches of improvement in one Institution, to be extended upon a scale that will render it truly national, requires some development. We find ourselves in possession of a country so vast as to lead the mind to anticipate a scene of social intercourse and interest unexampled in the experience of mankind. This territory presents and will present such a variety of productions, natural and artificial, such a diversity of connections abroad, and of manners, habits, and propensities at home, as will create a strong tendency to diverge and separate the views of those who shall inhabit the different regions within our limits.

It is most essential to the happiness of the people and to the preservation of their republican principles, that this tendency to a separation should be overbalanced by superior motives to a harmony of sentiment; that they may habitually feel that community of interest on which their federal system is founded. This desirable object is to be attained, not only by the operations of the government in its several departments, but by those of literature, sciences, and arts. The liberal sciences are in their nature republican; they delight in reciprocal communication; they cherish fraternal feelings, and lead to a freedom of intercourse, combined with the restraints of society, which contribute together to our improvement.

To explore the natural productions of our country, give an enlightened direction to the labors of industry, explain the advantages of interior tranquillity, of moderation and justice in the pursuits of self-interest, and to promote, as far as circumstances will admit, an assimilation of civil regulations, political principles, and modes of education, must engage the solicitude of every patriotic citizen; as he must perceive in them the necessary means of securing good morals and every republican virtue; a wholesome jealousy of right and a clear understanding of duty; without which, no people can be expected to enjoy the one or perform the other for any number of years.

The time is fast approaching when the United States, if no foreign disputes should induce an extraordinary expenditure of money, will be out of debt. From that time forward, the greater part of their public revenue may, and probably will, be applied to public improvements of various kinds; such as facilitating the intercourse through all parts of their dominion by roads, bridges, and canals; such as making more exact surveys, and forming maps and charts of the interior country, and of the coasts, bays, and harbors, perfecting the system of lights, buoys, and other nautical aids; such as encouraging new branches of industry, so far as may be advantageous to the public, either by offering premiums for discoveries, or by purchasing from their proprietors such inventions as shall appear to be of immediate and general utility, and rendering them free to the citizens at large; such as exploring the remaining parts of the wilderness of our continent, both within and without our own jurisdiction, and extending to their savage inhabitants, as far as may be practicable, a taste for civilization, and the means of knowing the comforts that men are capable of yielding to each other in the peaceable pursuits of industry, as they are understood in our stage of society.

To prepare the way for the government to act on these great objects with intelligence, economy, and effect, and to aid its operations when it shall be ready to apply its funds to that purpose, will occupy in part the attention of that branch of the Institution composed of men of scientific research; whose labors, it is expected, will

Denison Olmsted

be in a great measure gratuitous. It cannot be too early, even at this moment, to direct the researches of science to occupations of this nature. By these means, at the end of the eleven years, the epoch at which the government may expect to be free of debt, the way can be prepared to begin with system, and proceed with regularity in the various details of public improvement; a business which, if the rulers of all nations did but know it, ought to be considered among the first of their duties, one of the principal objects of their appointment.

The science of political economy is still in its infancy; as indeed is the whole science of government, if we regard it as founded on principles analogous to the nature of man, and designed to promote his happiness. As we believe our government to be founded on these principles, we cannot but perceive an immense field of improvement opening before us; a field in which all the physical as well as the moral sciences should lend their aid and unite their operation, to place human society on such a footing in this great section of the habitable world, as to secure it against further convulsions from violence and war. Mankind have a right to expect this example from us; we alone are in a situation to hold it up before them, to command their esteem, and perhaps their imitation. Should we, by a narrowness of views, neglect the opportunity of realising so many benefits, we ought to reflect that it never can occur to us again; nor can we foresee that it will return to any age or nation. We should grievously disappoint the expectations of all good men in other countries, we should ourselves regret our error while we live; and if posterity did not load us with the reproaches we should merit, it would be because our conduct will have kept them ignorant of the possibility of obtaining the blessings of which it had deprived them.

It would be superfluous, in this Prospectus, to point out the objects merely scientific, that will naturally engage the attention of this branch of the Institution. We are sensible that many of the sciences, physical as well as moral, are very little advanced; some of them, in which we seem to have made considerable progress, are yet so uncertain as to leave it doubtful whether even their first principles do not remain to be discovered; and in all of them, there is a great deficiency as to the mode of familiarizing their results, and applying them to the useful arts of life, the true object of all labor and research.

What a range is open in this country for mineralogy and botany! How many new arts are to arise, and how far the old ones are to be advanced, by the pursuit of these two sciencies, it is impossible even to imagine. Chemistry is making a rapid and useful progress, though we still dispute about its elements. Our knowledge of anatomy has laid a necessary and sure foundation for surgery and medicine; surgery indeed is making great proficiency; but, after three thousand years of recorded experience, how little do we know of medicine! Mechanics and hydraulics are progressing fast, and wonderful are the facilities and comforts we draw from them; but while it continues to be necessary to make use of animal force to move heavy bodies in any direction by land or water, we have a right to anticipate new discoveries. Could the genius of a Bacon place itself on the high ground of all the sciences in their present state of advancement, and marshal them before him in so great a country as this, and under a government like ours, he would point out their objects, foretell their successes, and move them on their march, in a manner that should animate their votaries and greatly accelerate their progress.

The mathematics, considered as a science, may probably be susceptible of higher powers than it has yet attained; considered as the handmaid of all the sciences and all the arts, it doubtless remains to be simplified. Some new processes, and perhaps new modes of expressing quantities and numbers, may yet be discovered, to assist the mind in climbing the difficult steps that lead to an elevation so much above our crude conceptions; an elevation that subjects the material universe, with all its abstractions of space and time, to our inspection; and opens, for their combinations, so many useful and satisfying truths.

Researches in literature, to which may be united those in morals, government, and laws, are so vague in their nature, and have been so little methodised, as scarcely to have obtained the name of sciences. No man has denied the importance of these pursuits; though the English nation, from whom we have borrowed so many useful things, has not thought proper to give them that consistency and standing among the objects of laudable ambition, to which they are entitled. Men the most eminent in these studies have not been members of their learned associations. Locke, Berkely, Pope, Hume, Robertson, Gibbon, Adam Smith, and Blackstone, were never admitted into the Royal Society. This is doubtless owing to the nature of their government; though the government itself exerts no influence in these elections. The science of morals connects itself so intimately with the principles of political institutions, that where it is deemed expedient to keep the latter out of sight, it is not strange that the former should meet no encouragement.

This policy is strikingly exemplified in the history of the French Institute. That learned and respectable body was incorporated by the national convention in the year 1795, and took place of all the old academies, which had been previously abolished. It was composed of three classes, according to the objects to be pursued by its members. The first was the class for the physical sciences, the second was the class for the moral and political sciences, the third was for the fine arts. Thus it went on and made great progress in its several branches, till the year 1803, when Bonaparte's government assumed that character which rendered the pursuit of moral and political science inconvenient to him. He then new modeled the Institute, and abolished that class. But lest his real object should be perceived, and he be accused of narrowing the compass of research, he created two new classes in the room of this; one for ancient literature, and one for the French language. On the same occasion an order was issued to all the colleges and great schools in France, suppressing the professorships of moral and political philosophy.

But in our country, and at this early epoch in the course of republican experiment, no subjects of research can be more important than those embraced by these branches of science. Our representative system is new in practice, though some theories of that sort have been framed by speculative writers; and partial trials have been made in the British dominions. But our federal system, combined with democratical representation is a magnificent stranger upon earth; a new world of experiment, bursting with incalculable omens on the view of mankind. It was the result of circumstances which no man could foresee, and no writer pretended to contemplate. It represented itself to us from the necessity of the situation we were in; dreaded at first as an evil by many good men in our country, as well as by our friends in Europe; and it is at this day far from being understood, or properly appreciated, by the generality of those who admire it. Our practice upon it, as far as we have gone, and the vast regions of our continent that present themselves to its embrace, must convince the world that it is the greatest improvement in the mechanism of government that has ever been discovered, the most consoling to the friends of liberty, humanity, and peace.

Men who have grown old in the intrigues of cabinets, and those who, in the frenzy of youthful ambition, present themselves on the theatre of politics, at the head of armies, which they cannot live without, are telling us that "no new principle of government has been discovered for these two thousand years;"[1] and that all proposals to ameliorate the system are vain abstractions, unworthy of sound philosophy. They may tell us too that no new principle in mechanics had been discovered since we came to the knowledge of the lever; no new principle in war, since we first found that a man would cease to fight the moment he was killed. Yet we see in the

[1] This is asserted in a book written to support the present government in France. I forget the title

two latter cases that new combinations of principle have been discovered; they are daily now discovered and carried into practice. In these there are no books written to inform us we can go no further; no imperial decrees to arrest our progress. Why, then, should this be the case in those combinations of the moral sense of man, which compose the science of government?

But whether we consider the principles themselves as new, or the combinations only as new, the fact with respect to our government is this: although the principle has long since been known that the powers necessarily exercised in the people at large, and that these powers cannot conveniently be exercised by the people at large, yet it was not discovered how these powers could be conveniently exercised by a few delegates, in such a manner as to be constantly kept within the reach of the people at large, so as to be controlled by them without a convulsion. But a mode of doing this has been discovered in latter years, and is now for the first time carried into practice in our country; I do not say in the utmost perfection of which the principle is capable; yet in a manner which greatly contributes, with our other advantages, to render us the happiest people on earth. Again, although the principle has long since been known, that good laws faithfully executed within a state, would protect the industry of men, and preserve interior tranquillity; yet no method was discovered which would effectually preserve exterior tranquillity between state and state. Treaties were made, oaths were exacted, the name of God was invoked, forts, garrisons, and armies were established on their respective frontiers; all with the sincere desire, no doubt, of preserving peace. The whole of these precautions have been constantly found ineffectual. But we at last, and almost by accident, have discovered a mode of preserving peace among states without any of the old precautions; which were always found extremely expensive, destructive to liberty, and incapable of securing the object. We have found that states have some interests that are common and mutual among themselves; that, so far as these interests go, the states should not be independent; that, without losing anything of their dignity, but rather increasing it, they can bind themselves together by a federal government, composed of their own delegates, frequently and freely elected, to whom they can confide these common interests; and that by giving up to these delegates the exercise of certain acts of sovereignty, and retaining the rest to themselves, each state puts it out of its own power to withdraw from the confederation, and out of the power of the general government to deprive them of the rights they have retained.

If these are not new principles of government, they are at least new combinations of principles, which require to be developed, studied, and understood better than they have been, even by ourselves; but especially by the rising generation, and by all foreign observers who shall study our institutions. Foreigners will thus give us credit for what we have done, point out to our attention what we have omitted to do, and perhaps aid us with their lights, in bringing towards perfection a system, which may be destined to ameliorate the condition of the human race.

It is in this view that moral and political research ought to be regarded as one of the most important objects of the National Institution, the highest theme of literary emulation, whether in prose or verse, the constant stimulus to excite the ambition of youth in the course of education.

What are called the fine arts, in distinction from what are called the useful, have been but little cultivated in America. Indeed, few of them have yet arrived, in modern times, to that degree of splendor which they had acquired among the ancients. Here we must examine an opinion, entertained by some persons, that the encouragement of the fine arts savors too much of luxury, and is unfavorable to republican principles. It is true, as is alleged, they have usually flourished most under despotic governments; but so have corn and cattle. Republican principles have never been organised or understood, so as to form a government, in any country but our own. It is therefore from theory, rather than example, that we must reason on this subject. There is no doubt but that the fine arts, both in those who cultivate and those who only admire them, open and expand the mind to great ideas. They inspire liberal feelings, create a harmony of temper, favorable to a sense of justice and a habit of moderation in our social intercourse. By increasing the circle of our pleasures, they moderate the intensity with which pleasures, not dependent on them, would be pursued. In proportion as they multiply our wants, they stimulate our industry, they diversify the objects of our ambition, they furnish new motives for a constant activity of mind and body, highly favorable to the health of both. The encouragement of a taste for elegant luxuries discourages the relish for luxuries that are gross and sensual, debilitating to the body, and demoralising to the mind. These last, it must be acknowledged, are prevailing in our country; they are perhaps the natural growth of domestic affluence and civil liberty. The government, however mild and paternal, cannot check them by any direct application of its powers, without improper encroachments on the liberty and affluence, that give them birth. But a taste for the elegant enjoyments which spring from the culture of the fine arts, excites passions not so irresistible, but that they are easily kept within the limits, which the means of each individual will prescribe. It is the friend of morals and of health; it supposes a certain degree of information; it necessitates liberal instruction; it cannot but be favorable to republican manners, principles, and discipline.

A taste for these arts is peculiarly desirable in those parts of our country, at the southward and westward, where the earth yields her rich productions with little labor, and leaves to the cultivator considerable vacancies of time and superfluities of wealth, which otherwise will, in all probability, be worse employed. The arts of drawing, painting, statuary, engraving, music, poetry, ornamental architecture, and ornamental gardening, would employ a portion of the surplus time and money of our citizens; and at the same time be more likely to dispose their minds to devote another portion to charitable and patriotic purposes, than if the first portion had not been thus employed.

In England there is a Royal Academy for the fine arts, as well as a Royal Society for the sciences; though men of merit in other learned labors are not associated. In France the two classes of eminent men who pursue the sciences and the arts, are united in the National Institute. Besides those, and besides the colleges and universities, there exists in each of those countries a variety of institutions useful in their different objects, and highly conducive to the general mass of public improvement, as well as to private instruction.

The French Government supports,

1. *The School of Mines*, an extensive establishment; where is preserved a collection of specimens from all the mines, wrought and unwrought, that are known to exist in that country; where, with the free use of a laboratory, lectures are given gratis one day in the week for nine months in the year, and where young men receive what is called a mineralogical education. At this place the proprietor of a mine, whether of metals, coals, or other valuable fossils, may have them examined without expense; and here he can apply for an able and scientific artist, recommended by the professors, to be the conductor of his works, as well in the engineering as the metallurgical branch.

2. *The School of Roads and Bridges;* whose title ought to extend likewise to canals, river navigation, and hydraulic architecture; since it embraces all these objects. Here are preserved models and drawings of all the great works, and many of the abortive attempts, in these branches of business. It is a curious and useful collection. This establishment, too, maintains its professors, who give lectures gratis, and produce among their pupils the ablest draftsmen and civil engineers, ready to be employed where the public service or private enterprise may require.

JOHN GRUBB PARKE.

3. *The Conservatory of Arts;* meaning the useful arts and trades. This, in appearance, is a vast Babel of materials; consisting of tools, models, and entire machines, ancient and modern, good and bad. For it is often useful to preserve for inspection a bad machine. The professor explains the reason why it did not answer the purpose; and this either prevents another person from spending his time and money in pursuit of the same impracticable scheme, or it may lead his mind to some ingenious invention to remedy the defect and make it a useful object. Here is a professor for explaining the use of the machines, and for aiding the minister in discharging the duties of the patent office. Here likewise several trades are carried on, and persons are taught gratis the use of the tools by practice as well as by lectures.

4. *The Museum of Natural History.* This consists of a botanical garden, an extensive menagery, or collection of wild animals, and large cabinets of minerals. To this institution are attached several professorships; and lectures are given on every branch of natural history.

5. *The Museum of Arts;* meaning the fine arts. This is the school for painting, statuary, music, etc. The great splendor of this establishment consists chiefly in its vast gallery of pictures, and its awful synod of statues. These are as far beyond description as they are above comparison. Since, to the collections of the kings of France, the government has added so many of the best productions of Italy, Flanders, and Holland, there is no other assemblage of the works of art where students can be so well accommodated with variety and excellence, to excite their emulation and form their taste.

6. *The National Library.* This collection is likewise unparalleled both for the number and variety of works it contains; having about five hundred thousand volumes, in print and manuscript; besides all of value that is extant in maps, charts, engravings; and a museum of coins, medals, and inscriptions, ancient and modern.

8. *The Mint;* which is a scientific, as well as a laboratorial establishment; where lectures are given in mineralogy, metallurgy, and chemistry.

9. *The Military School*, where field engineering, fortification, gunnery, attack and defence of places, and the branches of mathematics, necessary to these sciences, are taught by experienced masters.

10. *The Prytaneum;* which is an excellent school of general science, more especially military and nautical; but it is exclusively devoted to what are called *enfans de la patrie*, children of the country, or boys adopted by the government, and educated at the public expense. They are generally those whose fathers have died in the public service. But this distinction is often conferred on others, through particular favor. The school is supplied with able instructors; and the pupils are very numerous. They are taught to consider themselves entirely devoted to the service of their country, as is indicated both by their own appellation and that of their seminary.

11. *The College of France* retains all its ancient advantages, and has been improved by the revolution.

12. *The School of Medicine*, united with anatomy and surgery, is in able hands, and well conducted.

13. *The Veterinary School;* where practical and scientific lessons are given on the constitution and diseases of animals.

14. *The Observatory* is an appellation still retained by an eminent school of astronomy; though its importance has grown far beyond what is indicated by its name. It publishes the annual work called *la connaissance des tems;* a work not only of national, but of universal utility for navigators and astronomers.

15. Another institution, whose functions have outgrown its name, is the *Bureau of Longitude*. It not only offers premiums for discoveries, tending to the great object of finding an easy method of ascertaining the longitude at sea, and judges of

their merit; but it is the encourager and depositary of all nautical and geographical discoveries; and, in conjunction with the school of astronomy and that of natural history, it directs and superintends such voyages of discovery as the government chooses to undertake.

16. The last public establishment for liberal instruction, that I shall mention in the capital, though not the only remaining one that might be named, is the *Polytechnic School.* This, for the variety of sciences taught, the degree of previous attainment necessary for admission, the eminent talents of the professors, and the high state of erudition to which the pupils are carried, is doubtless the first institution in the world.

The Prytaneum, the Polytechnic School, the Museum of Arts, the Conservatory of Arts, and the Veterinary School, are new institutions, established during the revolution. The others existed before; but most of them have been much improved. There were likewise erected during the same period, a great number of provincial colleges. The general provision was to have one in each county, or department, of which there are upwards of a hundred in France. The provision likewise extended to what are called primary schools, to be erected and multiplied in every town and village. This is also executed in part, but not completely.

On the whole, the business of education in France is on a much better footing at present than it ever was before the revolution. The clamor that was raised by the emigrants against the convention, reproaching them with having destroyed education, were unfounded; and, we may almost say, the reverse of truth. Their plans on this subject were great, and in general good; much good, indeed, has grown out of them; though they have not been pursued by the government during its subsequent changes, in the manner contemplated by the projectors.

Besides the public foundations, established and partly supported by the government, there is a variety of private associations for collecting and diffusing information; such as agricultural societies, a society for the encouragement of arts and manufactures; and another which, though neither scientific nor literary, is a great encourager of literature. It is a charitable fund for giving relief to indigent authors, and to their widows and orphans.

The Lyceum of Arts, as a private society, merits a distinguished place in this hasty review of the liberal establishments in Paris. This foundation belongs to a number of proprietors, who draw no other advantage from it than the right of attending the lectures, and of using the laboratory, reading rooms, library, and philosophical apparatus. It employs able professors in all the sciences, in technology, in literature, and in several modern languages. It admits annual subscribers, who enjoy these advantages during the year; and it is particularly useful to strangers and to young men from the provinces, who might otherwise employ their leisure hours in less profitable amusements.

If, in speaking of the state of public instruction in England, we are less particular than in those of her neighbors, it will not be for want of respect for her institutions; but because most of them are better known in this country, and some of them similar to those we have described. Her universities and colleges, her numerous agricultural societies, her society of arts and manufactures, her royal society, royal academy, royal observatory, British museum, marine and military academies, her society for exploring the interior of Africa, her missionary society, and her board of longitude, are probably familiar to most of the readers of this Prospectus. We shall particularise only two or three others; which, being of recent date, are probably less known.

The Literary Fund, for the relief of indigent authors and their families, is an institution of extensive and increasing beneficence. It is not merely a charitable, but a patriotic endowment; and its influence must extend to other nations, and to posterity. For an author of merit belongs to the world at large; his genius is not the property of one age or nation, but the general heritage of all. When a fund like this is administered by men of discernment and fidelity, worthy of their trust, as the one in question certainly is, lending its aid to all proper objects, without regard to party or system, whether in politics, science, or religion, it gives independence to literary pursuits. Men who are fostered by it, or feel a confidence that they may, in case of need, partake of its munificence, become bold in the development of useful truths; they are not discouraged by the dread of opposing the opinions of vulgar minds, whether among members of the government, or powerful individuals.

This generous and energetic establishment owes it foundation to David Williams; whose luminous writings, as well as other labors, in favor of liberty and morals, are well known in this country. It was a new attempt to utilize the gifts of fortune, and the efforts of timid merit. It was not till after many years of exertion by its patriotic founder, that the institution assumed a vigorous existence, became rich by the donations of the opulent, and popular from the patronage of the first names in the kingdom. It was from this fund that the one of a similar nature in Paris was copied; but the latter is hitherto far inferior to the former, both in its endowments and its activity.

On the other hand, the *Royal Institution* and the *London Institution* have been copied from the Lyceum in Paris. But in these instances the copies have already equaled, if not surpassed, the original.

We have traced this rapid sketch of what is doing for the advancement of liberal knowledge and public improvements in other countries, for the sake of grouping the whole in one general view; that we may compare their establishments with our situation, our wants, our means, and our prospects; reject what is unsuitable to us, adopt such as would be useful, and organize them as shall be advantageous in our National Institution.

It is proposed, as already observed, that this Institution should combine the two great objects, *research* and *instruction*. It is expected from every member that he will employ his talents gratuitously in contributing to the *first* of these objects. The *second* will be the special occupation of a branch of the Institution, to be styled the Professorate. And, as it is expected from the members of this branch, that they devote their time as well as talents to the labor of instruction, they will receive a suitable compensation, to be fixed by the board of trustees.

The members of the National Institution shall be elected from citizens of the United States, eminent in any of the liberal sciences, whether physical, moral, political, or economical; in literature, arts, agriculture; in mechanical, nautical, or geographical discoveries. The number of members shall at no time exceed the decuple of the number of states, composing the confederation of the United States. But in addition to these, it may elect honorary members abroad, not exceeding in number one-half of that of its members. And it may likewise elect corresponding members within the United States, or elsewhere, not exceeding the last-mentioned proportion.

The members of the Institution may divide themselves into several sections, for their more convenient deliberations on the objects of their several pursuits, not exceeding five sections. Each section shall keep a register of its proceedings. It shall be the duty of each section to nominate candidates for members of the Institution, suitable for such section. Which nomination, if there be vacancies, shall entitle such candidates to be balloted for at the general meetings.

There shall be a Chancellor of the National Institution; whose duty it shall be to superintend its general concerns. He shall, in the first instance, be appointed by the President of the United States; and hold his office during the pleasure of the Institution. He shall preside in its general meetings; direct the order of its deliberations, and sign the diplomas of its members. He shall be president of the board of trustees; and, in consequence of their appropriations, order the payment of monies, and otherwise carry into execution their ordinances and resolutions. He shall be director of the Professorate; order the courses of lectures and other modes of instruction and objects of study; confer degrees in the central university; appoint examiners, either at the district colleges or at the central university, for the admission of students into the latter; fill vacancies in the Professorate, until the next meeting of the board of trustees; and he shall have power to suspend from office a professor, until the time of such meeting. He shall instruct and direct in their mission, such traveling professors as the board of trustees shall employ, for the objects of science, in our own country or abroad.

The board of trustees shall consist of fifteen members; they shall be first appointed by the President of the United States, and hold their office during the pleasure of the Institution. They shall give bonds with surety for the faithful execution of their trust. They and the chancellor are, of course, members of the Institution. As soon as convenient after their appointment, they are to assemble at the seat of government, elect by ballot fifteen additional members of the Institution, appoint three professors, and transact such other business as they may think proper. But no more than the second fifteen members of the Institution shall be elected, until the last Wednesday in November next. On which day a general meeting of the Institution shall be held at the seat of government; and the members then present may proceed to elect fifteen additional members. Two months after which, another election of fifteen members may take place; but no more until the November then next. Thus they may proceed to hold two elections in each year, of fifteen members each, if they think proper, till the whole number allowed by law shall be elected. The Institution will fill its own vacancies, and those in the board of trustees, appoint its treasurer and secretaries and, on all occasions after the first, elect the chancellor.

The chancellor and board of trustees shall have the sole management of the funds of the Institution, whether in lands or movables; they shall organize the Professorate, appoint the professors and other masters and teachers; assign them their compensations, and remove them at pleasure. They shall establish a central university at or near the seat of government, and such other universities, colleges, and schools of education, as the funds of the Institution will enable them to do, whether in the city of Washington, or in other parts of the United States; and make the necessary regulations for the government and discipline of the same. They may likewise establish printing presses for the use of the Institution, laboratories, libraries, and apparatus for the sciences and the arts; and gardens for botany and agricultural experiments.

Thus organized, and with proper endowments, the National Institution will be able to expand itself to a large breadth of public utility. It will, by its correspondence, its various establishments, its premiums, its gratuities, and other encouragements, excite a scrupulous attention to the duties of education in every part of the United States. By printing school books in the vast quantities that are wanted, and selling them at prime cost, it will furnish them at one-third of the price usually demanded; and by an able selection or composition of such as are best adapted to the purpose, it will give a uniformity to the moral sentiment, a republican energy to the character, a liberal cast to the mind and manners of the rising and following generations. None will deny that these things are peculiarly essential to the people of this country; for the preservation of their republican principles, and especially of their federal system.

Add to this the advantages that the government will draw, in its projected plans of public improvement, from this facility of concentrating the rays of science upon the most useful objects; from directing the researches of so many of the ablest men in the country to the best modes of increasing its productions and its happiness; from having a greater choice of young and well-taught engineers, civil and military; as well as mechanicians, architects, geologists; and men versed in the mathematical sciences and political economy.

C W Peale

Attached to the university in Washington, and under the direction of the Institution, might be the best position for the military academy, now at West Point; as likewise for the naval academy and for the mint of the United States. The patent office is now an embarrassing appendage to the department of state. It might occupy very usefully one of the professors of this university. The machines and models belonging to it would be useful ornaments in a lecture room, where mechanics, hydraulics, and other branches of natural philosophy are taught. Such professor might be the proper person to examine the applications for patents, and report upon their merits; the chancellor might grant the patents. It might likewise be advantageous, that the trustees, when the state of their funds will permit, should purchase from their proprietors such inventions as, in their opinion, might be of immediate and general use; and perhaps the chancellor might be authorized to refuse patents for impracticable things, and expose to public view such imposters as sometimes apply for them, with the intention of imposing upon the credulous, by selling their fallacious privileges either in whole or in part.

The geographical and mineralogical archives of the nation might be better placed in this university than elsewhere. Being confided to professors, they might draw advantages from them in the course of their instructions. Thus the Institution might become a general depositary of the results of scientific research; of experiments in art, manufactures, and husbandry; and of discoveries by voyages and travels. In short, no rudiment of knowledge should be below its attention, no height of improvement above its ambition, no corner of our empire beyond its vigilant activity for collecting and diffusing information.

It is hoped that the legislature, as well as our opulent citizens, will assist in making a liberal endowment for so great an object; and as soon as circumstances will admit; as too much time has already been lost since the government has taken its definitive stand, in so advantageous a position for the development of this part of our national resources.

Appendix.

Such is the outline of a system of Public Instruction, that would seem to promise the greatest benefits. And, although under present circumstances, it is doubtless too extensive to be carried into immediate practice in all its parts; yet there are strong reasons to wish that its general basis may be preserved entire, in the law for incorporating the Institution; and that such law may be enacted during the present session of Congress. Believing that no possible disadvantage could arise from adopting both of these propositions, we will endeavor to elucidate the advantages by a few additional observations.

1. As we must solicit donations from individual citizens, and depend principally on them for its endowment, we ought to have a basis on which they can repose their confidence. This can only be done by a board of trustees, standing on the ground of a corporation; whose object is clearly defined; and which is composed of men of known character and responsibility, anxious themselves to promote the object, and pledged in honor and reputation for its ultimate success.

2. The present appears to be a more favorable moment for an establishment of this kind, and especially for obtaining donations, than can be expected to arrive hereafter. A general opinion now prevails, that education has been too much and too long neglected in most parts of our country; and this opinion is happily accompanied by a liberal spirit on the subject; a spirit worthy of the age and country in which we live, and of the government that conducts our affairs. It is a patriotic spirit, that only requires to be directed; but if not directed, may soon be lost. The opinions and dispositions of men are changeable. The race of patriarchs who framed our political systems, and are peculiarly solicitous to ensure their permanent support, are passing off the stage of public life. Children are growing up, to take the legacy we are

bequeathing them, insensible of its value, and ignorant of the means by which it can be preserved. It will seem as if we had labored in vain, if we leave our work but half accomplished. And surely the task of preserving liberty, if not as bold, is at least as difficult, as that of acquiring it.

To acquire liberty, comparatively speaking, is the work of few; to preserve it is the sober and watchful business of all. In the first operation, a group of well-informed, enthusiastic, and patriotic leaders, step forward to the field of danger, impress their own energy on the multitude of followers; who cannot go wrong, because the object is palpable, and clearly understood; but in the second, the impetuosity of enthusiasm is no longer the weapon to be used; the mass of the people are masters; they must be instructed in their work; and they may justly say, that when their leaders taught them how to gain their liberty, they contracted the obligation to teach them how to use it.

3. The Institution, though established on the broad foundation we here propose, will begin upon a small scale; no larger than its means will render convenient. And the magnitude of the perspective will not discourage its infant exertions, but rather increase them. Its expenditures will not be greater at the beginning than they would be if it were always to be confined to the narrow compass in which it will move at first. It will immediately open a few schools at Washington, where they are much wanted. It may soon begin to receive donations for this and other objects; and by its correspondence, it will be learning the wants of the different districts of the United States, and directing its enquiries how to supply them.

4. It is believed that several men of science, without any compensation, but the pleasure of being useful, may be engaged to give courses of lectures during the next winter, on some of the higher branches of knowledge; such as chemistry, mathematics, natural and moral philosophy, political economy, medicine, and jurisprudence: that it may no longer be said of the capital of the United States, that it offers no attractions as a winter residence to strangers or citizens; no amusements but such as are monotonous, and unimproving; nothing to variegate the scene and enliven the labors of those whom the confidence of their country has called to this place, to manage her great concerns. A few courses of lectures on these subjects, announced in the public papers, to be delivered next winter, would draw to this place many young men from the different states; who, being at a loss for the means of finishing their education, are often driven to Europe for that purpose. This would be a beginning for the university, and lead to its interior organisation. It would help to bring the Institution into notice, be the means of augmenting its endowments, and enable the trustees to devise measures for some of their buildings.

5. It ought not to be forgotten that a central Institution of this kind in the United States would not only remove the disadvantages that our young men now experience, in being obliged to obtain a European education; but it would federalize, as well as republicanise their education at home. Coming together from all parts of the union, at an age, when impressions on the mind are not easily effaced, the bent of intellect will attain a similarity in all, diversified only by what nature had done before; their moral characters would be cast in a kindred mould; they would form friendships, which their subsequent pursuits in life would never destroy. This would greatly tend to strengthen the political union of the states, a union which, though founded on permanent interest, can only be supported by a permanent sense of that interest. In addition to the other advantages of study, we ought to notice the great political school that will be open to the student, during the sessions of Congress; the school of jurisprudence in the federal courts; the constant examples of enlarged ideas, and paternal solicitude for the national welfare, which he will see in the several departments of the executive government.

When the men, who shall have finished their education in this central seat, shall return to it in maturer life, clothed with the confidence of their fellow citizens, to assist in the councils of the nation, the scene will enliven the liberal impressions of youth, combined with the cautions that experience will have taught. They will bring from home the feelings and interests of their own districts; and they will mingle them here with those of the nation. From such men the Institution may perceive the good it may have done; and from them it will learn what new openings may be found in the different states, for the extension of its benefits.

WASHINGTON, *27th January, 1806.*

APPENDIX D.

THE MORRILL ACT.[1]

AN ACT donating Public Lands to the several States and Territories which may provide Colleges for the Benefit of Agriculture and Mechanic Arts.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State a quantity equal to thirty thousand acres for each senator and representative in Congress to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty: *Provided,* That no mineral lands shall be selected or purchased under the provisions of this act.

SEC. 2. *And be it further enacted,* That the land aforesaid, after being surveyed, shall be apportioned to the several States in sections or subdivisions of sections, not less than one-quarter of a section; and whenever there are public lands in a State subject to sale at private entry at one dollar and twenty-five cents per acre, the quantity to which said State shall be entitled shall be selected from such lands within the limits of such State, and the Secretary of the Interior is hereby directed to issue to each of the States in which there is not the quantity of public lands subject to sale at private entry at one dollar and twenty-five cents per acre, to which said State may be entitled under the provisions of this act, land scrip to the amount in acres for the deficiency of its distributive share: said scrip to be sold by said States and the proceeds thereof applied to the uses and purposes prescribed in this act, and for no other use or purpose whatsoever: *Provided,* That in no case shall any State to which land scrip may thus be issued be allowed to locate the same within the limits of any other State, or of any Territory of the United States, but their assignees may thus locate said land scrip upon any of the unappropriated lands of the United States subject to sale at private entry at one dollar and twenty-five cents, or less, per acre: *And provided, further,* That not more than one million acres shall be located by such assignees in any one of the States: *And provided, further,* That no such location shall be made before one year from the passage of this act.

SEC. 3. *And be it further enacted,* That all the expenses of management, superintendence, and taxes from date of selection of said lands, previous to their sales, and all expenses incurred in the management and disbursement of the moneys which may be received therefrom, shall be paid by the States to which they may belong, out of the treasury of said States, so that the entire proceeds of the sale of said lands shall be applied without any diminution whatever to the purposes hereinafter mentioned.

SEC. 4. *And be it further enacted,* That all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sales of land scrip hereinbefore provided for, shall be invested in stocks of the United States, or of the States, or some other safe stocks yielding not less than five per centum upon the par value of said stocks; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished, (except so far as may be provided in section fifth of this act,) and the interest of

[1] Introduced in the House of Representatives by the Hon. Justin S. Morrill, of Vermont, and approved by President Lincoln, July 2, 1862.

which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.

SEC. 5. *And be it further enacted*, That the grant of land and land scrip hereby authorized shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by legislative acts:

First. If any portion of the fund invested, as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or contingency be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum, not exceeding ten per centum upon the amount received by any State under the provisions of this act, may be expended for the purchase of lands for sites or experimental farms, whenever authorized by the respective legislatures of said States.

Second. No portion of said fund, nor the interest thereon, shall be applied, directly or indirectly, under any pretence whatever, to the purchase, erection, preservation, or repair of any building or buildings.

Third. Any State which may take and claim the benefit of the provisions of this act shall provide, within five years, at least not less than one college, as described in the fourth section of this act, or the grant to such State shall cease; and said State shall be bound to pay the United States the amount received of any lands previously sold, and that the title to purchasers under the State shall be valid.

Fourth. An annual report shall be made regarding the progress of each college, recording any improvements and experiments made, with their costs and results, and such other matters, including State industrial and economical statistics, as may be supposed useful; one copy of which shall be transmitted by mail free, by each, to all the other colleges which may be endowed under the provisions of this act, and also one copy to the Secretary of the Interior.

Fifth. When lands shall be selected from those which have been raised to double the minimum price, in consequence of railroad grants, they shall be computed to the States at the maximum price, and the number of acres proportionally diminished.

Sixth. No State while in a condition of rebellion or insurrection against the government of the United States shall be entitled to the benefit of this act.

Seventh. No State shall be entitled to the benefits of this act unless it shall express its acceptance thereof by its legislature within two years from the date of its approval by the President.

SEC. 6. *And be it further enacted*, That land scrip issued under the provisions of this act shall not be subject to location until after the first day of January, one thousand eight hundred and sixty-three.

SEC. 7. *And be it further enacted*, That the land officers shall receive the same fees for locating land scrip issued under the provisions of this act as is now allowed for the location of military bounty land warrants under existing laws: *Provided*, Their maximum compensation shall not be thereby increased.

SEC. 8. *And be it further enacted*, That the Governors of the several States to which scrip shall be issued under this act shall be required to report annually to Congress all sales made of such scrip until the whole shall be disposed of, the amount received for the same, and what appropriation has been made of the proceeds.

Approved, July 2, 1862.

Rembrandt Peale

THE HATCH ACT.[1]

[Forty-ninth Congress, second session, chapter 314, Statutes of the United States, Vol. XXIV, page 440.]

AN ACT to establish agricultural experiment stations in connection with the colleges established in the several States under the provisions of an act approved July second, eighteen hundred and sixty-two, and of the acts supplementary thereto.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to aid in acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science, there shall be established, under direction of the college or colleges or agricultural department of colleges in each State or Territory established, or which may hereafter be established, in accordance with the provisions of an act approved July second, eighteen hundred and sixty-two, entitled "An act donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts," or any of the supplements to said act, a department to be known and designated as an "agricultural experiment station:" *Provided*, That in any State or Territory in which two such colleges have been or may be so established the appropriation hereinafter made to such State or Territory shall be equally divided between such colleges, unless the legislature of such State or Territory shall otherwise direct.

SEC. 2. That it shall be the object and duty of said experiment stations to conduct original researches or verify experiments on the physiology of plants and animals; the diseases to which they are severally subject, with the remedies for the same; the chemical composition of useful plants at their different stages of growth; the comparative advantages of rotative cropping as pursued under a varying series of crops; the capacity of new plants or trees for acclimation; the analysis of soils and water; the chemical composition of manures, natural or artificial, with experiments designed to test their comparative effects on crops of different kinds; the adaptation and value of grasses and forage plants; the composition and digestibility of the different kinds of food for domestic animals; the scientific and economic questions involved in the production of butter and cheese; and such other researches or experiments bearing directly on the agricultural industry of the United States as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States or Territories.

SEC. 3. That in order to secure, as far as practicable, uniformity of methods and results in the work of said stations, it shall be the duty of the United States Commissioner of Agriculture to furnish forms, as far as practicable, for the tabulation of results of investigation or experiments; to indicate, from time to time, such lines of inquiry as to him shall seem most important; and, in general, to furnish such advice and assistance as will best promote the purposes of this act. It shall be the duty of each of said stations, annually, on or before the first day of February, to make to the governor of the State or Territory in which it is located a full and detailed report of its operations, including a statement of receipts and expenditures, a copy of which report shall be sent to each of said stations, to the said Commissioner of Agriculture, and to the Secretary of the Treasury of the United States.

SEC. 4. That bulletins or reports of progress shall be published at said stations at least once in three months, one copy of which shall be sent to each newspaper in the States or Territories in which they are respectively located, and to such individuals actually engaged in farming as may request the same, and as far as the means of the

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[1] Introduced in the House of Representatives in 1885 by the Hon. William H. Hatch of Missouri, and approved by President Cleveland, March 2, 1887.

station will permit. Such bulletins or reports and the annual reports of said stations shall be transmitted in the mails of the United States free of charge for postage, under such regulations as the Postmaster-General may from time to time prescribe.

SEC. 5. That for the purpose of paying the necessary expenses of conducting investigations and experiments and printing and distributing the results as hereinbefore prescribed, the sum of fifteen thousand dollars per annum is hereby appropriated to each State, to be specially provided for by Congress in the appropriations from year to year, and to each Territory entitled under the provisions of section eight of this act, out of any money in the Treasury proceeding from the sales of public lands, to be paid in equal quarterly payments, on the first day of January, April, July, and October in each year, to the treasurer or other officer duly appointed by the governing boards of said colleges to receive the same, the first payment to be made on the first day of October, eighteen hundred and eighty-seven: *Provided, however*, That out of the first annual appropriation so received by any station an amount not exceeding one-fifth may be expended in the erection, enlargement, or repair of a building or buildings necessary for carrying on the work of such station; and thereafter an amount not exceeding five per centum of such annual appropriation may be so expended.

SEC. 6. That whenever it shall appear to the Secretary of the Treasury from the annual statement of receipts and expenditures of any of said stations that a portion of the preceding annual appropriation remains unexpended, such amount shall be deducted from the next succeeding annual appropriation to such station, in order that the amount of money appropriated to any station shall not exceed the amount actually and necessarily required for its maintenance and support.

SEC. 7. That nothing in this act shall be construed to impair or modify the legal relation existing between any of the said colleges and the government of the States or Territories in which they are respectively located.

SEC. 8. That in States having colleges entitled under this section to the benefits of this act and having also agricultural experiment stations established by law separate from said colleges, such States shall be authorized to apply such benefits to experiments at stations so established by such States; and in case any State shall have established under the provisions of said act of July second aforesaid, an agricultural department or experimental station, in connection with any university, college, or institution not distinctively an agricultural college or school, and such State shall have established or shall hereafter establish a separate agricultural college or school, which shall have connected therewith an experimental farm or station, the legislature of such State may apply in whole or in part the appropriation by this act made, to such separate agricultural college or school, and no legislature shall by contract express or implied disable itself from so doing.

SEC. 9. That the grants of moneys[1] authorized by this act are made subject to the legislative assent of the several States and Territories to the purposes of said grants: *Provided*, That payment of such instalments of the appropriation herein made as shall become due to any State before the adjournment of the regular session of its legislature meeting next after the passage of this act shall be made upon the assent of the governor thereof duly certified to the Secretary of the Treasury.

SEC. 10. Nothing in this act shall be held or construed as binding the United States to continue any payment from the Treasury to any or all the States or institutions mentioned in this act, but Congress may at any time amend, suspend, or repeal any or all the provisions of this act.

Approved, March 2, 1887.

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[1] The grants of money to carry out the provisions of this act amounted in 1887–88 to $585,000, in 1888–89 to 595,000, in 1889–90 to $600,000, and for 1890–91 the amount estimated is $630,000.

APPENDIX E.

A LIST OF STATE UNIVERSITIES AND FEDERAL LAND-GRANT COLLEGES, WITH THE DATES OF THEIR ORGANIZATION.

NOTE.—Most of the State universities owe their origin wholly or in part to Federal land grants in connection with the Morrill act, or by special acts passed by Congress. The thirteen original States and six others have received no land grants, except for agricultural and mechanical colleges. All the Territories have had land grants for educational purposes except the District of Columbia and Alaska. Of the thirteen original States only four—Virginia, Georgia, and North and South Carolina—have founded and maintained State universities; six—Massachusetts, Connecticut, Pennsylvania, New Jersey, Rhode Island, and New Hampshire—founded in colonial days institutions which have become practically State universities; New York, though fairly liberal to its colleges, has never concentrated its patronage; Maryland and Delaware have practically ignored the university question. In the other States without grants—Vermont, Maine, Kentucky, Tennessee, Texas, and West Virginia—the efforts to found State institutions have been attended with much difficulty, and it is evident to one who studies the subject that their educational systems are probably much less prosperous than they would have been had they received assistance from the General Government similar to that given their sister States.[1]

In the following list institutions wholly or in part supported by the State are designated by the symbol †. Institutions organized or extended in scope in connection with the Morrill act of 1862 are designated by the symbol *. Institutions maintained in connection with the Hatch act are designated by the symbol △. Institutions whose names are indented are subordinated to those which precede them.

The total amount of land given by the General Government for State educational work has been 1,995,920 acres. The total amount appropriated by the States for higher education is shown by Blackmar to have been $27,475,646.

I am indebted to Professor F. W. Blackmar, Professor W. O. Atwater, and Mr. A. C. True for the facts embodied in the following tables:

ALABAMA.

(Territory, 1817; State, 1819; land grant, 1818–19.)

†UNIVERSITY OF ALABAMA, Tuscaloosa, 1819–1821.
*ALABAMA AGRICULTURAL AND MECHANICAL COLLEGE, Auburn, 1872.
  △AGRICULTURAL EXPERIMENT STATION, Auburn, 1883.
  △†CANEBRAKE AGRICULTURAL EXPERIMENT STATION, Uniontown, 1885.
    Alabama Historical Society, Tuscaloosa, 1851.
    No scientific society in the State.

ALASKA.

(Territory, 1872.)

No colleges.

Alaska Historical Society, Sitka, 1890.
Society of Alaskan Natural History and Ethnology, Sitka, 1887.

ARIZONA.

(Territory, 1863; land grant, 1881.)

UNIVERSITY OF ARIZONA, Tucson, 1889.
  COLLEGE OF AGRICULTURE, UNIVERSITY OF ARIZONA, Tucson, 1889.
    No historical or scientific society.

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[1] See Blackmar's Federal and State Aid to Higher Education.

ARKANSAS.

(Territory, 1819; State, 1836; land grant, 1836.)

*† ARKANSAS INDUSTRIAL UNIVERSITY, Fayetteville, 1868–1872.

△ ARKANSAS AGRICULTURAL EXPERIMENT STATION, Fayetteville, 1888.

(Substations at Pine Bluff, Newport, and Texarkana.)

Arkansas Historical Society, Little Rock.

No scientific society.

CALIFORNIA.

(Territory, 1846; State, 1850; land grant, 1853.)

†* UNIVERSITY OF CALIFORNIA, Berkeley, 1868–69.

COLLEGE OF AGRICULTURE, MECHANICS, MINING, ENGINEERING, AND CHEMISTRY, UNIVERSITY OF CALIFORNIA, Berkeley, 1866–1868.

△ AGRICULTURAL EXPERIMENT STATION, UNIVERSITY OF CALIFORNIA, Berkeley, 1876 and 1888.

(Outlying stations at Paso Robles, Tulare, Jackson, Cupertino, Fresno, Mission San José.)

California Historical Society, San Francisco.

California Academy of Sciences, San Francisco, 1854.

COLORADO.

(Territory, 1861; State, 1876; land grant, 1875.)

† UNIVERSITY OF COLORADO, Boulder, 1875–1877.

* STATE AGRICULTURAL COLLEGE, Fort Collins, 1879.

△ AGRICULTURAL EXPERIMENT STATION OF COLORADO, Fort Collins, 1888.

(Substations at Del Norte and Rocky Ford.)

† STATE SCHOOL OF MINES, Golden, 1874.

Colorado State Historical Society, Denver.

Colorado Scientific Society, Denver.

CONNECTICUT.

(Settled, 1634; State, 1788.)

YALE UNIVERSITY, New Haven, 1700.

* SHEFFIELD SCIENTIFIC SCHOOL OF YALE UNIVERSITY, 1847 and 1864.

△† CONNECTICUT AGRICULTURAL EXPERIMENT STATION, New Haven, 1875 and 1877.

STORRS AGRICULTURAL SCHOOL, Mansfield, 1881.

STORRS SCHOOL AGRICULTURAL EXPERIMENT STATION, 1888.

Connecticut Academy of Sciences, New Haven, 1799.

Connecticut Historical Society, Hartford, 1825.

DAKOTA, NORTH.

(Territory of Dakota, 1861; State, 1889; land grant, 1881.)

(?) UNIVERSITY OF NORTH DAKOTA, Grand Forks, 1883–4.

NORTH DAKOTA AGRICULTURAL COLLEGE, Fargo, 1890.

No State historical or scientific society.

DAKOTA, SOUTH.

(State, 1889; land grant, 1881.)

(?) UNIVERSITY OF SOUTH DAKOTA, Vermilion, 1883.

† SOUTH DAKOTA AGRICULTURAL COLLEGE, Brookings, 1889.

SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION, Brookings, 1888.

SOUTH DAKOTA SCHOOL OF MINES, Rapid City, 1886.

No State historical or scientific society.

BENJAMIN PEIRCE.

DELAWARE.

(Settled, 1638; State, 1787.)

†*DELAWARE COLLEGE, Newark, 1834, 1851, and 1871.

△ DELAWARE COLLEGE AGRICULTURAL EXPERIMENT STATION, Newark, 1888.

Historical Society of Delaware, Wilmington, 1884.

No scientific society.

FLORIDA.

(Territory, 1821; State, 1845; land grant, 1845.)

*FLORIDA STATE AGRICULTURAL AND MECHANICAL COLLEGE, Lake City, 1884.

△ AGRICULTURAL EXPERIMENT STATION OF FLORIDA, Lake City, 1888.

Historical Society of Florida, St. Augustine.

GEORGIA.

(Settled, 1732; State, 1788.)

†*UNIVERSITY OF GEORGIA, Athens [1784], 1801.

GEORGIA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, OF THE UNIVERSITY OF GEORGIA, Athens, 1872.

△ GEORGIA AGRICULTURAL EXPERIMENT STATION, Athens, 1888.

SOUTHWEST GEORGIA AGRICULTURAL COLLEGE, UNIVERSITY OF GEORGIA, Cuthbert, 1879.

NORTH GEORGIA AGRICULTURAL COLLEGE, UNIVERSITY OF GEORGIA, Dahlonega, 1873.

WEST GEORGIA AGRICULTURAL AND MECHANICAL COLLEGE, Hamilton, 1882.

MIDDLE GEORGIA MILITARY AND AGRICULTURAL COLLEGE, UNIVERSITY OF GEORGIA, Milledgeville, 1880.

SOUTH GEORGIA COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS, UNIVERSITY OF GEORGIA, Thomasville, 1879.

†ATLANTA UNIVERSITY (colored), Atlanta, 1859.

Georgia Historical Society, Savannah, 1839.

No scientific society.

ILLINOIS.

(Territory, 1809; State, 1818; land grants, 1804 and 1818.)

†UNIVERSITY OF ILLINOIS, Urbana, 1868. (Formerly Illinois Industrial University.

*COLLEGE OF AGRICULTURE OF THE UNIVERSITY OF ILLINOIS, Urbana, 1867.

△ AGRICULTURAL EXPERIMENT STATION OF THE UNIVERSITY OF ILLINOIS, Champaign, 1888.

Illinois State Historical Society, Champaign.

No State scientific society.

INDIANA.

(Territory, 1800; State, 1816; land grants, 1804 and 1816.)

†INDIANA UNIVERSITY, Bloomington, 1820–26. (Successor to Vincennes University, 1806.)

PURDUE UNIVERSITY, Lafayette, 1874.

*SCHOOL OF AGRICULTURE, HORTICULTURE, AND VETERINARY SCIENCE OF PURDUE UNIVERSITY, Lafayette, 1873.

△ AGRICULTURAL STATION OF INDIANA, Lafayette, 1887.

Indiana Historical Society, Indianapolis, 1832.

Indiana Academy of Sciences (unlocalized), 1885.

IOWA.

(Territory, 1838; State, 1846; land grant, 1845.)

† STATE UNIVERSITY OF IOWA, Iowa City, 1847–60.

* IOWA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS, Ames, 1858; opened for students October 21, 1868.

△ IOWA AGRICULTURAL EXPERIMENT STATION, Ames, 1888.

Iowa State Historical Society, Iowa City.
Davenport Academy of Sciences, Davenport, 1867.
Iowa Academy of Sciences, Iowa City, 1875.

KANSAS.

(Territory, 1857; State, 1861; land grant, 1861.)

† UNIVERSITY OF KANSAS, Lawrence, 1861–1866.

* KANSAS STATE AGRICULTURAL COLLEGE, Manhattan, 1863.

△ KANSAS AGRICULTURAL EXPERIMENT STATION, Manhattan, 1888.

Kansas State Historical Society, Topeka.
Kansas Academy of Science, Topeka, 1868.

KENTUCKY.

(State, 1792.)

* AGRICULTURAL AND MECHANICAL COLLEGE OF KENTUCKY, Lexington, 1865; reorganized, 1880. (Successor to Transylvania University, organized 1798.)

△ KENTUCKY AGRICULTURAL EXPERIMENT STATION, Lexington, 1885.

Kentucky Historical Society, Frankfort.
No State scientific society.

LOUISIANA.

(Territory, 1803; State, 1812; land grants, 1806, 1811, 1827.)

TULANE UNIVERSITY OF LOUISIANA, New Orleans, 1847.

† SOUTHERN UNIVERSITY (colored), New Orleans, 1880.

† * LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE, Baton Rouge, 1873; reorganized, 1877.

△ † { SUGAR EXPERIMENT STATION NO. 1, Kenner, 1885.
SUGAR EXPERIMENT STATION NO. 2, Baton Rouge, 1886.
NORTH LOUISIANA EXPERIMENT STATION, Calhoun, 1888.

Louisiana Historical Society, Baton Rouge.
No State scientific society.

MAINE.

(Settled, 1622; State, 1820.)

* MAINE STATE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS, Orono, 1865.[1]

△ MAINE STATE COLLEGE AGRICULTURAL EXPERIMENT STATION, Orono, 1885 and 1887.

Maine Historical Society, Portland, 1822.
No State scientific society.

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[1] State grants have been made to Bowdoin College, 1794–1802, and to Colby University, formerly Waterville College, 1818.

MARYLAND.

(Settled, 1631; State, 1788.)

[University of Maryland, organized 1784; abandoned, 1805.]

*Maryland Agricultural College, Agricultural College [1856], 1859.

△ Maryland Agricultural Experiment Station, Agricultural College, 1888.

Maryland Academy of Sciences, 1822.

Maryland Historical Society, Baltimore.

MASSACHUSETTS.

(Settled, 1620; State, 1788.)

Harvard University, Cambridge, 1636.[1]

*Massachusetts Institute of Technology, Boston, 1863–1865.

*Massachusetts Agricultural College, Amherst, 1856, 1863, and 1867.

† Massachusetts State Agricultural Experiment Station, Amherst, 1882 and 1888.

△ Hatch Experiment Station of Massachusetts Agricultural College, Amherst, 1888.

American Academy of Arts and Sciences, 1780.

Massachusetts Historical Society, Boston.

MICHIGAN.

(Territory, 1805; State, 1836; land grant, 1836.)

† University of Michigan, Ann Arbor [1817], 1836, 1840.

*Michigan Agricultural College, Agricultural College [1855], 1857.

△ Experiment Station of Michigan Agricultural College, Agricultural College, 1888.

Historical Society of Michigan, Detroit.

No academy of sciences.

MINNESOTA.

(Territory, 1849; State, 1858; land grants, 1857, 1861, and 1870.)

†* University of Minnesota, Minneapolis [1857], 1868.

College of Agriculture and Mechanic Arts of the University of Minnesota, Saint Anthony Park, 1868.

† State School of Agriculture of the University of Minnesota, Saint Anthony Park, 1888.

△ Agricultural Experiment Station of the University of Minnesota, Saint Anthony Park, 1888.

Minnesota Historical Society, St. Paul.

Minnesota Academy of Science, Minneapolis, 1873.

St. Paul Academy of Sciences, St. Paul.

MISSISSIPPI.

(Territory, 1798; State, 1817; land grants, 1803, 1819.)

[Jefferson College, Washington, 1803—discontinued.]

† University of Mississippi, Oxford, 1874.

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[1] The appropriations by the State to Harvard have amounted to $784,793, in addition to 46,000 acres of land. The State has also given $157,500 to Williams, and $52,500 to Amherst.—Blackmar.

*AGRICULTURAL AND MECHANICAL COLLEGE OF MISSISSIPPI, Agricultural College (Starkville), 1880.

△MISSISSIPPI AGRICULTURAL EXPERIMENT STATION, Agricultural College, 1888.

*ALCORN AGRICULTURAL AND MECHANICAL COLLEGE (colored), Rodney, 1871, reorganized in 1878.

Mississippi Historical Society, Jackson.

No academy of sciences.

MISSOURI.

(Territory, 1812; State, 1821; land grants, 1818 and 1820.)

†*UNIVERSITY OF MISSOURI, Columbia [1820], 1839.

MISSOURI AGRICULTURAL AND MECHANICAL COLLEGE OF THE UNIVERSITY OF MISSOURI, Columbia, 1870.

△MISSOURI AGRICULTURAL EXPERIMENT STATION, Columbia, 1881.

*MISSOURI SCHOOL OF MINES AND METALLURGY OF THE UNIVERSITY OF MISSOURI, Rolla, 1870.

Missouri Historical Society, St. Louis.

St. Louis Academy of Sciences, 1857.

MONTANA.

(Territory, 1864; land grant, 1881.)

COLLEGE OF MONTANA, Deer Lodge, 1883.

Montana Historical Society, Helena.

NEBRASKA.

(Territory, 1859; State, 1867; land grant, 1881.)

†*UNIVERSITY OF NEBRASKA, Lincoln, 1869.

INDUSTRIAL COLLEGE OF THE UNIVERSITY OF NEBRASKA, Lincoln, 1869; opened for students 1871.

△AGRICULTURAL EXPERIMENT STATION OF NEBRASKA, Lincoln, 1887.

Nebraska State Historical Society, Lincoln, 1878.

No scientific society.

NEVADA.

(Territory, 1861; State, 1864; land grant, 1866.)

†*STATE UNIVERSITY OF NEVADA, Reno [1865], 1874.

SCHOOL OF AGRICULTURE OF THE NEVADA STATE UNIVERSITY, Reno, 1877.

△NEVADA STATE AGRICULTURAL STATION, Reno.

No scientific or historical society.

NEW HAMPSHIRE.

(Settled, 1629; State, 1788.)

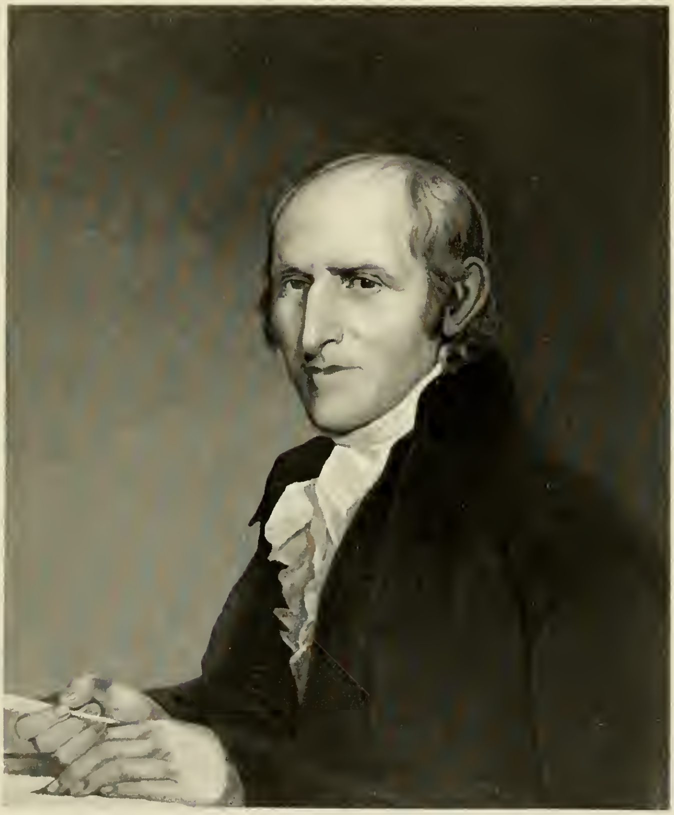
DARTMOUTH COLLEGE, Hanover [1758], 1770.

*NEW HAMPSHIRE COLLEGE OF AGRICULTURE AND THE MECHANIC ARTS (in connection with Dartmouth College), Hanover [1866], 1868.

△NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION, Hanover, 1888.

New Hampshire Historical Society, Concord, 1823.

No academy of science.



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NEW JERSEY.

(Settled, 1614–20; State, 1787.)

College of New Jersey, Princeton, 1746.

*Rutgers Scientific School of Rutgers College, New Brunswick. Made State College of Agriculture and the Mechanic Arts [1864], 1865.

†New Jersey State Agricultural Experiment Station, New Brunswick, 1880.

△New Jersey Agricultural College Experiment Station, New Brunswick, 1888.

New Jersey Historical Society, Newark, 1845.

No academy of science.

NEW MEXICO.

(Territory, 1850; land grant, 1854.)

University of New Mexico, Santa Fe, 1881.

†Agricultural College of New Mexico, Las Cruces. Established by Territorial legislature, 1888–89.

Historical Society of New Mexico, Santa Fe.

NEW YORK.

(Settled, 1613; State, 1788.)

The University of New York, 1787, is not a teaching body. It is in indirect relationship with Columbia College, 1754, Union College, Hamilton College, and numerous collegiate and technical schools.

*Cornell University, Ithaca [1865], 1868.

College of Agriculture of Cornell University, Ithaca, 1888.

△Cornell University Agricultural Experiment Station, Ithaca, 1879.

†New York Agricultural Experiment Station, Geneva, 1882.

New York Historical Society, New York, 1804.

New York Academy of Sciences, 1817.

NORTH CAROLINA.

(Settled, 1653; State, 1789.)

†University of North Carolina, Chapel Hill [1789], 1795.

*North Carolina College of Agriculture and Mechanic Arts, Raleigh. Established by State, 1889.

△†North Carolina Agricultural Experiment Station, Raleigh, 1877 and 1887.

OHIO.

(Territory, 1788; State, 1803; land grants, 1792 and 1803.)

Ohio University, Athens, 1804.

Miami University, Oxford, 1809, 1816.

†*Ohio State University, Columbus. Chartered 1870; organized September 17, 1873.

△Ohio Agricultural Experiment Station, Columbus, 1882 and 1888.

Historical and Philosophical Society of Ohio, Cincinnati.

No State scientific society.

OREGON.

(Territory, 1848; State, 1859.)

†University of Oregon, Eugene City [1850], 1876.
*Oregon State Agricultural College, Corvallis, 1888.
△Oregon Experiment Station, Corvallis, 1888.
Pioneer and Historical Society, Astoria.
No scientific society.

PENNSYLVANIA.

(Settled, 1626; State, 1787.)

University of Pennsylvania, Philadelphia, 1751.
*Pennsylvania State College, State College, 1859, 1862, and 1874.
△†Pennsylvania State College Agricultural Experiment Station, State College, 1887.
American Philosophical Society, Philadelphia, 1769.
Historical Society of Pennsylvania, Philadelphia, 1824.

RHODE ISLAND.

(Settled, 1636; State, 1790.)

*Brown University, Providence, 1764.
Agricultural and Scientific Department of Brown University, Providence.
†Rhode Island State Agricultural School, Kingston, 1888.
△Rhode Island State Agricultural College Experimental Station, Kingston, 1888.
Rhode Island Historical Society, Providence.

SOUTH CAROLINA.

(Settled, 1670; State, 1788.)

*†University of South Carolina, Columbia, 1801; reorganized, 1865.
South Carolina College of Agriculture and Mechanic Arts, University of South Carolina, Columbia 1879.
△South Carolina Agricultual Experiment Station, Columbia, 1888.
*Claflin University and South Carolina Agricultural College and Mechanics' Institute (Department of University of South Carolina), Orangeburg, 1872.
South Carolina Historical Society, Charleston.

TENNESSEE.

(Territory, 1790; State, 1796.)

University of Nashville (Cumberland College), 1806; discontinued, 1875.
†*University of Tennessee, Knoxville, 1806.
State Agricultural and Mechanical College of the University of Tennessee, Knoxville, 1869.
△Tennessee Agricultural Experiment Station, Knoxville, 1882 and 1887.
Tennessee Historical Society, Nashville.

TEXAS.

(Annexed, 1846; State, 1845.)

† UNIVERSITY OF TEXAS, Austin [1839], 1866.
* STATE AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, College Station [1871], 1876.
△ TEXAS AGRICULTURAL EXPERIMENT STATION, College Station, 1888.
No historical or scientific society.

UTAH.

(Territory, 1850; land grant, 1855.)

UNIVERSITY OF DESERET, Salt Lake City, 1850.
† UTAH AGRICULTURAL COLLEGE, Logan City. Established by Territorial legislature, March 8, 1888.

VERMONT.

(Settled, 1755-58; State, 1791.)

* UNIVERSITY OF VERMONT [1791], 1800, and
STATE AGRICULTURAL COLLEGE, Burlington, 1865-67.
△ † VERMONT STATE AGRICULTURAL EXPERIMENT STATION, Burlington, 1887.
Vermont Historical Society, Montpelier.

VIRGINIA.

(Settled, 1609; State, 1788.)

[COLLEGE OF HENRICO. Projected in 1620].
WILLIAM AND MARY COLLEGE, Williamsburgh, 1691.
† UNIVERSITY OF VIRGINIA, Charlottesville, 1819.
* VIRGINIA AGRICULTURAL AND MECHANICAL COLLEGE, Blacksburg, 1872.
△ VIRGINIA AGRICULTURAL EXPERIMENT STATION, Blacksburg, 1888.
* HAMPTON NORMAL AND AGRICULTURAL INSTITUTE, Hampton. Organized by American Missionary Society, April, 1868; reorganized under charter from State, June, 1870.
Virginia Historical Society, Richmond, 1831.

WASHINGTON.

(Territory, 1853; State, 1889.)

UNIVERSITY OF WASHINGTON, Seattle, 1862.

WEST VIRGINIA.

(State, 1862.)

† * WEST VIRGINIA UNIVERSITY, Morgantown, 1867.
AGRICULTURAL DEPARTMENT OF WEST VIRGINIA UNIVERSITY, Morgantown.
△ WEST VIRGINIA EXPERIMENT STATION, Morgantown, 1888.
West Virginia Historical Society, Morgantown.

WISCONSIN.

(Territory, 1836; State, 1847; land grants, 1846 and 1854.)

†*UNIVERSITY OF WISCONSIN, Madison [1838], 1848.

DEPARTMENT OF AGRICULTURE OF THE UNIVERSITY OF WISCONSIN, Madison, 1866.

△†AGRICULTURAL EXPERIMENT STATION OF THE UNIVERSITY OF WISCONSIN, Madison, 1883 and 1888.

Wisconsin Historical Society, Madison.

Wisconsin Academy of Science, Arts, and Letters, Madison, 1870.

WYOMING.

(Territory, 1868; State, 1889.)

UNIVERSITY OF WYOMING, Laramie City.

Wyoming Academy of Arts, Science, and Letters, Cheyenne.

ZEBULON MONTGOMERY PIKE.

THE BEGINNINGS OF NATURAL HISTORY IN AMERICA.

BY

GEORGE BROWN GOODE,

President of the Biological Society of Washington.

THE BEGINNINGS OF NATURAL HISTORY IN AMERICA.[1]

By George Brown Goode,

President of the Biological Society of Washington.

Is not science a growth? Has not science, too, its embryology? And must not the neglect of its embryology lead to a misunderstanding of the principles of its evolution and of its existing organization?

—Spencer: *The Genesis of Science.*

ANALYSIS.

I.

Three centuries ago the only English settlement in America was the little colony of one hundred and eight men which Raleigh had planted five months before upon Roanoke Island, in North Carolina.

The 17th of August, 1885, was the anniversary of one of the most noteworthy events in the history of America, for it marked the three hundredth return of the date when Sir Richard Greuville brought to its shores this sturdy company of pioneers, who, by their sojourn on this side of the Atlantic, prepared the way for the great armies of immigrants who were to follow.

It was also the anniversary of an important event in the history of science, for among the colonists was Thomas Harriot, the first English man of science who crossed the Atlantic. His name is familiar to few save those who love the time-browned pages and quaint narrations of Hakluyt, Purchas, and Pinkerton; yet Harriot was foremost among the

[1] Annual presidential address delivered at the sixth anniversary meeting of the Biological Society of Washington, February 6, 1886, in the lecture room of the United States National Museum.

scholars of his time—the Huxley or the Stokes of his day—a man of wide culture, a skillful astronomer, a profound mathematician, the author of a standard treatise upon algebra, and a botanist, zoologist, and anthropologist withal. "He had been the mathematical instructor of Raleigh, and in obeying this summons to go forth upon the present expedition gave to it," says Anderson, "the most valuable aid which could be derived from human strength." [1]

This eminent man deserves more than a passing notice on this occasion, and I have taken pains to bring together all that is known about him. He was born at Oxford in 1560, or, as old Anthony Wood quaintly expresses it, "he tumbled out of his mother's womb into the lap of the Oxonian muses," and at an early age was entered as a scholar in St. Mary's Hall, receiving his bachelor's degree in 1579. He was soon received into Raleigh's family as his instructor in mathematics, and at the age of twenty-five made his voyage to America.

After his return he was introduced by Raleigh to Henry Percy, Earl of Northumberland, one of the most munificent patrons of science of that day, who allowed him a pension of £120 a year. "About the same time," we are told, "Hues, well known by his Treatise upon the Globes,[2] and Walter Warner, who is said to have given Harvey the first hint concerning the circulation of the blood, being both of them mathematicians, received from him (Northumberland) pensions of less value; so that in 1606, when the Earl was committed to the Tower for life, Harriott, Hues, and Warner were his constant companions, and were usually called the Earl of Northumberland's Magi." [3]

One thing, at least, have three centuries accomplished for science. Its greatest workers are not now, as they were at the beginning of the seventeenth century, dependent upon the liberality and caprice of wealthy men, classed as their "pensioners" and "servants," and assigned places at their tables which they must needs accept or famish.

Harriot appears to have passed the latter years of his life at Sion College, near Isleworth, where he died in 1621. He was buried in St. Christopher's Church, London, and the following eulogy was embodied in his epitaph:

QUI OMNES SCIENTIAS CALLUIT AC IN OMNIBUS EXCELLUIT
MATHEMATICIS, PHILOSOPHICIS, THEOLOGICIS,
VERITATIS, INDAGATOR STUDIOSISSIMUS,
DEI TRINIUNIUS PIISSIMUS.

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[1] James S. M. Anderson, History of the Church of England in the Colonies, p. 86, London, 1845-56.

[2] Robert Hues, Tractatus de Globis, etc., 1611-63.

[3] Harriot was also a friend and companion of Raleigh during his imprisonment in the Tower (1603-1616), and was his collaborator in the preparation of the History of the World. His fidelity was rewarded by that distinguished authority, Chief Justice Popham, who denounced him from the bench as "a devil."

J. R. Poinsett

He was especially eminent in the field of mathematics. "Harriott," says Hallam, "was destined to make the last great discovery in the pure science of algebra. . . . Harriott arrived at a complete theory of the genesis of equations, which Cardan and Vieta had but partially conceived." [1]

His improvements in algebra were adopted, we are told, by Descartes, and for a considerable time imposed upon the French as his own invention, but the theft was at last detected and exposed by Doctor Wallis in his Treatise of Algebra, both Theoretical and Practical, London, 1685.[2]

"Oldys, in his Life of Sir Walter Raleigh, has shown," says Stith, "that the famous French philosopher, Descartes, borrowed much of his light from this excellent mathematician, and that the learned Doctor Wallis gave the preference to Hariot's improvements before Descarte's, although he had the advantage of coming after and being assisted by him." [3]

Harriot's papers were left after his death in the possession of the Percy family at Petworth, where they were examined in 1787 by Doctor Zach, and later by Professor Rigaud, of Oxford, who, in 1833, published in his supplement to the works of James Bradley, An Account of Thomas Harriot's Astronomical Papers. His observations on Halley's comet in 1607 are still referred to as being of great importance. Zach pronounced him an eminent astronomer, both theoretical and practical. "He was the first observer of the solar spots, on which he made a hundred and ninety-nine observations; he also made many excellent observations on the satellites of Jupiter, and, indeed, it is probable that he discovered them as early if not earlier than Galileo." [4]

A posthumous work, Artes Analyticæ Praxis ad Æquationes algebraicas nova, expedita et generali Methodo resolvendas, e posthumis Thomas Harriot, was published in 1631 by his friend and associate, Walter Warner, and there is in the library of Sion College a manuscript work of his entitled Ephemeris Chyrometrica.

Wood says that, "notwithstanding his great skill in mathematics, he had strange thoughts of the Scriptures, always undervalued the old story of the creation of the world, and would never believe that trite proposition, 'Ex nihilo nihil fit.'"

Stith, the historian of Virginia, protests, however, against the charge

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[1] Henry Hallam, Introduction to the Literature of Europe in the Fifteenth, Sixteenth, and Seventeenth Centuries, 4th ed., 1854; I, pp. 454, 456; II, p. 223; III, p. 181. See also J. E. Montucla, Histoire des Mathematiques · Ersch and Gruber, Algemeine Encyklopædie.

[2] It would appear, however, that Wallis may have been too enthusiastic in his admiration of the English mathematician. Hallam states that he ascribed to Harriot a long list of discoveries which have since been reclaimed for Cardan and Vieta.

[3] William Stith, History of The First Discovery and Settlement of Virginia, Williamsburg, 1747, p. 20.

[4] John M. Good and Olinthus Gilbert Gregory, The Pantologia, V, 1813.

that Harriot had led his pupil Raleigh into atheism. "As to this groundless Aspersion," he remarked, "the Truth of it, perhaps, was that Sir *Walter* and Mr. *Hariot* were the first who ventured to depart from the beaten Tract of the Schools, and to throw off and combat some hoary Follies and traditionary Errors which had been riveted by Age, and rendered sacred and inviolable in the Eyes of weak and prejudiced Persons. Sir *Walter* is said to have been first led to this by the manifest Detection, from his own Experience, of their erroneous Opinions concerning the *Torrid Zone;* and he intended to have proceeded farther in the Search after more solid and important Truths 'till he was chid and restrained by the Queen, into whom some Persons had infused a Notion that such Doctrine was against God."[1]

The erroneous opinions concerning the torrid zone which were called in question by Harriot and Raleigh were based upon a statement of Aristotle, in those days accepted as an article of faith, that the equatorial zone of the earth was so scorched and dried by the sun's heat as to be uninhabitable. Even the experience of explorers was for many years overpowered by the weight of this time-worn dogma. The Jesuit, Acosta, was accused of atheism on the same grounds by his Spanish contemporaries, but he rejoiced that he had seen for himself and that the climate under the equator was so different from what he had expected that "he could but laugh at Aristotle's meteors and his philosophy."

Harriot's Brief and True Report of the New Found Land of Virginia, a thin volume in quarto, printed at Frankfort on the Main in 1590,[2] is now one of the rarest and most precious works relating to America[3] and is full of interest to the naturalist. Harriot's description of the Indians and their customs and beliefs, though strongly tinctured

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[1] History of the First Discovery and Settlement of Virginia, Williamsburg, 1747, p. 20.

[2] 1590. HARIOT (or Harriott), THOMAS. A Briefe and True Report | of the New Found Land of Virginia | of the commodities and of the nature and man | ners of the naturall inhabitants. Discouered by the English Colony there seated by Sir Richard | Greinuile Knight In the yeere 1585. Which rema | ined Vnder the gouernment of twelue monethes, | At the special charge and direction of the Honou- | rable SIR WALTER RALEIGH Knight lord Warden | of the stanneries Who therein hath beene fauoured | and authorised by her MAIESTIE | : and her letters patents: | This fore booke Is made in English | By Thomas Hariot, seruant to the above named | Sir WALTER, a member of the Colony and there | imployed in discouering | CUM GRATIA ET PRIVILEGIO CAES. MA^TIS SPECIA^LI | Francoforti ad Mœnum | Typis Ioannis Wecheli, sumtibus vero Theodori | DeBry Anno CIC IC XC, | venales reperiunter in officina Sigismundi Feirabendii. | 4°. pp. 1–33 (1). Title page with ornamental border of architectural design.

[3] There are now only six or seven perfect copies in existence. These, we are told by Sabine, are in the British Museum and Bodleian libraries, and in the private collections of Messrs. Lenox, Brown, Christie-Miller, and Mann, besides an imperfect copy in the library of Harvard College and one in the possession of Sir Thomas Phillipps. At a sale in London in 1883 a copy sold for £300. A reproduction in photolithographic facsimile was issued by Sabine in New York in 1875.

with prepossessed ideas concerning them, is thorough and scholarly, and one of the fullest and most reliable of the early treatises upon the inhabitants of North America.

The chief man of the Roanoke colony, Sir Ralph Lane, usually spoken of as the first governor of Virginia, was a man of great energy and enterprise,[1] and with the help of Harriot planned and conducted expeditions in every direction—southward, 80 leagues to Secotan, "an Indian town, lying between the rivers Pampticoe and Neus;" to the northwest, up the Albemarle Sound and Chowan River to the forks of the Meherrin and Nottaway; and north, 130 miles to the Elizabeth River, on the south side of Chesapeake Bay.

Besides his description of the Indians, Harriot wrote "a particular narrative of all the beasts, birds, fishes, fowls, fruits, and roots, and how they may be useful." A systematic report could hardly be expected from one who lived a century and a half before Linnæus, but if we keep in mind the condition of zoology at that day we can but be pleased with the fullness of his narrative.

He collected the names of twenty-eight species of mammals, twelve of these, including the black bear, the gray squirrel, the cony or hare, the otto, and the possum and raccoon (*Saquenúckot* and *Maquówoc*), he saw, beside the civet cat or skunk, which he observed by means of another sense. He was the first to distinguish the American from the European deer, stating that the former have longer tails, and the snags of their horns look backward—a brief diagnosis, but one which was not replaced by a better one for nearly two centuries.

Of birds he collected the names of eighty-six "in the countrie language," and had pictures drawn of twenty-five. He mentions turkeys, stockdoves, partridges, crows, herons, and, in winter, great store of swans and geese.

With aquatic animals he seems to have been well acquainted. He refers to some by English names, and to many others which had no names "but in the countrey language." In the plates accompanying the first edition of his book are figured several familiar forms, then for the first time made known in Europe, among them the gar pike (*Lepidosteus*),[2] and the horse shoe or king crab (*Limulus*),[3] "*Seekanauk*, a kinde of

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[1] Edward Everett Hale's Life of Sir Ralph Lane. Archæologia Americana, IV, pp. 317–344.

[2] Subsequently referred to by Champlain in 1613, and Sagard in 1636, under the name *chaousarou*, and figured by Champlain on his map of Nouvelle France. Du Creux, in his Historiæ Canadensis, 1664, also mentions it.

[3] It has been generally supposed that Champlain was the first to notice this characteristic American animal, and Slafter, in his notes upon Champlain's works [Publications of the Prince Society, Champlain's Voyages, II, p. 87], makes a statement to that effect, and is followed by Higginson in his History of the United States. Actually, the French explorer did not observe it until twenty years after Harriot, and his account of it was not printed until 1613.

crustie shell fishe which is good meate, about a foot in breadth, having a crustie tayle, many legges like a crabbe, and her eyes in her back."

Harriot also alludes to various kinds of trees and shrubs, usually by their Indian names. Among them may easily be recognized the pitch pine, sassafras, shoemake, chestnut, walnut, hickory, persimmon, prickly pear, Nelumbium, Liriodendron, holly, beech, ash, and so on, beside the maize and tobacco cultivated by the natives.

A companion of Harriot's, whose labors are deserving of notice, was John With or White, the first delineator of plants and animals who visited this continent. Concerning him and the ultimate utilization of his work, Stith discourses as follows:

> UPON this Voyage, Sir *Walter Ralegh*, by the Queen's Advice and Directions, sent, at no small Expence, Mr. *John With*, a skilful and ingenious Painter, to take the Situation of the Country, and to paint, from the Life, the Figures and Habits of the Natives, their Way of Living, and their several Fashions, Modes, and Superstitions; which he did with great Beauty and Exactness. There was one *Theodore de Bry*, who afterwards published, in the Year 1624, the beautiful *Latin* Edition of Voyages, in six Volumes, *Folio*, a most curious and valuable Work. He being in *England* soon after, by the Means of the Rev. Mr. *Richard Hackluyt*, then of *Christ's-Church*, in *Oxford*, who, *De Bry* tells us, had himself seen the Country, obtained from Mr. *With* a Sight of these Pieces, with Permission to take them off in Copper Plates. These, being very lively and well done, he carried to *Frankfort*, on the *Maine*, where he published a noble Edition of them, with *Latin* Explanations, out of *John Wechelius's* Press, in the Year 1590. And these are the Originals from which Mr. *Beverley's*, and the Cuts of many of our late Writers and Travellers, have been chiefly imitated.[1]

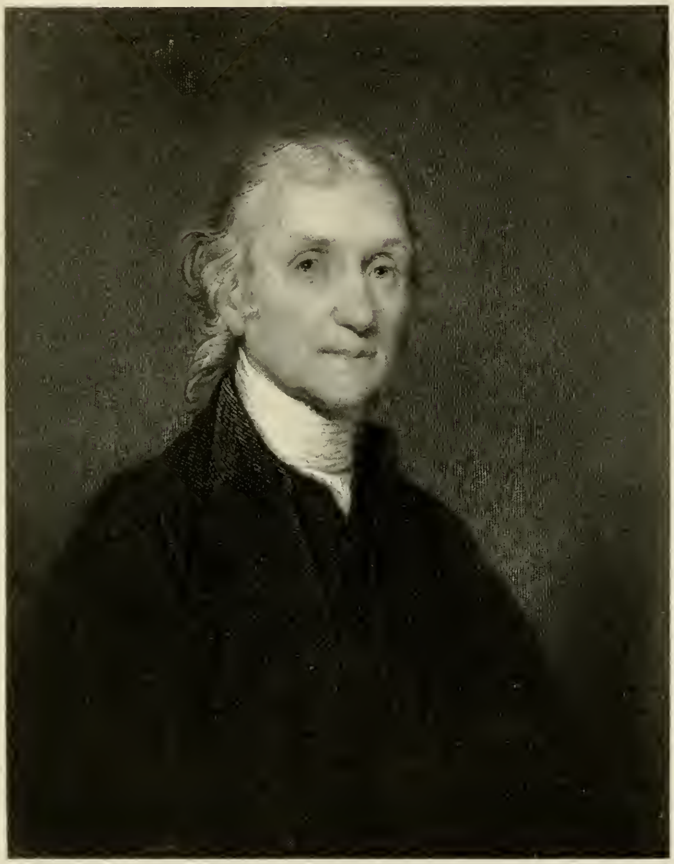
With's drawings are still in the British Museum,[2] where they were examined in 1860 by Doctor E. E. Hale, who reported upon their condition to the American Antiquarian Society.[3]

This collection, he says, consists of one hundred and twelve drawings in water color, very carefully preserved. They are very well drawn, colored with skill, and even in the present state of art would be considered anywhere valuable and creditable representations of the plants, birds, beasts, and men of a new country. Mr. Hale gives a list of these drawings as identified by Sloane and others. Among these were the bald eagle, the red-headed, hairy, and golden-winged woodpeckers, the bluebird, red-wing blackbird, towhee, redbird, blue jay, and fox-colored thrush, the crow blackbird, and apparently the mocking bird—"*Artamockes*, the linguist; a bird that imitateth and useth the sounds and tones of almost all birds in the countrie." Among the fish we recognize the mullet (*Tetszo*), the menhaden or oldwife (*Masunnehockeo*), and the sturgeon (*Coppauleo*), and perhaps the squeteague or chigwit (*Chigwusso*).

[1] History of the First Discovery and Settlement of Virginia, Williamsburg, 1747, p. 16.

[2] Sir Hans Sloane and additional Manuscripts, 5270.

[3] Archælogia Americana, IV, pp. 21–24.



JOSEPH PRIESTLEY.

The science of North America, then, began with Thomas Harriot. Let us review together to-night its progress for a period of two centuries—a period coinciding almost exactly with the colonial portion of the history of the United States.

"The present generation," says Whewell, "finds itself the heir of a vast patrimony of science, and it must needs concern us to know the steps by which these possessions were acquired and the documents by which they are secured to us and our heirs forever. Our species from the time of its creation has been traveling onward in pursuit of truth; and now that we have reached a lofty and commanding position, with the broad light of day around us, it must be grateful to look back on the line of our past progress; to review the journey begun in early twilight amid primeval wilds, for a long time continued with slow advance and obscure prospects, and gradually and in later days followed along more open and lightsome paths, in a wide and fertile region. The historian of science, from early periods to the present time, may hope for favor on the score of the mere subject of his narrative, and in virtue of the curiosity which the men of the present day may naturally feel respecting the events and persons of his story."

II.

Although Harriot was the first who described the natural characteristics of North America, it would not be proper to ignore the fact that the first scientific exploration of the Western Continent was accomplished by Spaniards and Frenchmen.

Gonzalo Fernandez de Oviedo y Valdes, the first historian of the New World [b. 1478, d. 1557], was an Asturian of noble birth, who began life as a page in the palace of Ferdinand and Isabella. He saw Columbus at Burgos on his second return from America in 1496. He came over in 1514 to Santo Domingo, having been appointed inspector of gold smelting, and was subsequently governor of that island and royal historiographer of the Indies. In 1525 he transmitted to Charles V his Sumario de la Natural Historia de las Indias, printed at Toledo two years later, and in 1535 began the publication of his Historia Natural y General de las Indias, a task which was finally completed only thirty years ago by the Spanish Royal Academy of History.

Las Casas said that Oviedo's books were "as full of lies almost as pages," but whatever may have been his methods in the discussion of history and politics, he seems, in his descriptions, to have been both minute and accurate. Among the American animals which he was first to mention was the tapir or *dant*—"of the bignesse of a meane mule, without hornes, ash-coloured," and the *churchia*, evidently a species of *Didelphys*, allied to our possum. This was the first notice of any member of the great group of marsupial mammals. I quote a portion of the description in Oviedo's Sumario, employing the quaint phraseology of Purchas's translation:

The *Churchia* is as bigge as a small *Conie*, tawnie, sharpe-snowted, dog-toothed, long-tayled and eared like a *Rat*. They do great harm to their Hennes, killing sometimes twenty or more at once to sucke their bloud: And if they then have young, shee carrieth them with her in a bagge of skin under her belly, running alongst the same like a Satchell, which shee opens and shuts at pleasure to let them in and out.[1]

He characterized and described at length many other animals, among them the manatee, the iguana (*Iuanna*), the armadillos (*Bardati*), the ant-eaters, the sloth, the pelican, the ivory-billed woodpecker, and the humming birds.

There are found in the firme land [he wrote] certaine birds, so little that the whole bodie of one of them is no bigger then the top of the biggest finger of a mans hand, and yet is the bare body without the feathers not half so bigge. This Bird, besides her littlenesse, is of such velocitie and swiftness in flying, that who so seeth her flying in the aire, cannot see her flap or beate her wings after any other sort then doe Dorres, or the Humble Bees, or Beetles. . . . . And I know not whereunto I may better liken them, then to the little birds which the lymners of bookes are accustomed to paint on the margent of Church Bookes, and other Bookes of Divine Service. Their Feathers are of manie faire colours, golden, yellow, and greene.

That the spirit of Oviedo's work was scientific and critical, and not credulous and marvel-seeking, like that of many of his contemporaries, is everywhere manifest. His materials are classified in systematically arranged chapters. His methods may be illustrated by referring to his chapter On tigers.

"In Terra Firma," he begins, "are found many terrible beasts which the first Spaniards called tigers—which thing, nevertheless, I dare not affirm." He then reviews concisely and critically what is known of tigers elsewhere, and goes on to describe the supposed American tiger at length, and in such terms that it is at once evident that the mammal under discussion is one of the spotted cats, doubtless the jaguar (*Felis onca*).[2]

The second in order of time to publish a book upon American natural history was Jean de Lery [b. 1534, d. 1611], a Calvinistic minister, who was a member of the Huguenot colony founded by the Chevalier de Villegagnon in 1555, on the small island in the bay of Rio de Janeiro, which still bears his name. He remained in Brazil less than five years, and in 1578 published at Rouen a work entitled Voyage en Amerique, avec la description des Animaux et Plantes de ce Pays.

Joseph d'Acosta was another Spanish explorer who preceded Harriot, and was a man of much the same school and temper of mind. Born in the province of Leon about the year 1539, he entered the society of Jesuits at the age of fourteen, and in 1571 went to Peru, where he traveled as a missionary for seventeen years. After his return to Spain

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[1] Sumario, Chap. XXVII, p. 491. Purchas, His Pilgrimmes, Chapter III, 1625, p. 995.

[2] Idem, Chap. XI, p. 487.

he filled several important ecclesiastical offices and died February 15, 1600, rector of the University of Salamanca. His first book, De Natvra Novi Orbis Libri dvo, was published in 1589. His Historia Natvral y Moral delas Indias appeared in 1590, and is one of the best known and most useful of the early Spanish works on America, having passed through numerous editions in many languages.

Acosta was, perhaps, the most learned of the early writers upon America, and his writings, though modeled after those of the mediæval schoolmen, were full of suggestive observations, "touching the naturall historie of the heavens, ayre, water, and earth at the West Indies, also of their beasts, fishes, fowles, plants, and other remarkable varieties of nature." He discoursed "of the fashion and form of heaven at the new-found world," "of the ayre and the winds," of ocean physics, of volcanoes and earthquakes, as well as of metals, pearls, emeralds, trees, beasts, and fowls.

He discussed the appearance and habits of the manatee and the crocodile, and described the Indian methods of whaling and pearl fishing. He dwelt at length upon the condition of the domestic animals, sheep, kine, goats, horses, asses, dogs, and cats which the Spaniards had introduced into the New World and which were already thoroughly acclimated. It seems strange to learn from his pages that in the year 1587, 99,794 hides of domestic cattle were exported from Santo Domingo and New Spain to Seville. Lynceus has suggested that some of these skins were from the bison herds, believed at that time to have been abundant in the north of Mexico.

He gives a formidable catalogue of the animals of Central and South America, in which occur the familiar names of armadillo, iguana, chinchilla, viscacha, vicugna, paco, and guanaco, and describes many of them at length, especially the peccary (*Saino*), the tapirs, the sloths, and the vicugna. He speaks of the cochineal insect, which had already become of importance in the arts.

He was the first to call attention to the existence in South America of immense fossil bones; these he supposed to be the remains of gigantic individuals of the human species.

His description of the flora is very full, and he dwells at length upon the useful applications of the cacao bean and its product, the drink which they call chocolate—"whereof they make great account in that country, foolishly and without reason"—the plantain, the yucca, the cassava, the maguey, the tunall or cactus, and very many more.

It is, however, as a scientific theorist that Acosta has the highest claim to our attention. He appears to have been the first to discuss America from the standpoint of the zoogeographer.

In considering the question, "How it should be possible that at the Indies there should be any sorts of beasts, whereof the like are nowhere else," he owns that he is quite unable to determine whether they were special creations or whether they came out of the ark. He evidently prefers the first alternative, although so trammeled by the prevalent opinions of his day and sect that he is unable to bring himself quite to its avowal. He approaches so close to the limits of heterodoxy, however, that Purchas, in His Pilgrimmes, feels obliged to print a footnote, pronouncing it "un-Christian to say that America was not drowned with the flood."

Acosta thoroughly appreciated the peculiar character of the American fauna, and remarked that "if the kinds of beasts are to be judged by their properties, it would be as reasonable to call an egg a chestnut as to seeke to reduce to the known kinds of Europe the divers kinds of the Indies." He was even willing to admit that it may not be necessary to say that the creation of the world was finished in six days, and that beasts of a more perfect character may have been made subsequently; and in his anxiety to escape the alternative of a Noah's ark almost committed himself to a theory of evolution. "We may consider well upon this subject," he wrote, "whether these beasts differ in kinde and essentially from all others, or if this difference be accidentall, which might grow by divers accidents, as we see in the Images of men, some are white, others black, some Giants, others Dwarfes; and in Apes, some have no taile, others have; and in Sheepe, some are bare, others have fleeces, some great and strong with a long necke, as those of Peru, others weake and little, having a short necke, as those of Castile. But to speak directly, who so would preserve the propagation of beasts at the Indies and reduce them to those of Europe, hee shall undertake a charge he will hardly discharge with his honour."

Francesco Hernandez, a representative physician and man of science, was sent by Philip II of Spain to Mexico, with unlimited facilities for exploration, and remained in that country from 1593 to 1600. His notes and collections seem to have been very extensive, and it is said that over 1,200 drawings of plants and animals were prepared under his direction. Editions of his works were published in Mexico in 1604 and 1615. I am assured by Mexican naturalists that his work was careful and valuable, the only defect being that he trusted too implicitly in what he was told by the native Mexicans.

Among the animals not met with in previous writings are the coyote (Aztec, *Coyotl*), the buffalo, the axolotl, the porcupine (*Hoitztlacuatzin*), the prong-buck (*Mazame*), the horned lizard (*Tapayaxin*), the bison, the peccary (*Quapizotl*), and the toucan.

Among those of which figures are for the first time published are the ocelot (*Ocelotl*), the rattlesnake (*Teuhtlacot zanhqui*), the manatee (*Manati*), the alligator (*Aquetzpalin*), the armadillo (*Ayotochtli*), the pelican (*Ayototl*).

The figures of plants are numerous, and in most instances, I should judge, recognizable.

SAMUEL PURCHAS.

Many other Spaniards published their observations upon America in the sixteenth and seventeenth centuries, but it is perhaps not necessary to refer to them even by name. They were, as a rule, travelers, not explorers. Purchas assures us that "Acosta and Oviedo have best deserved of the studious of Nature—that is, of the knowledge of God in his workes."

III.

A personage who must on no account be overlooked in the consideration of these early days is Garcilasso de la Vega. Born in Peru in 1539, his father the Spanish governor of Cuzco, his mother a princess of the Inca blood, he boasted of a lineage traced through the line of ancient Peruvian monarchs back to Manco Capac and the Sun. He served as a soldier in Europe and died in Spain about the year 1617. His Royal Commentaries of Peru, constitutes a magnificent contribution to the history of pre-Columbian America, and was said by some authorities to have been first written in the Peruvian language.[1]

Be this as it may, De la Vega's commentaries, though more valuable to the civil than to the natural historian, will always possess a peculiar interest, not only because the author was the first native of America who wrote concerning its animals and plants, but for the reason that it represents to us the historic and scientific lore of the aboriginal inhabitants of this continent.

De la Vega describes in an intelligible manner the condor (*Cuntur*) of South America, of which, as he tells us, there was a famous Indian painting in the temple at Cacha, the mountain cats or ocelots (Inca *Ozcollo*, Aztec *Ocelotl*), the puma, the viscacha, the tapir, and the three-toed ostrich. He was one of the first to notice the skunk (*Mephitis*, sp.), "which the Indians call Annas, the Spanish *Zorinnas*." "It is well," he remarks, "that these creatures are not in great numbers, for if they were, they were able to poison and stench up a whole countrey." He devotes a chapter to "the tame cattel which God hath given to the Indians of Peru"—the llama and the huanaco—and speaks also of the paco and the vicuna, clearly distinguishing and describing the appearance and habits of the four species of Tylopoda which occur on the west coast of South America, although European naturalists a century later knew but two of them. He describes the annual vicuna hunts which were conducted by the Inca kings in person, assisted by twenty or thirty thousand Indians.

The fauna of Peru, as catalogued by him, included nearly fifty species,

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[1]A Paris edition of 1633 had the following title: Commentaire Royal ou l'Histoire des Yncas Roys de Peru, etc. Ensemble une description particulière des Animaux, des Fruits, des Mineraux, des Plantes, etc. Ecrite en langue Peruvienne et traduit fur la version Espagnole par I. Baudouin, Paris, 1633; Amsterdam, 1704 and 1715. See Artedi, Bibliotheca Ichthyologica, 1788, p. 65.

and the minuteness of his observations and the accuracy of his descriptions are very surprising. He discusses at length the plants of Peru, especially the maguey, the pineapple, the tobacco, and "the pretious leaf called *Cuca*," whose virtues pharmacologists now hold in such high esteem, and devotes chapters to "The Emeralds, Turquoises, and Pearls of that Countrey;" to gold and silver, and to quicksilver.

De la Vega refers to a certain place in the city of Cuzco, where lions and other fierce creatures are kept in captivity. The taste for menageries and gardens seems to have been less pronounced in Peru, however, than in Mexico.

Much has been written concerning the wonderful collection of animals and plants which the Spanish conquistadors found in Montezuma's capital city. Carus, in his Geschichte der Zoölogie declares that at the time of the discovery of Mexico, Europe had no menageries and botanical gardens which could be compared with those of Chapoltepec and Huextepec, a statement which is quite within the bounds of truth, for the earliest botanical garden in the Old World was that founded at Pisa in 1543.[1] Our fellow member, Doctor Charles Rau, has also described the zoological gardens of Mexico in glowing terms,[2] and Professor E. B. Tylor states that in the palace gardens of Mexico all kinds of birds and beasts were kept in well-appointed zoological gardens, where there were homes even for alligators and snakes, and declares that this testifies to a cultivation of natural history which was really beyond the European level of the time.

Is it not to be regretted that the capital of the United States in 1885 is still unprovided with a means of public instruction which was to be found in the capital of Mexico four hundred years ago?

I have examined the historians of Mexico with care, and must express my conviction that the truth is more nearly touched in the bluff, soldier-like narrative of Cortez himself than in the flowery and redundant paraphrases of Prescott. We may, probably, safely accept the story as told by Bernal Diaz del Castillo, one of the companions of Cortez, to whom Torquemada, Robertson, Lockhart, Rau, and others give high praise as a truthful narrator.

Diaz presents a most vivid word-painting of the city of Mexico, and was particularly impressed by the royal aviaries:

> We saw here every kind of eagle, from the king's eagle[3] to the smallest kind included; and every species of bird, from the largest known to the little colibris,[4] in their full splendor of plumage. Here also were to be seen those birds from which the Mexicans take the green-colored feathers, of which they manufacture their

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[1] William Whewell, A History of the Inductive Sciences, from the Earliest to the Present Time, III, 1837, p. 325.

[2] Carl Rau, Thiergärten. New Yorker Staats-Zeitung, April 26, 1863.

[3] The golden eagle, says Aguilera.

[4] Humming birds.

beautiful feathered stuffs These last-mentioned birds very much resemble our Spanish jays and are called by the Indians *quezales*.[1]

The species of sparrows[2] were very curious, having five distinct colors in their plumage—green, red, white, yellow, blue.

There were such vast numbers of parrots and such a variety of kinds that I can not remember all their names; and geese of the richest plumage and other large birds. These were at stated periods stripped of their feathers, that new ones might grow in their place. All these birds had appropriate places to breed in and were under the care of several Indians of both sexes, who had to keep their nests clean, give to each kind its proper food, and set the birds for breeding.

In another place, near a temple, were kept all manner of beautiful animals, the names of which were not noted by Diaz, nor their peculiarities described.

In the building where the human sacrifices were perpetrated there were dens in which were kept poisonous serpents, and among them "a species at the end of whose tail there was a kind of rattle." This last-mentioned serpent, which is the most dangerous, was kept in a cabin in which a quantity of feathers had been strewed; here it laid its eggs, and it was fed with the flesh of dogs and of human beings which had been sacrificed. . . . When all the tigers and lions[3] roared together with the howlings of the jackals[4] and foxes and hissing of the serpents, it was quite fearful, and you could not suppose otherwise than that you were in hell.

This is the first record of the rattlesnake, and brings to mind the captive snakes of the Mokis, their annual snake dance, and their use of feathers in the same connection.[5]

I am not yet prepared to believe in the marvelous aquaria described by Prescott, although fish ponds there doubtless were.

I am assured by our fellow-member, Señor Aguilera, that the locations of the gardens of Montezuma are well identified, and that the Mexican Indians still possess a marvelous knowledge of the medicinal virtues of plants, which is handed down by tradition from generation to generation. From this he infers that in the days of Aztec glory the knowledge of the uses of plants must have been very comprehensive.

Who shall say that the spirit of true science did not inspire the Inca Pachacutec, when many centuries ago he handed down to his descendants maxims such as this:

A herbalist who knows the names but is ignorant of the virtues and qualities of herbs, or he who knows few but is ignorant of most, is a mere quack and mountebank, and deserves not the name and repute of a physician until he is skillful as well in the noxious as in the salutiferous qualities of herbs.

Impressed with the extent of the knowledge of nature among the aborigines of America, I asked one of the most learned of our anthro-

[1] Trogons, known as *quetzales* by the Mexican Indians of to-day. Excellent examples of their pictorial use of trogon feathers may be seen in the United States National Museum.

[2] *Cyanopiza versicolor.*

[3] Ocelot, juguars, pumas, eyras, jaguarundis.

[4] The coyote (*coyotl*), *Canis latrans*.

[5] John G. Bourke, The Snake Dance of the Moquis of Arizona, New York, 1884.

pologists for his opinion in regard to its character, and received the following statement:

WASHINGTON, *January 5, 1886.*

MY DEAR MR. GOODE: We make a very grave mistake if we think there was no study of nature before the science of natural history. In all branches of study whatever there was lore before there was science. Before the Weather Bureau was weather lore, a kind of rough induction which the ancient people made, and which was very far from erroneous, Doctor Washington Matthews read a paper before the Washington Philosophical Society more than a year ago[1] to draw attention to the marvelous intimacy of the Navajo Indians with the plant kingdom around them, and their vocabulary, which contained names for many species constructed so as to connote qualities well known to them. You are familiar with the stories concerning the respect in which certain animals are held by the Eskimo, and the minute acquaintance of all our aborigines of both continents with the life histories of many animals. The Eskimo, as well as the Indian tribes, carve and depict forms so well that the naturalist can frequently determine the species. Mr. Lucien Turner collected carvings in ivory of fœtal forms.

Very truly, yours, O. T. MASON.

Professor Mason also called attention to a long paper upon Tame Animals among the Red Men of America, by Doctor E. F. im Thurn,[2] in which it is stated that the Indian of South America finds means to tame almost every wild bird and beast of his country, so that these domesticated animals are ever among the most prominent members of his household, not because of any affection for them, but because he enjoys their bright colors, makes use of them in various ways, and employs them as a medium of exchange. They even know how to change the colors of a living bird from green to yellow. In one settlement he counted twenty-one kinds of monkeys. Nearly all of the thirty or more species of Guiana parrots are tamed, two species of deer, two of peccaries, two of coati-mundis, jaguars, pacas, capybaras, agoutis, hawks, owls, herons, plovers, toucans, troupials, rupicolas, and iguanas were also observed in captivity. The mere fact that these animals are kept in captivity is not in itself especially significant, but it renders it possible to understand how splendor-loving rulers of Mexico succeeded in building up the great menageries.

Bearing in mind the animal myths which Major Powell has found so prevalent among the Indians of Arizona and New Mexico, and has so charmingly translated, and those which Schoolcraft and others recorded in the north long ago, and which Longfellow has arranged in metric form, we can not but be impressed with the idea that the red man of old, living close to nature as he did, knew many of her secrets which we should be glad to share with him at the present day.

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[1] Washington Matthews, Natural Naturalists. Bulletin of the Philosophical Society Washington, VII, 1885, p. 73 (abstract).

[2] Timehri, being the Journal of the Royal Agricultural and Commercial Society of British Guiana. Demerara, I, 1882, pp. 25–43.

CONSTANTINE SAMUEL RAFINESQUE.

Garcilasso de la Vega was not the only descendant of the aboriginal Americans who has written upon their history. Among the authors of works upon Mexican archæology published in the seventeenth and eighteenth centuries were Taddeo de Niza and Gabriel d'Ayala, "noble Indians" of Tlazcala and Tezcuco, the three named Ixtlilxochitl, and ten or twelve more. Gongora, a native Mexican, professor of mathematics in the University of Mexico, was one of the earliest American astronomers, the author of the Mexican Cyclography, printed two centuries ago. Herrera, Martinez, Garcia, Torquemada, Castillejo, De Betancourt, De Solis, Del Pulgar, and Beneducci have done what they could to preserve a portion of this ancient American lore, and it seems almost incredible that, sometime in the future when American archæology shall have gained a firmer footing, some of the treasures of fact which these men garnered up are not to have an important function in elucidating anthropological problems which are as yet entirely unsolved.

IV.

The colony on Roanoke Island having been abandoned by the English, twenty years elapsed before their next effort toward peopling America. Then came the adventurers to Jamestown in 1606, and with them that picturesque personage, Captain John Smith, who, though unversed in the mathematics and astronomy which made up to a great extent the science of the day, was a keen observer and an enterprising explorer. His contributions to geography were important, and his descriptions of the animals and plants of Virginia and New England supplement well those of his predecessor, Harriot.

Captain Smith was the first to describe the raccoon, the musquash, and the flying squirrel:

> There is a beast they call *Aroughcun* (raccoon), much like a badger, but useth to live on trees, as Squirrels doe. Their Squirrels some are neare as great as our smallest sort of wilde Rabbets, some blackish, or blacke and white, but most are gray. A small beast they have they call *Assapanick*, but we call them flying Squirrels, because, spreading their legs, and so stretching the largenesse of their skins that they have been seene to fly 30 or 40 yards. An *Opossum* hath a head like a Swine, and a taile like a Rat, and is of the bignesse of a Cat. Vnder her belly she hath a bagge, wherein she lodgeth, carrieth, and suckleth her young. A *Mussascus* (musquash) is a beast of the forme and nature of our water Rats, but many of them smell exceedingly strongly of Muske.

And in the same strain he goes on to mention a score of mammals, identifying them with those of Europe with surprising accuracy.

His "*Utchun quoyes*, which is like a Wild Cat," is evidently the bay lynx. With the birds he was less familiar, but he mentions a number which resemble those of Europe, and states that many of them were unfamiliar. He was the first to refer to the red-wing blackbird (*Agelæus phœniceus*).

He catalogues twenty-five kinds of fish and shellfish, using the names by which many of them are known to this day.

He gives also a very judicious account of the useful trees of Virginia, referring, among novel things, to the Chechinquamin (chinkapin), and another which no one can fail to recognize.

> Plums, [he says], are of three sorts. . . . That which they call *Putchamins* grow as high as a *Palmeta;* the fruit is like a Medler; it is first greene, then yellow, and red when it is ripe; if it be not ripe it will draw a man's mouth awry with much torment.[1]

In his description of New England, Smith mentions twelve species of mammals, including the "moos," now spoken of for the first time,[2] sixteen of birds, and twenty-seven "fishes." His descriptions of the abundance of fishes are often quoted.[3]

Smith's first work upon Virginia was printed in 1612 and his General History in 1624. In the interim, Ralphe Hamor, the younger, secretary of the colony, issued his True Discourse of the Present Estate of Virginia, published in London in 1615.[4] Hamor was not a naturalist, but his name is usually referred to by zoological bibliographers, since he mentions by name over sixty native animals. He was the first to describe the great flocks of wild pigeons, of which he remarks: "In winter, beyond number or imagination, myselfe hath seene three or foure houres together flockes in the aire so thicke that even they have shadowed the skie from us."[5] He gives an amusing description of the "opossume," and also speaks of the introduction and successful acclimation of the Chinese silkworm.

In 1620 the Plymouth Colony was planted, and its members also began to record their impressions of the birds and the beasts and the plants which they found, for the instruction of their kinsfolk at home.

Bradford and Winslow's Journal, printed in London in 1622, contains various passing allusions to the animals and plants observed by the Pilgrims, as does also Bradford's History, which, however, was not printed until long after its completion. They added nothing, however, to what had already been said by Smith.

Edward Winslow's News from New England, printed in London

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[1] Generall Historie, 1624, p. 27.

[2] From the Indian word *Moosoa*. Slafter, in his notes on Champlain's Voyages, I, p. 265, supposes the *Orignac* referred to by this explorer in his De Sauvages, etc., Paris, 1607, to have been the Moose, and his *Cerf* to have been the Caribou.

[3] Generall Historie, 1624, pp. 216, 217.

[4] A copy of this rare work was sold in London, 1883, for £69. A reprint was issued by Joel Munsell at Albany in 1860, but this privately printed edition consisted of only 200 copies and it is already scarce.

[5] Page 21.

in 1624, contains one of the earliest descriptions of the Indians of the Northeast.

William Wood's New England's Prospect, which was issued in London in 1634, and Morton's New English Canaan, printed three years later in Amsterdam, were the first formal treatises upon New England and its animals and plants. The two authors were very unlike, and their books even more so—yet complementing each other very satisfactorily. Morton was the best educated man, brightest, and most observant; Wood the most conscientious and the most laborious in recording minute details.

"Thomas Morton, of Clifford's Inn, Gent.," was by no means a representative man in the Puritan community in which he lived. His habits were those of an English man of fashion, and his Rabelaisian humor, when directed against his fellow-colonists and their institutions, was no recommendation to their favor. We can not wonder that he was hunted from settlement to settlement and even cast into prison, to endure, without bedding or fire, the rigor of a New England winter.

As a naturalist, Morton appears to have been the most accurate of the two of this time. In those parts of his book which describe animals and plants he manifests a definite scientific purpose. He discriminates between species, and frequently points out characters by which American and European forms may be distinguished. He was the first to banish the lion from the catalogue of the mammals of eastern North America. Even Wood, though he admitted that he could not say that he ever saw one with his own eye, evidently believed that lions inhabited the woods of Massachusetts. Morton was a skeptic because, as he said, "it is contrary to the Nature of the beast to frequent places accustomed to snow; being like the Catt, that will hazard the burning of her tayle, rather than abide from the fire." His brief biographies, especially those of mammals, indicate that he was an observer of no slight acuteness.

Twenty species of mammals, thirty-two of birds, twenty of fishes, eight of marine invertebrates, and twenty-seven of plants are mentioned, usually in such definite terms that they may readily be identified.

A thorough pagan himself, he seems to have commanded the confidence of the Indians more than others, to have lived in their society, and learned to comprehend the meaning of their customs. His first book, The Originall of the Natives, their Manners and Customs, seems to have been the careful record of rather critical observations.

Wood's book is no less deserving of praise. The climate and the soil are judiciously discussed, and the herbs, fruits, woods, waters, and minerals, then "the beasts that live on land," "beasts living in the water," "birds and fowls both of land and water," and fish, after which follows a topographical description of the colony. His catalogues of species are in verse, and his adjectives are so descriptive and pictorial that his subsequent remarks in prose are often superfluous. I quote his catalogue of the trees of New England, an imitation in manner and meter of Spenser's famous catalogue in The Faerie Queene:

> Trees both in hills and plaines in plenty be
> The long liv'd Oake, and mourneful Cypris tree
> Skie towring pines, and Chestnuts coated rough,
> The lasting Cedar and the Walnut tough;
> The rozin dropping Firre for masts in use.
> The boatmen seeke for Oares light neeate growne sprewse,
> The brittle Ash, the ever trembling Aspes,
> The broad-spread Elme, whose concave harbours waspes
> The water-springie Alder, good for nought
> Small Elderes by the Indian Fletchers sought
> The knottie Maple, pallid Birtch, Hawthornes,
> The Horne bound tree that to be cloven scornes;
> Which from the tender Vine oft takes his spouse,
> Who twinds embracing armes about his boughes.
> Within this Indian Orchard fruites be some
> The ruddie Cherrie, and the jettie Plumbe
> Snake murthering Hazell, with sweet Saxaphrage
> Whose steemes in beere allays hot fever's rage.
> The Diar's Shumach, with more trees there be
> That are both good to use and rare to see.

Thus he describes the Animals of New England:

> The Kingly Lyon and the strong arm'd Beare
> The large limbed Mooses, with the tripping Deare.
> Quill darting Porcupines, and Rackcoones bee
> Castelld in the hollow of an aged Tree
> The skipping Squirrel, Rabbet, purblinde Hare
> Immured in the selfe same Castle are
> Least red-eyed Ferrets, wily Foxes should
> Them undermine if ramperd but with mould.
> The grim fac't Ounce, and ravenous howling Woolfe
> Whose meagre Paunch suckes like a swallowing Gulfe,
> Black glistening Otters and rich coated Beaver
> The Civet scented Musquash, smelling ever.

His subsequent remarks upon the mammals are expanded from his rhyme, and extended by tales which he has heard from hunters. One of the animals whose name would not lend itself to poesy is the "squuncke," which he classified among the "beasts of offence." This seems to be the first use of the name.

In the second part of Wood's book the Indians are discussed, and a very creditable vocabulary is given.

Most admirable work was now being done among the Indians by some of the colonial clergymen. Chief among them was the Rev. John Eliot [b. 1604, d. 1690], who, during a residence of more than half a century at Roxbury, mastered the language of the Massachusetts branch of the great Algonquin tribe and published his grammars and translations. He was a graduate of Jesus College, Cambridge, and came to Massachu-

Wm C. Redfield

setts in 1631. The Rev. Abraham Peirson, one of the founders of the colony at Newark, during his residence in New England made valuable investigations upon the language of the Quiripi or Quinnipiac Indians of the New Haven colony. The extensive bibliography of which Mr. Pilling has recently published advance sheets gives an excellent idea of the attention which American linguistics have since received.

That very eminent colonial statesman, John Winthrop the younger, the first governor of Connecticut [b. 1587, d. 1649], stood high in the esteem of English men of science, and was invited by the newly founded Royal Society, of which he was a fellow, "to take upon himself the charge of being the chief correspondent in the West, as Sir Philiberto Vernatti was in the East Indies." The secretary of the Royal Society said of him: "His name, had he put it to his writings, would have been as universally known as the Boyles, the Wilkins's, and the Oldenburghs, and been handed down to us with similar applause."[1]

Governor Winthrop's name occurs from time to time in the Philosophical Transactions, and it was to him that science was indebted for its first knowledge of the genus *Astrophyton*.

John Winthrop, F. R. S. [b. 1606, d. 1676], son of the last, and also governor of Connecticut in 1662, is said to have been "famous for his philosophical knowledge." He was a founder of the Royal Society, being at the time of its origin in England as agent of the colony. And the second governor's grandson, John Winthrop, F. R. S. [b. 1681, d. 1747], who passed the latter part of his life in England, was declared to have increased the Royal Society's repository "with more than six hundred curious specimens, chiefly in the mineral kingdom," and since the founder of the museum of the Royal Society. "the benefactor who has given the most numerous collections."[2]

The Rev. John Clayton, rector of Crofton, at Wakefield, in Yorkshire, made a journey to Virginia in 1685, and in 1688 communicated to the Royal Society An Account of several observables in Virginia and in his Voyage thither.[3] Clayton seems to have been a man of scientific culture, and to have been the author, in company with Doctor Moulin, of a treatise upon comparative anatomy. He was of the same school with Harriot and Wood, though more philosophical. His essay was, however, the most important which had yet been published upon the natural history of the South, and his annotated catalogue of mammals, birds, and reptiles is creditably full.

Thomas Glover also published about this time An Account of Vir-

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[1] Doctor Cromwell Mortimer, in the dedication of Volume XL, Philosophical Transactions.

[2] Tuckerman, in Archæologia Americana, IV, pp. 123–124. See also The Winthrop Papers. Massachusetts Historical Society Collections, 5th ser., VIII, p. 571.

[3] Philosophical Transactions, XVII, pp. 781–795, 978–999; XVIII, pp. 121–135, and in Miscellaneoua Curiosa, III; also reprinted in Force's Historical Tracts, III.

ginia,[1] in which he discussed the natural history of the colony after the manner of Wood and Morton. The Rev. Hugh Jones also published a similar but shorter paper upon Several Observables in Maryland,[2] in which, however, no new facts are mentioned. He collected insects and plants for Petiver.

Benjamin Bullivant, of Boston, was another of the men who, to use the language of the day, was "curious" in matters of natural history. One of his letters was published in the Philosophical Transactions,[3] and his notes on the "hum-bird" are sometimes referred to.

Bullivant was not a naturalist; he is less worthy of our consideration than Harriot, although a century later. A fit companion for Bullivant was John Josselyn.

Josselyn's famous work entitled New England's Rarities Discovered in Birds, Beasts, Fishes, Serpents, and Plants of that Country, was printed in London in 1672; his Account of Two Voyages to New England, in 1675 (second edition). No writer of his period is more frequently quoted than Josselyn, whose quaint language and picturesque style are very attractive. Although no more in sympathy with his Puritan associations than the author of New England's Prospect, he was evidently more justly entitled to subscribe himself as "Gentleman," and his books are not disfigured by personalities and political aspersions.

Josselyn does not seem to me to be the peer, as a naturalist, of many of those who preceded him. He was a bright, though superficial, man, and a ready compiler. He evidently had some botanical work in his possession, possibly, as Tuckerman has suggested, a recently published edition of Gerard's Herbal, and this he used with such skill as to give him a certain standing in botanical literature. In his zoological chapters I find little which had not been recorded before, while the author's fondness for startling anecdotes greatly mars the semblance of accuracy in his work. His catalogue of fishes is a strange olla-podrida of names and scraps of information, compiled, collected, and invented. His method of arrangement is not more scientific than his spirit, and it is questionable whether he is entitled to a place among naturalists.

Here is an example of his style:

> "The *Basse*," writes he, "is a salt water fish too . . . . one writes that the fat in the bone of a *Basses* head is his braines which is a lye."

To this period belongs, also, Lawson, the author of a History of Carolina and A New Voyage to Carolina, made in 1700 and the following years, while acting as surveyor-general of the colony. Lawson was burnt at the stake in 1709 by the Indians, who resented his encroachments upon their territory. His lists of the animals and plants of the region are very full and his observations accurate. Coues's "Lawsonian period" in the

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[1] Philosophical Transactions, XI, p. 6323.

[2] Idem., XXI, p. 436.

[3] Idem., XX, p. 167.

history of American ornithology is hardly justifiable. Lawson belonged to the school of Harriot and the first Clayton.

Edward Bohun and Job Lord, of Carolina, appear to have been interested in natural history at this time and to have been collecting specimens for Petiver in London, while William Vernon was engaged in similar occupations in Maryland.

In those early days all Europe was anxious to hear of the wonders of America, and still more eager to see the strange objects which explorers might be able to preserve and bring back with them. Public museums were as yet unknown, but the reigning princes sought eagerly to secure novelties in the shape of animals and plants.

Columbus was charged by Queen Isabella to collect birds, and it is recorded that he took back to Spain various skins of beasts. Even to this day may be seen, in Siena, hanging over the walls of the old collegiate church, a votive offering, placed there nearly four centuries ago by the discoverer of America, then in the prime of his glory. It consists of the helmet and armor worn by him when he first stepped upon the soil of the New World, and the rostrum of a swordfish killed on the American coast.

The State papers of Great Britain contain many entries of interest to naturalists. King James I was an enthusiastic collector. December 15, 1609, Lord Southampton wrote to Lord Salisbury that he had told the King of the Virginia squirrels brought into England, which were said to fly. The King very earnestly asked if none were provided for him—whether Salisbury had none for him—and said he was sure Salisbury would get him one. The writer apologizes for troubling Lord Salisbury, "but," he continues, "you know so well how he (the King) is affected to such toys."

Charles I appears to have been equally curious in such matters. In 1637 he sent John Tradescant, the younger, to Virginia "to gather all rarities of flowers, plants, and shells."

In 1625 we find Tradescant writing to one Nicholas that it is the Duke of Buckingham's pleasure that he should deal with all merchants from all places, but especially from Virginia, Bermudas, Newfoundland, Guinea, the Amazons, and the East Indies for all manner of rare beasts, fowls and birds, shells and shining stones, etc.[1]

In the Domestic Correspondence of Charles I, in another place,[2] July, 1625, is a "Note of things desired from Guinea, for which letters are to be written to the merchants of the Guinea Company." Among other items referred to are "an elephant's head with the teeth very large; a river horse's head; strange sorts of fowls; birds and fishes' skins; great flying and sucking fishes; all sorts of serpents, dried fruits, shining stones, etc." Still further on is a note of one Jeremy Blackman's charge, in all

[1] Calendar of Colonial Papers, IV, 1625, p. 77.

[2] Idem., III, p. 75, Nos. 155, 156.

£20, for transporting four deer from Virginia, including corn and a place made of wood for them to lie in.[1]

Not only did the kings make collections, but the keepers of public houses made museums then, as they do now, for the pleasure of their patrons.

At the middle of the last century there appear to have been several collections of curiosities.

In Artedi's ichthyological works there are numerous references to places where he had seen American fishes, especially at Spring-garden[2] and at the Naggshead, and the White-bear, and the Green Dragon in Stepney, in those days a famous hostelry in London. He speaks also of collections at the houses of Mr. Lillia and Master Saltero's[3] in Chelsey and at Stratford, and also in the collection of Seba, in Amsterdam, and in that of Hans Sloane.

With the exception of "*the monk* or *Angel-fish*, *Anglis* aliis *Mermaid-fish*," probably a species of *Squatina*, which he saw at the Nag's Head, all the fishes in these London collections belonged to the order Plectognathi.

Josselyn, after telling us how a Piscataway colonist had the fortune to kill a Pilhannaw—the king of birds of prey—continues, "How he disposed of her I know not, but had he taken her alive and sent her over into England neither Bartholomew nor Sturbridge Fair could have produced such another sight."[4]

Shakespeare's mirror strongly reflects the spirit of the day. When Trinculo, cast ashore upon a lonesome island, catches a glimpse of Caliban he exclaims:

> "What have we here,—a man or a fish? Dead or alive? A fish: he smells like a fish; a very ancient and fish-like smell. . . . A strange fish! Were I in England now, (as once I was,) and had but this fish painted, not a holiday fool there but would give a piece of silver; there would this monster make a man; any strange beast there makes a man: when they will not give a doit to relieve a lame beggar, they will lay out ten to see a dead Indian."[5]

The compilers of the great encyclopedialike works on natural history were quick to pick up the names and descriptions of the American animals which had found their way to Europe, and many such are mentioned in the writings of Gesner, Clusius and Aldrovandus, Lister, Laet, and Willughby.[6]

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[1] Calendar of Colonial Papers, I, 1638, p. 285.

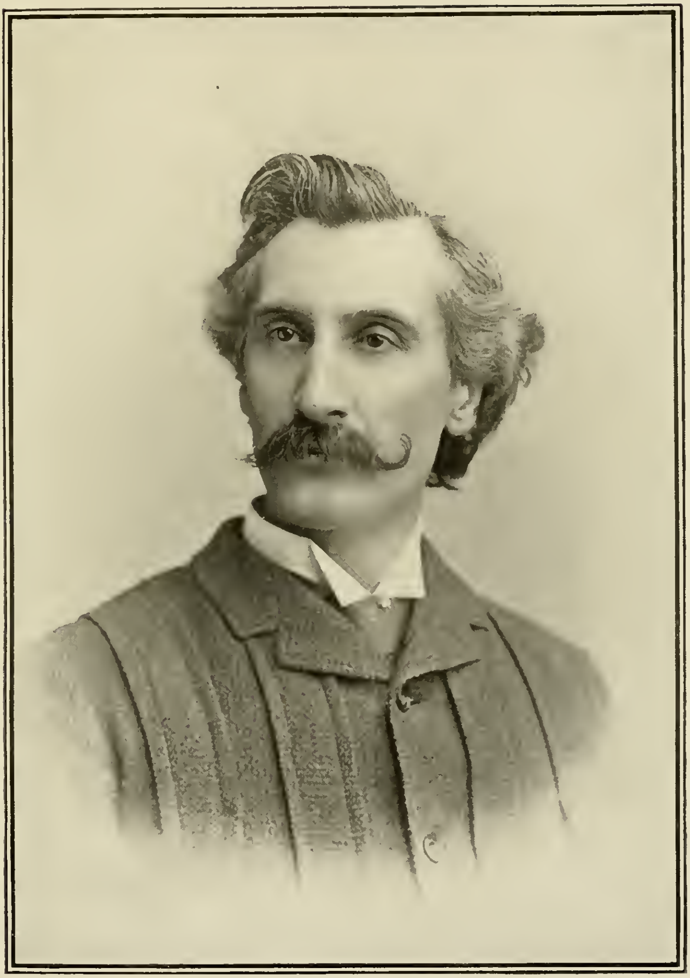
[2] Later known as Vauxhall Gardens, a famous place of resort.

[3] The barber virtuoso, described in Bulwer's Devereux.

[4] John Josselyn, An Account of Two Voyages to New England (made during the years 1638, 1663), Boston, 1865.

[5] The Tempest, Act II, Scene 2.

[6] In Nehemiah Grew's Catalogue and description of the natural and artificial Rarities, belonging to the Royal Society and preserved at Gresham College, Whereunto is subjoined the comparative Anatomy of Stomachs and Guts, London, 1694, are descriptions and figures of every American animal.



CHARLES VALENTINE RILEY.

Creatures of remarkable appearance, which could be preserved with ease, were the first to become known. Among fishes, for instance, those with a hard, inflexible integument, such as the trunk fishes. Every species of the family *Ostraciontidæ* was known in Europe as early as 1685; most of them probably a century before. We know that Columbus caught a trunk fish and described it in his Voyages.

Professor Tuckerman has traced in a most instructive manner the beginnings of European acquaintance with American plants, finding traces of the knowledge of a few at a very early period:

> Dalechamp, Clusius, Lobel, and Alpinus—all authors of the sixteenth century—must be cited occasionally in any complete synonymy of our *Flora*. The Indian-corn, the side-saddle flower (*Sarracenia purpurea* and *S. flava*), the columbine, the common milkweed (*Asclepias cornuti*), the everlasting (*Antennaria margaritacea*), and the *Arbor vitæ*, were known to the just-mentioned botanists before 1600. *Sarracenia flava* was sent either from Virginia, or possibly from some Spanish monk in Florida. Clusius's figure of our well-known northern *S. purpurea* . . . . was derived from a specimen furnished to him by one Mr. Claude Gonier, apothecary at Paris, who himself had it from Lisbon; whither we may suppose it was carried by some fisherman from the Newfoundland coast. The evening primrose (*Œnothera biennis*) was known in Europe, according to Linnæus, as early as 1614. *Polygonum sagittatum* and *arafolinm* (tear-thumb) were figured by De Laet, probably from New York specimens, in his Novus Orbis, 1633. Johnson's edition of Gerard's Herbal (1636) . . . . contains some dozen North American species, furnished often from the garden of Mr. John Tradescant . . . . and John Parkinson—whose Theatrum Botanicum (1640) is declared by Tournefort to embrace a larger number of species than any work which had gone before it—describes, especially from Cornuti, a still larger number.[1]

All the early voyagers were striving for the discovery of a western passage to India, and the West Indies, so called, were considered simply a stage on the journey toward the East Indies. It is not strange, therefore, that writers should often have failed to distinguish the faunal relations of the animals which they described. Many curious paradoxes in nomenclature have thus arisen—*Cassis madagascariensis*, for instance, a very misleading name for a common West India mollusk.

V.

The seventeenth century bears upon its roll the names of many explorers besides those of English origin who have already been named. Within fifty years of the time of Harriot and of the planting of the colony at Roanoke, the number and extent of the European settlements in America had become very considerable. Virginia and the New England plantations were growing populous and Maryland was fairly established. Insular colonies were thriving at Newfoundland and Bermuda and on Barbados and elsewhere in the West Indies.

New Spain and Florida marked the northern limits of the domain of the Spaniards, who had already overrun almost all of South America.

[1] Archæologia Americana, IV, pp. 116, 117.

New France bounded New England on the north, and the French were pushing their military posts and missionary stations down into the Mississippi Valley.

The Dutch were established on Manhattan Island and elsewhere in the surrounding country, and the Dutch West India Company had already a foothold in Brazil and Guiana. A colony of Scandinavians had been planted by the Swedish West India Company near the present site of Philadelphia, and the forsaken Danish colonies of Greenland were soon to be reestablished. The Portuguese had flourishing settlements in Brazil, for the possession of which they were contending with the Dutch.

Every European nation was represented in the great struggle for territory save Italy and Germany, Switzerland and Russia; but the Italians and Germans, the Swiss and the Russians were to hold their own in the more generous emulation of scientific exploration which was to follow.

During the seventeenth and eighteenth centuries numerous explorations were made both in North and South America by Spanish, French, Dutch, German, and Scandinavian explorers. Although these men have been studied in the preparation of this address, I do not intend to speak of them at any length, but to confine my attention in the main to the growth of scientific opinions and institutions in the English colonies.

The number of volumes of reports and narratives, often sumptuously printed and expensively illustrated, which were published during the seventeenth and eighteenth centuries, impresses upon one most powerfully the idea of the earnestness, diligence, and intelligence of their writers.

The Spaniards.—Even as early as the beginning of the century, Spanish influence was less prominent in the affairs of the New World; in no respect more strikingly so than in explorations. The political supremacy of Spain was gone, her intellectual activity was waning, and the mighty storm of energy, by which her domain in America had been so suddenly and widely established, seemed to have completely exhausted the energy of her people, depleted as it had been by wars without and religious prosecution within.

From this time forward the record of Spanish achievements in the fields of science and discovery is very meager. Between the day of Hernandez and that of Azara and Mutis, who explored South America in the latter part of the eighteenth century, I find but two names worthy of mention, and these seem properly to belong with the naturalists who lived a hundred years before them. I refer to José Gumilla, who published, in 1741, a work on the natural history of the Orinoco region, and Miguèl Venegas, whose Noticia de la California appeared in 1757.

The French.—One of the first French explorers who left a record of his observations was Samuel de Champlain, who made a voyage to the West Indies and Mexico, 1599–1602, and began his travels in New France in 1603. He was the founder of Quebec, where he died in 1635, and his geographical explorations and maps are of great value. His observations upon the animals and plants are disappointing. He describes the gar-pike and the king-crab, already described and figured by Harriot many years before, and refers in unmistakable terms to the shearwater, the caribou, the wild turkey, and the scarlet tanager. His lists of animals which occur now and again in the course of his narrative are too vague to be of value.[1]

Much higher in the esteem of naturalists was Gabriel Sagard Théodat, a Franciscan friar, whose Le Grand Voyage du Pays des Hurons, printed in 1632, was the most scholarly work upon America which had yet appeared, and whose History of Canada and of the journeys made by the Franciscans for the conversion of the infidels also contains most valuable records.

The first work on the plants of North America was that of Cornuti—Canadensium Plantarum, aliarùmque nondum editarum historia—printed in Paris in 1635, which described thirty-seven species, thirty-six of these being illustrated by elaborate engravings upon copper. The botanical part of this treatise is usually ascribed to Vespasian Robin, and Tuckerman supposes that the local notes, as well as the specimens described, were probably the result of the labors of the worthy Franciscan missionary, Sagard.[2]

A few years later, Pierre François Xavier de Charlevoix [b. 1682, d. 1761], a Jesuit priest, having by royal command traveled through the northern part of North America, published his Histoire et Description Générale de la Nouvelle France, Paris, 1744, which was full of important biological and ethnological observations, the accuracy of which is not questioned.

He subsequently traveled in South America, and published in 1760 a work full of statements concerning the animals, plants, and fruits of that country, and also particularly interesting from the account which it gives of the singular Jesuit establishment in Paraguay.

Other French missionaries, Brebœuf, Du Poisson, Jaques, Joliet, La Chaise, Lallemand, Marquette, Senat, and Souel, followed Charlevoix in the exploration of these regions. Their works contain many valuable notes upon animals and plants.

Jean Baptiste du Tertre, in his Histoire Générale des Antilles, habitées par les François, published in Paris in 1667 [ed. 1667–71], described and illustrated many of the New World animals.

In 1672 Nicolas Denyse published in Paris two comprehensive works upon America, viz: Histoire Naturelle des Peuples, des Animaux des Arbres and Plantes de l'Amérique,[3] and Description Geographique des Costes de l'Amérique Septentrionale, avec l'Histoire Naturelle du Païs.[4]

[1] Publications of Prince Society, Boston, 1878; Hakluyt Society, XXIV, 1850.

[2] Archæologia Americana, IV, p. 119.

[3] Paris, 1672, octavo.

[4] 1672, duodecimo, 2 vols.

F. Froger, a companion of De Gennes in his voyage made in 1695–1697 to the coast of Africa, the Straits of Magellan, Brazil, Cayenne, and the Antilles, published a report in 1698.[1] The book has been overlooked by recent bibliographers, but, judging from Artedi's remarks upon its ichthyological portion, it was fully equal to similar works of its day.

Baron de la Hontan, lord lieutenant of the French colony at Placentia, printed at the Hague in 1703 his Voyages dans l'Amérique, which is sometimes referred to by zoologists.

Louis Feuillée, who traveled by royal commission from 1707 to 1712 in Central and South America, published four volumes of physical mathematics and botanical observations, 1714–1725, in Paris.

The Père Jean Baptiste Labat visited the West Indies as a missionary early in the eighteenth century, and Nouveau Voyage aux Isles de l'Amérique, printed in Paris, 1722, is very full of interesting and copious details of natural history.

The Père Laval visited Louisiana and published in Paris, 1728, his Voyage de la Louisiane.

M. Le Page Du Pratz followed, in 1758, with his Histoire de la Louisiane,[2] full of geographical, biological, and anthropological observations upon the lower valley of the Mississippi, and Captain Bossu, of the French marines, also published a book upon the same region,[3] translated into English in 1771 by John Reinhold Forster, whose notes gave to the work its only value. These men are all catalogued with the seventeenth-century naturalists because they were of the old school of general observers and only indirectly contributed to the progress of systematic zoology.

Charles Plumier [b. 1646, d. 1704] was sent thrice by the King of France to the Antilles during the latter years of the seventeenth century. He published three magnificently illustrated works upon the plants of America[4] and left an extensive collection of notes and drawings of animals and plants, many of which have proved of value to naturalists of recent years. His colored drawings of fishes were of great service to Cuvier in the preparation of his great work upon ichthyology, and in some instances species were founded upon them.

The Dutch.—There were few lovers of nature among the colonists of Manhattan, and with the exception of certain names which have clung to well-known animals, such as the mossbunker and weakfish, naturalists have little to remind them of the days of Van Twiller and Stuyvesant. Van Der Donck, in 1659, described the fauna, and Jakob Steendam's poem, "In praise of the Netherlands," catalogued many of the animals.

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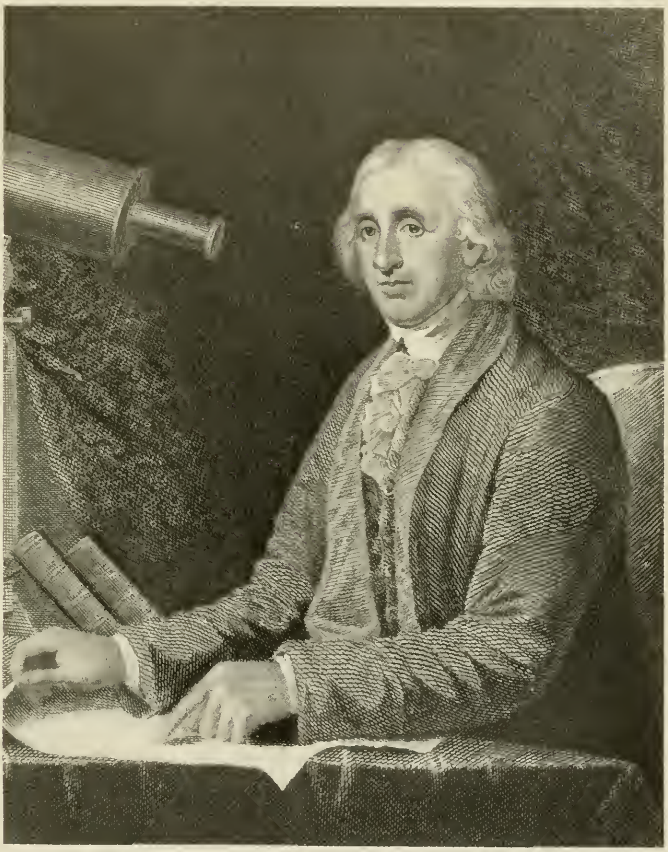
[1] Paris, 1698; Amsterdam, 1699; London (translation), 1698.

[2] Paris, 1758.

[3] Nouveaux Voyages aux Indes Occidentales, etc., Paris, 1768.

[4] Nova Plantarum Americanarum Genera, 1703. Traité Des Fougères de L'Amérique 1705.



Dav^d. Rittenhouse

The achievements of Prince Maurice of Nassau (b. 1604, d. 1679), the conqueror of Brazil, during his residence in that country from 1636 to 1644, were far more important than those of any one man in the seventeenth century, and entitled the Netherlands to a leading place in the early history of American scientific explorations. The notes and figures which were collected by him and his scientific assistants, Marcgrave, Piso, and Cralitz, were published in part under the editorship of Golius and Laet, and have been frequently used by naturalists of the present century. An atlas of colored drawings from the hand of Prince Maurice is still preserved in the Royal Library in Berlin. Here are depicted 34 species of mammals, 100 of birds, 55 of reptiles, 69 of fishes, and 77 of insects, besides many of plants.

Marcgrave's Historia Rerum Naturalium Brasiliæ was printed in Amsterdam in 1648, four years after his untimely death while exploring the coast of Guinea.

Piso's Medicina Braziliensis, 1648, and his Natural History and Medicine of both Indies, 1658, were also results of Prince Maurice's expedition.

Among other contributions made by the Netherlands to the natural history of America were the Relation du Voyage de Isle Tobago, Paris, 1606, and the Histoire Naturelle et Morale des Iles Antilles, Rotterdam, 1658,[1] written by N. Rochefort, a Protestant missionary to the West Indies, and Jan Nieuhof's See und Landreize benessens een bondege Beschreyving van gantsch Nederland Brazil so van Landschappen Steden, deren Gewaffen, etc., printed in 1682.

Jan Jacob Hartsinck, a Dutch traveler in Guiana, printed a book of scientific travels at Amsterdam in 1770.

Philippe Fermin, a Dutch naturalist, resident for many years in Surinam, published in Amsterdam two important works upon the natural history of that region, in 1765 his Histoire Naturelle de la Hollande Equinoxiale, and in 1769 his Description de Surinam. I refer to these works as important, not because they are of great value to zoological writers of to-day, but because they, in their day, marked distinct advances in knowledge.

The Scandinavians.—Danish enterprise at an early day sent explorers to the Western Continent, and the scholarly tendencies of the Scandinavian mind were soon manifest in a literature of geographical and scientific observations.

Hans Egede, a missionary who went to Greenland at least as early as 1715, published in 1741 his comprehensive work upon Greenland, of which so many editions have been published.

Otho Fabricius [b. 1744, d. 1822], another missionary, long resident in Greenland, published in 1780 his Fauna Grœnlandica, a work which

[1] First edition without name of author; others, Paris, 1665; Lyons, 1667; Amsterdam, 1716.

in scientific accuracy has never been excelled—a most important contribution to systematic zoology. David Crantz's History of Greenland, published in 1770, is another important scientific work from the hand of a missionary, and Zorgdrager's notices of the Greenland fisheries deserve a passing notice.

The travels of Kalm, a Swede and a pupil of Linnæus, are noticed elsewhere. Peter Loefling, another pupil of Linnæus, visited Spanish America, and in his Iter Hispanicum, printed in Stockholm, 1758, described many animals and plants observed by him.

Olaf Swartz, a Swede, discovered and described 850 new species of West Indian plants from 1785 to 1789. He spent a year in the Southern United States before going to the West Indies.[1]

The Germans.—Germany, too, soon began to send its students across the Atlantic. Johann Anderson, a burgomaster of Hamburg, published in 1746 his Tidings from Iceland, Greenland, and Davis Straits, for the benefit of Science and Commerce. Hans Just Winkelmann published in Oldenburg in 1664 Der Amerikanischen neuen Welt Bescreibung, etc., with descriptions and figures of animals and plants.

Christian Bullen in 1667 made a voyage to Greenland and Spitzbergen, an account of which, including interesting observations on whales and the whale fishery, was printed at Bremen in 1668.

Marcgrave, Krieg, the two Forsters, and Schoepf are referred to elsewhere. Steller, Pallas, and Chamisso are mentioned in connection with Russian explorations.

Madame Maria Sibilla Merian [b. 1647, d. 1717], who was a native of Frankfort, was an enthusiastic entomologist who traveled in Surinam from 1699 to 1701. Her paintings of tropical insects were reproduced in a magnificent folio volume, printed 1705–1709, which was one of the wonders of her day, and which, together with her other writings upon insects, have secured her a prominent place in the early history of science.

VI.

The seventeenth century was not, upon the whole, a period favorable to the promotion of science, for all Europe was agitated by war and political strife, and men had neither opportunity nor inclination for intellectual pursuits. During its latter half, however, and with the return of peace and tranquillity, science grew in favor as it had never done before. The restoration of the Stuarts to the English throne was quickly followed by the establishment of the Royal Society. Louis XIV made the period of his accession memorable by founding the Royal Academy of Sciences, and by building an observatory.

This was the period of intellectual activity which followed the revival of letters in Europe. Carus, in his Geschichte der Zoologie, 1872, p. 259, calls it the period of encyclopædia-making (*Periode der encyklopädischen*

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[1] Brendel, American Naturalist, December, 1879, p. 757.

Darstellungen), filling the interspace between "The Zoology of the Middle Ages" and "the period of Systematic Classification." Students of science had ceased to compile endless commentaries on the works of Aristotle, and had begun to record their own observations and thoughts, to gather new facts and materials, which were to serve as a basis for the systematic work for their successors.

The greatest names of the day among naturalists were those of Ray, Tournefort, Lister, Jonston, Goedart, Redi, Willughby, Swammerdam, Sloane, Jung, and Morrison; names not often referred to at the present day, but worthy of our recollection and veneration, for they were men of a new era—the pioneers in systematic zoology and botany.

Among the earliest representatives of the new school in North America were Banister, Clayton, Mitchell, and Garden. John Banister, a clergyman of the Church of England, emigrated to Virginia before 1668, and in addition to his clerical duties applied himself assiduously to the study of natural history. He was a disciple and also, no doubt, a pupil of the great English naturalist, John Ray, who called him in his Historia Plantarum, "erudissimus vir et consummatissimus Botanicus," and corresponded also with Lister, and Compton, Bishop of London. He was the first to observe intelligently the mollusks and insects of North America. In a paper communicated to the Royal Society in 1693 he refers to drawings of ten or twelve kinds of land snails and six of fresh-water mussels. The drawings were not published, nor were the notes, except those in reference to the circulation of a species of snail.[1]

He sent to Petiver, in 1680, a collection of fifty-two species of insects, his observations upon which, with notes by Petiver, were a few years later communicated to the Royal Society.[2] Among them many familiar forms are recognizable—the mudwasp, seventeen-year locust, cimex, cockroach, firefly, the spring beetle (*Elater*), and the tobacco moth. He appears to have drawn and described several phases of the life history of the ichneumon fly. He had in his possession in 1686, and exhibited to an English traveler, large bones and teeth of fossil mammals from the interior of Virginia, the first of which we have any record in North America.[3]

It was as a botanist, however, that he was best known. He made drawings of the rarer species, and transmitted these with his notes and dried specimens to Compton and Ray. Banister's Catalogus Plantarum in Virginia Observatarum, printed in 1686,[4] was the first systematic paper

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[1] Philosophical Transactions, XVII, 1693, pp. 671, 672. See also Transactions of the Linnæan Society, VII, p. 227.

[2] Some Observations concerning Insects made by Mr. John Banister, in Virginia, A. D. 1680, with Remarks on them by Mr. James Petiver, etc. Philosophical Transactions, XXII, 1701, pp. 807–814.

[3] Perhaps the *Megalonyx jeffersonii*, subsequently discovered.

[4] In Ray's Historia Plantarum, London, 1686.

upon natural history which emanated from America. In one of his botanical excursions, about the year 1692, he visited the falls of the Roanoke, and, slipping among the rocks, was killed.[1]

Lawson, the historian of North Carolina, writing at the beginning of the next century, remarked: "Had not the ingenious Mr. Banister (the greatest virtuoso we ever had on this continent) been unfortunately taken out of this world, he would have given the best account of the plants of America of any that ever yet made such an attempt in these parts."[2] The memory of John Banister is still cherished in Virginia, where his decendants are numerous.[3]

John Clayton was also an excellent representative of the new school, and should not be confounded with the Rev. John Clayton who visited America in 1685. John Clayton, the naturalist, as he is styled in Virginian history, appears to have been born in Fulham, a suburb of London, in 1693, and to have accompanied his father, John Clayton, subsequently attorney-general of Virginia, when he came to this country in 1705. He was clerk of Gloucester County, Virginia, for fifty-one years, and died December 15, 1773. "He passed a long life," says Thacher, "in exploring and describing the plants of this country, and is supposed to have enlarged the botanical catalogue as much as any man who ever lived." He was a correspondent of Linnæus, Gronovius, and other naturalists, as well as of Collinson, who wrote of him in 1764 as "my friend John Clayton, the greatest botanist of America."

Clayton's Flora Virginica, which was edited by J. F. Gronovius, assisted by the young Linnæus, who was just entering upon his career of success and was then resident in Leyden, began to appear in 1739, subsequent portions being published in 1743 and 1762. It seems to be the opinion of botanists that Gronovius deserves less credit for his share in this work than has usually been allowed him, and that Clayton's descriptions were those of a thorough master of botanical science as then understood. He communicated to the Royal Society various botanical papers, including one upon the culture of the different kinds of tobacco. On his death he left two volumes of manuscripts, and an herbarium, with marginal notes and references for the engraver who should prepare the plates for his proposed work. These were in the possession of his son when the Revolutionary war commenced, and were placed in the office of the clerk of New Kent County for security from the invading enemy. The building was burned down by incendiaries, and thus perished not only the records of the county, but probably one of the most important works on American botany written before the days of Gray and Torrey.

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[1] His papers and collections were sent to the Bishop of London. The plants are said to have passed into the hands of Sloane, and to be still preserved in the British Museum. It would be interesting to know what has become of his manuscripts.

[2] John Lawson, History of North Carolina, Raleigh edition, p. 134.

[3] See The Bland Papers and Slaughter's History of Bristol Parish, 1st and 2d editions.

JOHN RODGERS.

Jefferson declares that Clayton was a native Virginian, and such is the confusion in the records that it is quite possible that such may be the fact.[1]

Still another pioneer was Doctor John Mitchell, born in England about 1680, and settled early in the last century at Urbana, Virginia, on the Rappahannock, where he remained nearly fifty years, practicing medicine and promoting science. He appears to have been a man of genius and broad culture, and was one of the earliest chemists and physicists in America. His political and botanical writings were well received, and his map of North America is still an authority in boundary matters. He was a correspondent of Linnæus, and in 1740 sent Collinson a paper in which thirty new genera of Virginia plants were proposed.[2] His Dissertation upon the Elements of Botany and Zoology[3] was dated Virginia, 1738, and was thus almost contemporary with the first edition of the Systema Naturæ of Linnæus, though it was not printed until ten years after it was written. This was the first work upon the principles of science ever written in America. In 1743 he communicated to the Royal Society An Essay upon the Causes of the different Colours of People in different Climates,[4] writing from the standpoint of an evolutionist. He also communicated An Account of the Preparation and Uses of the various Kinds of Potash,[5] and a Letter concerning the Force of electrical Cohesion.[6] His fame rests chiefly, however, upon his investigations into the yellow fever epidemic of 1737–1742, published after his death by his friends, Franklin and Rush.[7] In 1743 he appears to have been engaged in physiological researches upon the opossum, which, however, were never published. In 1746 Doctor Mitchell returned to England, and upon the voyage was captured by French or Spanish pirates, and his collections and apparently his manuscripts destroyed. He became a Fellow of the Royal Society, and in 1748 was writing a work upon the natural and medical history of North America.[8] He died at an advanced age, about 1772. His name is perpetuated in that of our beautiful little partridge berry, *Mitchella repens*. "Mitchell and Clayton together," says Tuckerman, "gave to the botany of Virginia a distinguished luster."

Doctor John Tennent, of Port Royal, Virginia, seems to have been a man of botanical tastes. He it was who brought into view the virtues of the Seneca snake root, publishing at Williamsburg, in 1736, an essay

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[1] Spotswood Letters, I, pp. 1, 8; II, pp. 44, 58, 354.

[2] Darlington, Memorials of John Bartram and Humphrey Marshall, p. 21.

[3] Dissertatio brevis de Principiis Botanicorum et Zoologorum, deque novo stabiliendo naturæ rerum congruo cum Appendice aliquot generum plantarum recens conditorum et in Virginia observatorum. Nuremburg, 1748.

[4] Philosophical Transactions, XLIII, 1744, p. 102.

[5] Idem., XLV, 1748, p. 541.

[6] Idem., LI, Pt. 1, 1759, p. 390.

[7] American Medical and Philosophical Register, IV.

[8] James Edward Smith, Correspondence of Linnæus, II, pp. 442–451.

on pleurisy, in which he treats of the Seneca as an efficient remedy in the cure of this disease.[1] He also wrote other botanical treatises.[2] Doctor George Greham, of Dumfries, Virginia, was a man of similar tastes, and it is said by Mr. Jefferson that we are indebted to him for the introduction to America of the tomato.

David Krieg, F. R. S., a German botanist, collected insects for Petiver in Maryland, and gathered also hundreds of species of plants. He seems to have returned to England very early in the century, for his name appears in the Philosophical Transactions in 1701.

Colonel William Byrd, of Westover, Virginia [b. 1764, d. 1793], was a man of European education, the owner of a magnificent library, in which Stith wrote his history of Virginia, founder of the city of Richmond, colonial agent in London, and president of the King's council. He was a Fellow of the Royal Society, to which he communicated a paper An Account of a Negro Boy that is dappeld in several Places of his Body with White spots,[3] and was a correspondent of Collinson, Bartram, and other naturalists. His History of the Dividing Line, and his Journey to the Land of Eden, in 1733, contain many interesting observations upon Indians and general natural history. He it was who, in 1694, carried to England a female opossum, which furnished the materials for the first dissertation upon the anatomy of the marsupiates.[4]

One of the most eminent of our colonial naturalists was Doctor Alexander Garden, born in Scotland about 1728 [d. 1791]. He emigrated to America about 1750, and practiced medicine in Charleston, South Carolina, until after the close of the Revolutionary war, when he returned to England and became very prominent in scientific and literary circles, and vice-president of the Royal Society in 1783. He was an excellent botanist, but did his best work upon fishes and reptiles. He sent large collections of fishes to Linnæus, which were so well prepared that when I examined the fishes in the Linnæan collection in London, in 1883, I found nearly every specimen referred to by him in his letters in excellent condition, though few collected by others were identifiable. Garden was the discoverer of *Amphiuma means*, and was instrumental in first sending the electrical eel to Europe. His letters to Linnæus and to Ellis are voluminous and abound in valuable information. In 1764 he published a description of *Spigelia marilandica*, with an account of its medicinal properties.

James Logan [b. 1664, d. 1751], a native of Ireland and member of

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[1] James Thacher, Medical Biography, I, p. 73.

[2] Mitchell, writing to Linnæus, in 1748, remarks: "I can now only send you . . . some dissertations of Mr. Tennent upon the *Polygala*, two of which only have come out among his latest publications. His former ones, of inferior merit, are not now to be had."

[3] Philosophical Transactions, XIX, 1697, p. 781.

[4] Edward Tyson, Carigueya, seu Marsupialie Americanum, or the Anatomy of an Opossum, etc. Philosophical Transactions, XX, 1698, p. 105.

the Society of Friends, accompanied William Penn to this country in 1682 in the capacity of secretary, and became a public man of prominence, serving for two years as governor of the colony of Pennsylvania. He was a man of broad culture and was the author of a translation of Cicero's De Senectute, printed by Benjamin Franklin in 1744. To Logan belongs the honor of having carried on the first American investigations in physiological botany, the results of which were published in Leyden, in 1739, in an essay entitled Experimenta et Meletemata de Plantarum Generationis. This essay, which related to the fructification of the Indian corn, was accepted in its day as a valuable contribution to knowledge.

Cadwallader Colden [b. 1688, d. 1776] was also a statesman and a naturalist. A native of Scotland, he came to America in 1708, and, after a short residence in Pennsylvania, settled in New York, where he held the office of surveyor-general and member of the King's council, and in later life was for many years lieutenant-governor, and frequently acting governor of the province. His intellectual activity manifested itself in various directions, and his History of the Five Indian Nations of Canada, New York, 1727, was one of the earliest ethnological works printed in America. He also was interested in meteorology and astronomy, and as a correspondent of Linnæus and Collinson did much to advance the study of American botany. His daughter, Miss Jane Colden, was the first lady in America to become proficient in the study of plants. She was the author of a Flora of New York, which was never published.[1] Governor Colden's Plantæ Coldenhamiæ, the first part of a catalogue of the plants growing in the neighborhood of his country residence, Coldenham, near Newburg, was the first treatise on the flora of New York. It was published in 1744 in the acts of the Royal Society of Upsala.[2] A most interesting collection of papers from the scientific correspondence of Colden was published many years ago by Doctor Asa Gray.[3]

Hans Sloane, a young Irish physician [b. 1660, d. 1753], who had been a pupil of Tournefort and Magnol, visited the West Indies in 1684, and after his return printed a Catalogue of Jamaica Plants in 1696, and later a sumptuously illustrated work on the natural history of Jamaica (1707–1725). After his return he became an eminent physician, and in 1727 succeeded Isaac Newton as president of the Royal Society. The collection of animals and plants made by Sir Hans Sloane in America was greatly increased by him during his long and active life, and, having been bequeathed by him to the nation, became, upon his death in 1753, the nucleus of the British Museum.

Another naturalist of the same general character was Mark Catesby [b. 1679, d. 1749], who lived in Virginia, 1712 to 1721, collecting and

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[1] Brendel in American Naturalist, December, 1879, p. 756.

[2] John Torrey, Flora of New York, Albany, 1843.

[3] American Journal of Science, XLIV, 1843, p. 85.

making paintings of birds and plants; in the Carolinas, 1722 to 1725, and a year also in the Bahamas. His magnificent illustrated work upon the Natural History of Carolina, Florida, and the Bahama Islands,[1] is still of great value to students of natural history.

The name of John Bartram, the Quaker naturalist of Philadelphia, is possibly better remembered than those of his contemporaries. This is no doubt due to the fact that he left behind him a lasting monument in his botanic garden on the banks of the Schuylkill. He was the earliest native American to prosecute studies in systematic botany, unless Jefferson's statement concerning Clayton proves to be true. Linnæus is said to have called him "the greatest natural botanist in the world," and George III honored him in 1765 with the title of Botanist to his Majesty for the Floridas and a pension of £50 a year. Bartram was a most picturesque and interesting personage, and a true lover of nature. He did great service to botany by supplying plants and seeds to Linnæus, Dillenius, Collinson, and other European botanists. He was a collector, however, rather than an investigator, and his successes seem to have been due, in the main, to the patient promptings and advice of his friend Collinson in London. Garden, whom he visited at Charleston in 1765, after his appointment as King's Botanist, wrote of him to Ellis:

> I have been several times into the country, and places adjacent to town, with him, and have told him the classes, genera, and species of all the plants that occurred, which I knew. I did this in order to facilitate his enquiries, as I find he knows nothing of the generic characters of plants, and can neither class them nor describe them; but I see that, from great natural strength of mind and long practice, he has much acquaintance with the specific characters; though this knowledge is rude, inaccurate, indistinct, and confused, seldom determining well between species and varieties. He is, however, alert, active, industrious, and indefatigable in his pursuits.[2]

Fothergill says in his Memoir of Collinson "that the eminent naturalist, John Bartram, may almost be said to have been created by my friend's assistance."

The foregoing remarks concerning the elder Bartram are simply for the purpose of calling attention to his proper position among the American naturalists of his day. It is not that I esteem Bartram the less, but that I esteem Garden, Clayton, Mitchell, and Colden more. The name of Bartram brings up at once that of his friend and patron, Peter Collinson, just as that of Garden reminds us of John Ellis.

Collinson and Ellis were never in America, yet if any men deserve to be called the fathers of American natural history it is they. For a period of thirty years or more, that period during which Linnæus was bringing about those reforms which have associated his name forever with the history of the classificatory sciences, these enlightened and science-loving London merchants seem to have held the welfare of American science in their keeping and to have faithfully performed their trust. I know few

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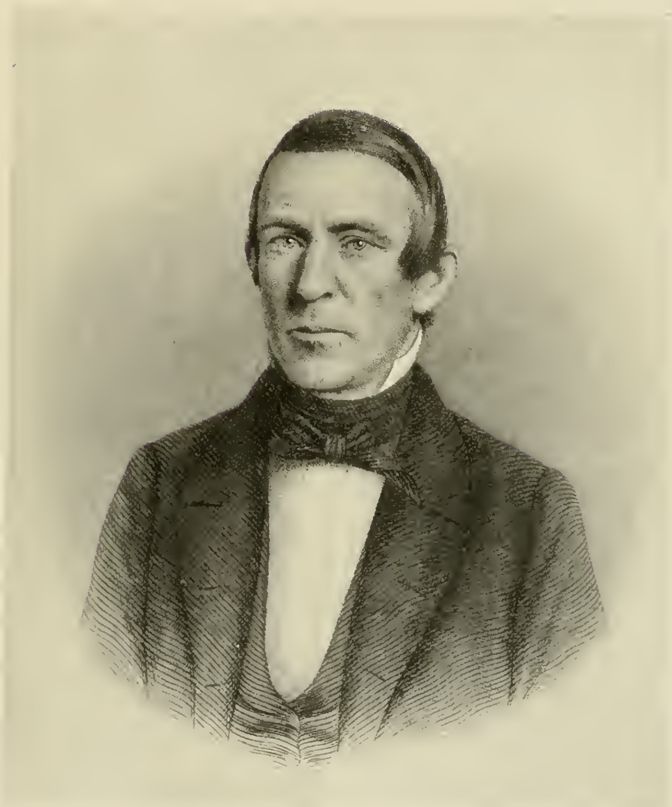
[1] London, 1754–1771. [2] Smith, Correspondence of Linnæus, I, p. 537.



Henry D Rogers.

books which are more delightful than Darlington's Memorial or Bartram and Smith's Correspondence of Linnæus, made up as they are largely of the letters which passed between Collinson and Ellis and their correspondents in America, and with Linnæus, to whom they were constantly transmitting American notes and specimens.[1]

Humphrey Marshall [b. 1722, d. 1801] was a farmer-botanist of the Bartram type, and the author of The American Grove, a treatise upon the forest trees and shrubs of the United States, the first botanical work which was entirely American. Darlington's Memorials of Bartram and Marshall is a worthy tribute to this useful man.

Moses Bartram, a nephew of John, was also a botanist, and William, his son [b. 1739, d. 1823], was a much more prominent figure in American science. His Travels through North and South Carolina, published in 1791, was, in the opinion of Coues, the starting point of the distinctively American school of ornithology.

Collinson was a correspondent of Benjamin Franklin, and is said not only to have procured and sent to him the first electrical machine which came to America, but to have made known to him in 1743 the results of the first experiments in electricity, the continuation of which gave to Franklin his European reputation as a man of science. Collinson was instrumental in introducing grape culture in Virginia, and in acclimating here many foreign ornamental shrubs.

Ellis was a more eminent man of science, and his name is associated with the beginnings of modern marine zoology.

Linnæus wrote to him in 1769: "Your discoveries may be said to vie with those of Columbus. He found out America, or a new India, in the west; you have laid open hitherto unknown Indies in the depths of the ocean." He was royal agent for West Florida, and had extraordinary facilities for obtaining specimens from the colonies.

His nephew, Henry Ellis, F. R. S. [b. 1720, d. 1805], was the author of A Voyage to Hudson's Bay in 1746 and 1747 for Discovering a North West Passage, which contains some valuable notes upon zoology. He was in 1756 appointed governor of the colony of Georgia, and in 1758 published in the Philosophical Transactions an essay on The Heat of the Weather in Georgia. In 1760 he made a voyage for the discovery of a new passage to the Pacific, and later was governor of Nova Scotia, where we can but believe he continued his observations and his correspondence with the savans of Europe. "Finally," says Jones, "having attained a venerable age, and to the last intent upon the prosecution of some favorite physical researches, he fell in sleep, as did Pliny the Elder, within sight of Vesuvius, and upon the shores of the beautiful Bay of Naples."[2]

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[1] William Darlington, Memorials of John Bartram and Humphrey Marshall. Philadelphia, 1849, 1850.

[2] Charles C. Jones, History of Georgia. Boston and New York, 1863.

Jones, in his History of Georgia [I, p. 444], refers to the Rev. Stephen Hales—"equally renowned as a naturalist and a divine"—who lived for a time in Georgia during the last century. Can this have been the famous author of Vegetable Statics? I have been unable to find any allusion to a sojourn in America, in the published notices of the English Hales, and equally unable to discover a second Hales in the annals of science.

The central figure among eighteenth-century naturalists was of course Linnæus. His Systema Naturæ was an epoch-making work, and with the publication of its first edition at Leyden in 1735 the study of the biological sciences received an impress which was soon felt in America.

In 1738, while in Leyden, he assisted Gronovius in editing the notes sent by Clayton from Virginia, and it is evident that Linnæus was already, at the age of thirty, recognized by European botanists as an authority upon the plants of America. It was in this year that he visited Paris. He at once made his way to the Garden of Plants, and entered the lecture room of Bernard de Jussieu, who was describing some exotics to his pupils in Latin. There was one which the demonstrator had not yet determined, and which seemed to puzzle him. The Swede looked on in silence at first, but observing the hesitation of the learned professor, cried out: "Haec plantam faciem Americanam habet." Jussieu turned about quickly with the exclamation, "You are Linnæus."

It is interesting to notice how strongly the Linnæan reforms took root in American soil, and how soon. Collinson wrote to Bartram in 1737: "The Systema Naturæ is a curious performance for a young man, but his coining a new set of names for plants tends but to embarrass and perplex the study of botany. As to his system . . . botanists are not agreed about it. Very few like it. Be that as it will, he is certainly a very ingenious man, and a great naturalist."[1] Six years later he wrote to Linnæus himself:

> Your system, I can tell you, obtains much in America. Mr. Clayton and Dr. Colden at Albany on Hudson's River in New York, are complete Professors; as is Dr. Mitchell at Urbana on Rappahannock River, in Virginia.[2]

This may not seem a very numerous following, but twelve years after this (1755) only seven English botanists were mentioned by Collinson in response to a request from Linnæus to know what botanical people in London were skilled in his plan.[3]

It is a fact not often referred to that during his period of poverty and struggles, Linnæus received, through the influence of his patron, Boerhaave, an appointment in the colony of Surinam. His prospects for a successful career in Europe had, however, brightened, and he decided not to come to America.

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[1] Darlington, Memorials of John Bartram and Humphrey Marshall. Philadelphia, 1849, 1850, p. 106.

[2] Smith, Correspondence of Linnæus, I, p. 9.

[3] Idem., p. 33.

His interest in American natural history was always very great, and his descriptions of New World forms seem to have been drawn up with especial care. Garden, Colden, Bartram, Mitchell, Clayton, and Ellis were all, as we have seen, active in supplying him with materials, and his pupils, Kalm, Alstroem, Loefling, Kuhn, and Rolander (who collected for many years in Surinam) sent him many notes and specimens.

The progress of systematic zoology in the interval between Ray and Linnæus may perhaps best be illustrated by some brief statistical references. The former, in 1690, made an estimate of the number of animals and plants known at that time.

The number of beasts, including serpents, he placed at 150, adding that according to his belief not many that are of any considerable bigness in the known regions of the world have escaped the cognizance of the curious.

Linnæus in his twelfth edition (1766) described 210 species of beasts or mammals, and 124 of reptiles, so called. Of the mammals known to Linnæus, 78, or more than one-third, were American, and 88 of the reptiles were attributed to this country.

"The number of birds," said Ray, "may be near 500." Linnæus catalogued 790, of which about one-third were American.

Although at this time the Middle and Southern States were the most active in the prosecution of scientific researches, there were in New England at least two diligent students of nature. Paul Dudley, F. R. S. [b. 1675], chief justice of the colony of Massachusetts, was the author of several papers in the Philosophical Transactions. Among these were A Description of the Moose Deer in America,[1] An Account of a Method lately found out in New England for Discovering where the Bees Hive in the Woods,[2] An Account of the Rattlesnake,[3] and An Essay upon the Natural History of Whales, with a particular Account of the Ambergris found in the Spermaceti Whale,[4] which is often quoted.

Others were An account of the Poyson Wood Tree in New England,[5] and Observations on some Plants in New England, with remarkable Instances of the Nature and Power of Vegetation.[6] He also appears to have sent to Collinson a treatise upon the evergreens of New England.[7]

The Rev. Jared Eliot [b. 1685, d. 1763], minister at Killingworth, in Connecticut, and one of the earliest graduates of Yale College, described by his contemporaries as "the first physician of his day," and as "the first botanist in New England," appears to have been a correspondent of Franklin and a scientific agriculturist.

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[1] Philosophical Transactions, XXXI, 1721, pp. 165–168.

[2] Idem., XXXI, 1721, pp. 148–150.

[3] Idem., XXXII, 1723, pp. 292–295.

[4] Idem., XXXIII, 1725, pp. 256–269.

[5] Idem., XXI, 1721, pp. 145, 146.

[6] Idem., XXXIII, 1724, pp. 194–200

[7] See Tuckerman in Archæologia Americana, IV, pp. 125, 126.

In 1781 appeared Jefferson's Notes on Virginia. This was the first comprehensive treatise upon the topography, natural history, and natural resources of one of the United States, and was the precursor of the great library of scientific reports which have since been issued by the State and Federal Governments.

The book, although hastily prepared to meet a special need, and not put forth as a formal essay upon a scientific topic, was, if measured by its influence, the most important scientific work as yet published in America. The personal history and the public career of Thomas Jefferson are so familiar to all that it would be an idle task to repeat them here. Had he not been a master in statecraft he would have been a master of science. It is probable that no two men have done so much for science in America as Jefferson and Agassiz—not so much by their direct contributions to knowledge as by the immense weight which they gave to scientific interests by their advocacy.

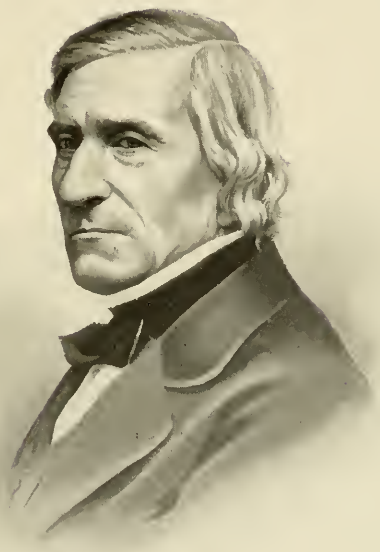
Many pages of Jefferson's Notes on Virginia are devoted to the discussion of Buffon's statements: (1) That the animals common to both continents are smaller in the New World; (2) that those which are peculiar to the New are on a smaller scale; (3) that those which have been domesticated in both have degenerated in America, and (4) that, on the whole, America exhibits fewer species. He successfully overthrows the specious and superficial arguments of the eloquent French naturalist, who, it must be remembered, was at this time considered the highest authority living in such matters. Not content with this, when minister plenipotentiary to Europe a few years later he forced Buffon himself to admit his error.

The circumstance shall be related in the words of Daniel Webster, who was very fond of relating the anecdote:

> It was a dispute in relation to the moose, and in one of the circles of the *beaux-esprits* in Paris, Mr. Jefferson contended for some characteristics in the formation of the animal, which Buffon stoutly denied. Whereupon Mr. Jefferson wrote from Paris to General John Sullivan, then residing in Durham, New Hampshire, to procure and send him the whole frame of a moose. The General was no little astonished at a request he deemed so extraordinary, but, well acquainted with Mr. Jefferson, he knew he must have sufficient reason for it, so he made a hunting party of his neighbors and took the field. They captured a moose of unusual proportions, stripped it to the bone, and sent the skeleton to Mr. Jefferson at a cost of £50. On its arrival Mr. Jefferson invited Buffon and some other savants to a supper at his house and exhibited his dear-bought specimen. Buffon immediately acknowledged his error. "I should have consulted you, Monsieur," he said, "before publishing my book on Natural History, and then I should have been sure of my facts."

In still another matter in which he was at variance with Buffon he was manifestly in the right. In a letter to President Madison, of William and Mary College, he wrote:

> Speaking one day with M. de Buffon on the present ardor of chemical inquiry, he affected to consider chemistry but as cookery and to place the toils of the laboratory



William B. Rogers

on a footing with those of the kitchen. I think it, on the contrary, among the most useful of sciences and big with future discoveries for the utility and safety of the human race.

It was the scientific foresight of Jefferson, so manifest in such letters, which led him to advocate so vigorously the idea that science must be the corner stone of our Republic.

In 1789 he wrote from Paris to Doctor Willard, president of Harvard College:

To Doctor WILLARD:

What a field have we at our doors to signalize ourselves in. The botany of America is far from being exhausted, its mineralogy is untouched, and its natural history or zoology totally mistaken and misrepresented. . . . It is for such institutions as that over which you preside so worthily, sir, to do justice to our country, its productions, and its genius. It is the work to which the young men you are forming should lay their hands. We have spent the prime of our lives in procuring them the precious blessing of liberty. Let them spend theirs in showing that it is the great parent of science and of virtue, and that a nation will be great in both always in proportion as it is free.

THOMAS JEFFERSON.

To Jefferson's interest was due the organization of the first Government exploring expedition. As early as 1780 we find him anxious to promote an expedition to the upper portion of the Mississippi Valley, and offering to raise 1,000 guineas for the purpose from private sources, and while he was President he dispatched Lewis and Clarke upon their famous expedition into the Northwest—the precursor of all the similar enterprises carried on by the General Government, which have culminated in our magnificent Geological Survey.

Jefferson's personal influence in favor of science was of incalculable value. Transferred from the presidency of the principal American scientific society to the Presidency of the nation, he carried with him to the Executive Mansion the tastes and habits of a scientific investigator. Mr. Luther, in his recent essay upon Jefferson as a Naturalist,[1] has shown that during his residence in Paris he kept the four principal colleges—Harvard, Yale, William and Mary, and the College of Philadelphia—informed of all that happened in the scientific circles of Europe.

He wrote to one correspondent: "Nature intended me for the tranquil pursuits of science, by rendering them my supreme delight." To another he said: "Your first gives me information in the line of natural history, and the second promises political news. The first is my passion, the last my duty, and therefore both desirable."

When Jefferson went to Philadelphia to be inaugurated Vice-President he carried with him a collection of fossil bones which he had obtained in Greenbrier County, West Virginia, together with a paper, in which were formulated the results of his studies upon them. This was published in

[1] Magazine of American History, April, 1885, p. 379.

the Transactions of the American Philosophical Society, and the species is still known as *Megalonyx jeffersoni.*

"The spectacle," remarks Luther, "of an American statesman coming to take part as a central figure in the greatest political ceremony of our country and bringing with him an original contribution to the scientific knowledge of the world, is certainly one we shall not soon see repeated." [1]

When Jefferson became President his scientific tastes were the subject of much ridicule as well as of bitter opposition among the people in whose eyes, even in that day, science was considered synonymous with atheism. William Cullen Bryant, then a lad of thirteen, wrote a satirical poem, The Embargo, since suppressed, in which the popular feeling seems to have been voiced:

> Go, wretch, resign the presidential chair,
> Disclose thy secret measures, foul or fair.
> Go, search with curious eyes for horned frogs,
> 'Mid the wild wastes of Louisianian bogs;
> Or, where the Ohio rolls his turbid stream,
> Dig for huge bones, thy glory and thy theme.

A prominent personage in the history of this period was Peter Kalm, a pupil of Linnæus and professor in the University of Aobo, who was sent to America by the Swedish Government, and traveled through Canada, New York, New Jersey, and Pennsylvania from 1748 to 1751. Although the ostensible object of his mission was to find a species of mulberry suitable for acclimatization in Sweden, with a view to the introduction of silk culture, it is very evident that he and his master were very willing to make of applied science a beast of burden, upon whose back they could heap up a heavy burden of investigations in pure science. Kalm's botanical collections were of great importance and are still preserved in the Linnæan Herbarium in London. His Travels into North America are full of interesting observations upon animals and men, as well as upon plants, and give us an insight into the life of the naturalists at that time resident in America. After his return to Sweden he published several papers relating to his discoveries in America.

Another traveler who deserves our attention, Johann David Schœpf [b. 1752, d. in Baireuth, 1800], the author of one of the earliest monographs of the Testudinata, was a surgeon of mercenary troops under the Marcgrave of Anspach, and was one of the hated Hessian auxiliaries during the Revolutionary war (1776–1783). While stationed at New York he wrote a paper upon the Fishes of New York, which was published in Berlin in 1787. This was the first special ichthyological paper ever written in America or concerning American species. Immediately after the treaty of peace in 1783, Schœpf made an extensive tour

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[1] Magazine of American History, April, 1885, p. 386.

through the United States, proceeding from New York south to Florida and the Bahamas. He was accompanied in his more southern excursions by Professor Marter and Doctor Stupicz, who, with several assistants, had been sent to America from Vienna to make botanical explorations. Schœpf's Nord Amerikanische Reisen is full of interesting notes upon natural history, and describes nearly all the scientific men at that time resident in the United States. His Materia Medica Americana, published in 1787 at Erlangen, was a standard in its day.[1]

One of the most prominent names in American natural history is that of John Reinhold Forster [b. 1729, d. 1798], who was a leader in zoological studies in England during the last century. He was a native of Germany, and at the time of his death professor of botany at Halle. He spent many years in England, and was the naturalist of Cooke's second voyage around the world (1772–1775). In 1771 he published in London, in an appendix to his translation of Kalm's Travels, A Catalogue of the Animals of North America, compiled from the writings of Linnæus, Pennant, Brisson, Edwards, and Catesby, and in the same year a similar nominal catalogue of the plants of North America. His account of the birds sent from Hudson Bay, published in 1772, was a valuable contribution to American ornithology, "notable," says Coues, "as the first formal treatise exclusively devoted to a collection of North American birds sent abroad." Fifty-eight species were described, among which were several new to science. Other papers of equal value were published upon the quadrupeds and fishes of the same region. Forster was one of the earliest students of the geographical distribution of animals, and his Enchiridion of Natural History was in its day a standard. His son, John George Forster, who was his companion in the voyage of circumnavigation, owes his fame to his literary rather than to his scientific labors. He published a paper on the Patella or Limpet Fish found at Bermuda.[2]

The annals of Russian explorations upon the west coast of North America have been so exhaustively recorded by Dall in his Alaska and its Resources that only passing mention need be made of the two German naturalists, Steller and Chamisso, whose names are identified with the natural history work of the Russian explorer.

Among the other naturalists whose names are associated with America during this period may be mentioned Sonnini de Manoncour, an eminent French zoologist, who traveled in Surinam from 1771 to 1775 and made important contributions to its ornithology. Don Felix de Azara [b. 1746, d. after 1806], who carried on researches in Spanish America from 1781 to 1801; Don Antonio Parra, who published a useful treatise on the natural history of Cuba in Havana, in 1787; Don Joseph C. Mutis, a learned Spanish ecclesiastic and physician, professor of natural history in the

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[1] Erlangen, 1788, 2 vols., octavo.

[2] Philosophical Transactions, L, Pt. 2, 1758, p. 859.

University of Santa Fe de Bogota, in Grenada, who carried on a voluminous correspondence with Linnæus and his son from 1763 to 1778,[1] and Joseph Jussieu, botanist to the King of France, who went to the west coast of South America in 1734 as a member of the commission sent by the Royal Academy of Sciences to make observations to determine more accurately the shape and magnitude of the earth. "His curiosity," says Flourens, "held him captive for many years in these regions, so rich and unexplored, where he often joined the labors of the engineer with those of the botanist. To him Europe owes several new plants, the heliotrope, the marvel of Peru, etc., with many curious and then unknown species." Here, also, should be mentioned the eminent French ornithologist, Francois Levaillant [b. 1753, d. 1824], who was a native of America, and the two Mexican naturalists, also native born, Jose A. Alzate [b. in Ozumba 1729, d. in Mexico February 2, 1790], a learned botanist, and Francisco Xavier Clavigero.

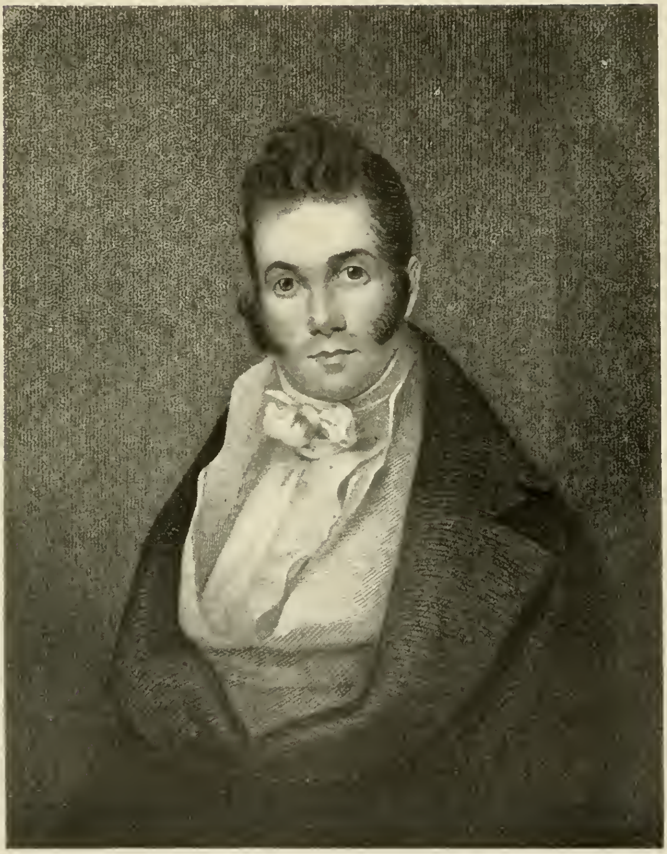
Francisco Xavier Clavigero, the historian of Mexico, was one of the earliest of American archæologists. Born in Vera Cruz September 9, 1731, the son of a Spanish scholar, he was educated at the college of Puebla, entered the Society of Jesus, and was sent out as a missionary among the Indians, with whom he spent thirty-six years. He learned their language, collected their traditions, and examined all their historical records and monuments for the purpose of correcting the misrepresentations of early Spanish writers. When the Society of Jesus was suppressed by Spain, in 1767, Clavigero went to Italy, where he wrote his Storia Antica del Messico, printed in 1780–81.

Clavigero was a man who, in his spirit, was fully abreast of the science of his day, but whose methods of thought and argument were already antiquated.

His monastic training led him to write from the standpoint of a commentator rather than that of an original observer, and his observations upon the animals and plants of Mexico were subordinated in a very unfortunate manner to those of his predecessor, Hernandez. In the Dissertations, which make up the fourth volume of his history, he throws aside, in the ardor of his dispute with Buffon and his followers, the trammels of tradition, and places upon record many facts concerning American natural history which had never before been referred to. He here presented a list of the quadrupeds of America, the first ever printed for the entire continent, including 143 species; not systematically arranged, it is true, but perhaps as scientific in its construction as was possible at that time, even had its author been trained in the school of Linnæus.

Clavigero's dissertations are well worthy of the attention of naturalists even of the present day. His essay upon the manner in which the conti-

[1] Smith, Correspondence of Linnæus, II, pp. 507–550.



Thomas Say

nent of America was peopled with living forms, shows a remarkable appreciation of the difficulties in the way of the solution of this still unsolved problem. The position taken by its author is not unlike that held by zoogeographers of to-day, in considering it necessary to bridge with land the waters between Asia and Northwestern America, and Africa and South America.[1] In his first Dissertation of the Animals of Mexico he combats the prevailing European views as to the inferiority of the soil and climate of the New World and the degeneracy of its inhabitants, engaging in the same battle in which fought also Harriot, Acosta, and Jefferson.

Clavigero's contributions to archæology and ethnology are extensive and valuable, and we can but admit that at the time of the issue of his Storia Antica no work concerning America had been printed in English which was equally valuable.

Although in his formal discussion of the natural history of Mexico he follows closely the nomenclature and arrangement of Hernandez, there are many important original observations inserted. I will instance only the notes on the mechanism of the poison gland and fang of the rattle-snake, the biographies of the possum, the coyote and the tapir, and the Tuza or pouched rat, the mocking bird, the chegoe, and the cochineal insect. Clavigero states that Father Inamma, a Jesuit missionary of California, has made many experiments upon snakes which serve to confirm those made by Mead upon vipers.

To the post-Revolutionary period belongs Doctor Manasseh Cutler, for fifty-one years minister of Ipswich Hamlet, Massachusetts [b. 1743, d. 1823], who in 1785 published An Account of some of the vegetable Productions, naturally growing in this Part of America, botanically arranged,[2] in which he described about 370 species. Cutler was a correspondent of Muhlenberg in Pennsylvania, Swartz and Payshull in Sweden, and Withering and Stokes in England. He left unpublished manuscripts of great value. He was one of the founders of the settlement in Ohio, and at one time a member of Congress. After Cutler, says Tuckerman, there appeared in the Northeastern States nothing of importance until the new school of New England botanists, a school characterized by the names of an Oakes, a Boott, and an Emerson, was founded in 1814, by the publication of Bigelow's Florula Bostoniensis.

Thomas Walter [b. in Hampshire, 1740] published in London, in 1787, his Flora Caroliniana, a scholarly work describing the plants of a region situate upon the Santee River.[3]

Doctor Hugh Williamson, of North Carolina [b. 1735, d. 1819], was a prominent member of the American Philosophical Society. He was con-

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[1] See similar speculation in George Scot's Model of the Government of the Province of East New Jersey in America. Edinburgh, 1685.

[2] Memoirs of the American Academy of Sciences, 1785.

[3] Brendel, American Naturalist, December, 1879, p. 758.

cerned in some of the earliest astronomical and mathematical work in America; published papers upon comets and climatology, which were favorably received, and secured his election to many foreign societies, and in 1775 printed in the Philosophical Transactions his Experiments and Observations on the *Gymnotus Electricus*, or Electrical Eel.

Doctor Caspar Wistar [b. 1761, d. 1818] was one of the early professors of chemistry [1789] and anatomy [1793] in the College of Philadelphia. He was the discoverer of some important points in the structure of the ethmoid bone, a man of eminence as a teacher, and versed in all the sciences of his day.

Doctor James Woodhouse, of Philadelphia [b. 1770, d. 1809], made investigations in chemistry, mineralogy, and vegetable physiology which were considered of importance.

The story of the origin of American scientific societies has been so often told that it need not be repeated here. The only institutions of the kind which were in existence at the end of the period under consideration were the American Philosophical Society, an outgrowth primarily of the American Society for the Advancement of Natural Knowledge, founded in Philadelphia in 1743, and secondarily of Franklin's famous Junto, whose origin dates back to 1727, and the American Academy of Arts and Sciences, founded in 1780.

The relations of the colonial naturalists to the scientific societies of England have not so often been referred to, and it does not seem to be generally known that the early history of the Royal Society of London was intimately connected with the foundation of New England, and that the first proposition for the establishment of a scientific society in America was under consideration early in the seventeenth century. "The great Mr. Boyle," writes Eliot, "Bishop Wilkins, and several other learned men, had proposed to leave England and establish a society for promoting natural knowledge in the new colony, of which Mr. Winthrop, their intimate friend and associate, was appointed governor. Such men were too valuable to lose from Great Britain; and Charles II having taken them under his protection, the society was there established, and obtained the title of the Royal Society of London."[1]

For more than a hundred years the Royal Society was the chief resource of naturalists in North America. The three Winthrops, Mitchell, Clayton, Garden, Franklin, Byrd, Rittenhouse, and others were among its fellows, and the Philosophical Transactions contained many American papers.

As at an early date the Society of Arts in London began to offer prizes for various industrial successes in the colonies, for instance, for the production of potash and pearlash, for the culture of silk, and for the culture of hemp, the vine, safflower, olives, logwood, opium, scammony, burilla,

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[1] John Eliot, Biographical Dictionary of Eminent Characters in New England. Boston, 1809.

aloes, sarsaparilla, cinnamon, myrtle wax, the production of saltpeter, cobalt, cochineal, the manufacture of wine, raisins, and olive oil, the collection of gum from the persimmon tree, and the acclimation of silk grass. A medal was given in 1861 to Doctor Jared Eliot, of Connecticut, for the extraction of iron from "black sand."[1] In 1757 we find their secretary endeavoring to establish branch societies in the colonial cities, especially in Charleston, Philadelphia, and New York, and Garden seems to have tried to carry out the enterprise in Charleston. After two years he wrote that the society organized had become "a mere society of drawing, painting, and sculpture."

In a subsequent letter he utters a pitiful plaint. He has often wondered, he says, "that there should be a country abounding with almost every sort of plant, and almost every species of the animal kind, and yet that it should not have pleased God to raise up one botanist."[2]

The American Academy of Arts and Sciences was founded by the legislature of Massachusetts in 1780, and its first volume of memoirs appeared in 1785.

In 1788 an effort was made by the Chevalier Quesnay de Beaurepaire to found in Richmond, Virginia, the Academy of Arts and Sciences of the United States of America, upon the model of the French Academy. The plan was submitted to the Royal Academy of Sciences in Paris, and received its unqualified indorsement, signed, among others, by Lavoisier. A large subscription was made by the Virginians and a large building erected, but an academy of sciences needs members as well as a president, and the enterprise was soon abandoned.[3]

In 1799 was organized the Connecticut Academy of Arts and Sciences, which, after publishing one volume of Transactions, went into a state of inactivity from which it did not arouse itself until 1866.

This sketch would not be complete without some reference also to the history of scientific instruction in America during the last century.

The first regular lectures upon a special natural history topic appear to have been upon comparative anatomy. A course upon this topic was delivered at Newport, Rhode Island, in 1754, by Doctor William Hunter, a native of Scotland [b. about 1729], a kinsman of the famous English anatomists, William and John Hunter, and a pupil of Munro. His course upon comparative anatomy was given in connection with others upon human anatomy and the history of anatomy, the first medical lectures in America.[4]

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[1] See Dossie, Memoirs of Agriculture. London, I, 1768, pp. 24–26; also Brock in Richmond Standard; April 26, 1879, p. 4.

[2] Smith, Correspondence of Linnæus, I, p. 477.

[3] Samuel Mordecai, Richmond in By-gone Days. Richmond, 1856. A copy of the original pamphlet of proposals is still preserved in the Virginia State Library.

[4] One of the original tickets to these courses is in the Library of the Surgeon-General's Office in Washington.

The first instruction in botany was given in Philadelphia in 1768 by Kuhn, who began in May of that year a course of lectures upon that subject in connection with his professorship of materia medica and botany in the College of Philadelphia. Adam Kuhn [b. in Germantown, Pennsylvania, 1741, d. 1817] was educated in Europe, and had been a favorite pupil of Linnæus. He did not, however, continue his devotion to natural history, though he became an eminent physician. William Bartram, son of John Bartram, was elected to the same professorship in 1782. In 1788 Professor Waterhouse, of Harvard College, read lectures upon natural history to his medical classes, and is said to have subsequently claimed that these were the first public lectures upon natural history given in the United States. This was doubtless an error, for we find that in 1785 a course upon the philosophy of chemistry and natural history was delivered in Philadelphia. "People of every description, men and women, flock to these lectures," writes a contemporary. "They are held at the university three evenings in a week."[1]

The first professor of chemistry was Doctor Benjamin Rush, who lectured in the Philadelphia Medical School as early as 1769. Bishop Madison was professor of chemistry and natural philosophy at William and Mary College from 1774 to 1777; Aaron Dexter, of chemistry and materia medica at Harvard, 1783 to 1816; John Maclean, at Princeton, 1795–1812, being the first to occupy a separate chair of chemistry. Before the days of chemical professorships, the professor of mathematics seems to have been the chief exponent of science in our institutions of learning.

John Winthrop [b. 1714, d. 1779], for instance, who was Hollis professor of mathematics and natural philosophy at Harvard from 1738 to 1779, was a prominent Fellow of the Royal Society, to whose Transactions he communicated many important papers, chiefly astronomical. We read, however, that Count Rumford imbibed from his lectures his love for physical and chemical research, and from this it may be inferred that he taught as much of chemistry as was known in his day. William Small, professor of mathematics in William and Mary from 1758 to 1762, was a man of similar tastes, though less eminent. He was the intimate friend of Erasmus Darwin. President Jefferson was his pupil, attended his lectures on natural philosophy, and got from time to time his "first views of the expansion of science and of the system of things in which we are placed."

Doctor Samuel Latham Mitchill [b. 1764, d. 1831] was the first man to hold a professorship of natural history, lecturing upon that subject, together with chemistry, in Columbia College in 1792. Doctor Mitchill was eminent as a zoologist, mineralogist, and chemist, and not only published many valuable papers, but in 1798 established the first American scientific journal.

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[1] Darlington, Memorials of John Bartram and Humphrey Marshall, p. 535.

Henry R Schoolcraft

Harvard appears to have had the first separate professorship of natural history, which was filled by William Dandridge Peck, a zoologist and botanist of prominence in his day.

A professorship of botany was established in Columbia College, New York, as early as 1795, at which time Doctor David Hosack [b. in New York, 1769, d. 1835] was the incumbent. Doctor Hosack brought with him from Europe, in 1790, the first cabinet of minerals ever seen in the United States. In its arrangement he was assisted by one of his pupils, Archibald Bruce, who became, in 1806, professor of mineralogy, and who, soon after, in 1810, established the American Journal of Mineralogy.

Doctor Hosack was the founder of the first public botanic garden—this was in New York in 1801; another was founded in Charleston in 1804. These had disappeared forty years ago, and the one at Cambridge, established in 1808, is the only one now in existence.

The first public museum was that founded in Philadelphia, in 1785, by Charles Willson Peale, the bones of a mammoth and a stuffed paddlefish forming its nucleus. This establishment had a useful career of nearly fifty years.

VII.

We have now rehearsed the story of the earliest investigators of American natural history, including two centuries of English endeavor, and nearly three if we take into consideration the earlier explorations of the naturalists of continental Europe. We have seen how, in the course of many generations, the intellectual supremacy of the Western Continent went from the Spaniards and the French and the Dutch to the new people who were to be called Americans, and we have become acquainted with the men who were most thoroughly identified with the scientific endeavors of each successive period of activity.

The achievements of American science during the century which has elapsed since the time when Franklin, Jefferson, Rittenhouse, and Rumford were its chief exponents have been often the subject of presidential addresses like this, and the record is a proud one. During the last fifty years in England, and the last forty in America, discovery has followed discovery with such rapid succession that it is somewhat hard to realize that American science in the colonial period, or even that of Europe at the same time, had any features which are worthy of consideration.

The naturalists whose names I have mentioned were the intellectual ancestors of the naturalists of to-day. Upon the foundations which they laid the superstructure of modern natural history is supported. Without the encyclopedists and explorers there could have been no Ray, no Klein, no Linnæus. Without the systematists of the latter part of the eighteenth century the school of comparative anatomists would never have arisen. Had Cuvier and his disciples never lived there would have been no place for the philosophic biologists of to-day.

The spirit of the early naturalists may be tested by passages in their writings which show how well aware they were of the imperfections of their work. Listen to what John Lawson, the Carolina naturalist, wrote in the year 1700:

> The reptiles or smaller insects are too numerous to relate here, this country affording innumerable quantities thereof; as the flying stags with horns, beetles, butterflies, grasshoppers, locusts, and several hundreds of uncouth shapes, which in the summer season are discovered here in Carolina, the description of which requires a large volume, which is not my intent at present; besides, what the mountainous part of this land may hereafter open to our view, time and industry will discover, for we that have settled but a small share of this large province can not imagine, but there will be a great number of discoveries made by those that shall come hereafter into the back part of this land, and make inquiries therein, when, at least, we consider that the westward of Carolina is quite different in soil, air, weather, growth of vegetables, and several animals, too, which we at present are wholly strangers to, and seek for. As to a right knowledge thereof, I say, when another age is come, the ingenious then in being may stand upon the shoulders of those that went before them, adding their own experiments to what was delivered down to them by their predecessors, and then there will be something toward a complete natural history, which, in these days, would be no easy undertaking to any author that writes truly and compendiously as he ought to do.

Herbert Spencer, in his essay on The Genesis of Science, lays stress upon the fact that the most advanced sciences have attained to their present power by a slow process of improvement, extending through thousands of years, that science and the positive knowledge of the uncultured can not be separated in nature, and that the one is but a perfected and extended form of the other. "Is not science a growth?" says he. "Has not science its embryology? And must not the neglect of its embryology lead to a misunderstanding of the principles of its evolution and its existing organization?"

It seems to me unfortunate, therefore, that we should allow the value of the labors of our predecessors to be depreciated, or to refer to the naturalists of the last century as belonging to the unscientific or to the archaic period. It has been frequently said by naturalists that there was no science in America until after the beginning of the present century. This is, in one sense, true; in another very false. There were then, it is certain, many men equal in capacity, in culture, in enthusiasm, to the naturalists of to-day, who were giving careful attention to the study of precisely the same phenomena of nature. The misfortune of men of science in the year of 1785 was that they had three generations fewer of scientific predecessors than have we. Can it be doubted that the scientists of some period long distant will look back upon the work of our own time as archaic and crude, and catalogue our books among the "curiosities of scientific literature?"

Is it not incumbent upon workers in science to keep green the memory of those whose traditions they have inherited? That it is, I do most steadfastly believe, and with this purpose I have taken advantage of the tercentenary of American biology to read this review of the work of the men of old.

Monuments are not often erected to men of science. More enduring, however, than monuments are those living and self-perpetuating memorials, the plants and animals which bear the names of the masters who knew them and loved them. Well have the Agassizs remarked that "there is a world of meaning hidden under our zoological and botanical nomenclature, known only to those who are intimately acquainted with the annals of scientific life in its social as well as its professional aspect."[1]

I hope I am not at this day entirely alone in my appreciation of the extreme appropriateness of this time-honored custom, although I know that many of our too matter-of-fact naturalists are disposed to abandon it, and that it is losing much of its former significance. In fact, in these days of unstable nomenclature, such tributes are often very evanescent. It seems fortunate that the names of some of the most honored of the early naturalists are perpetuated in well-established generic and specific combinations.[2]

When I see the *Linnæa borealis*, I am always reminded of the sage of Upsala, as he is represented in the famous Amsterdam painting, clad in Lapland fur, and holding a spray of that graceful arctic plant. *Magnolia* and *Wistaria* call up the venerable professors of botany at Montpelier and Philadelphia. *Tradescantia virginica* reminds me of John Tradescant and the Ashmolean Museum, whose beginnings were gathered by him in Virginia. The cape jessamine (*Gardenia*), the spring beauty (*Claytonia*), the partridge berry (*Mitchella*), the iron weed (*Vernonia*), the *Quercus bartramii* (=*Q. heterophylla*), the *Scarus catesbyi*, *Thalictrum* and *Asclepias cornuti*, *Macrurus fabricii*, *Didelphys* and *Canis azaræ*, *Chauliodus sloanei*, *Alutera schœfii*, *Stema forsteri*, *Stolephorus mitchilli*, *Malacanthus plumieri*, *Salix cutleri*, and *Pinus banksiana*, the *Kalmia*, the *Jeffersonia*, the *Hernandia*, the *Comptonia*, the *Sarracenia*, the *Gaultheria*, the *Kuhnia*, the *Ellisia*, the *Coldenia*, the *Robinia*, the *Banisteria*, the *Plumieria*, the *Collinsonia*, the *Bartramia*, all bear the names of men associated with the beginnings of natural history in America.

Yet, pleasant as it is to recall in such manner the achievements of the

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[1] Seaside Studies in Natural History, p. 25.

[2] The genus *Harriotta* has been dedicated by Goode and Bean to the memory of Thomas Harriot. It is intended to embrace a long-rostrated chimæroid fish from deep water off the Atlantic coast of North America. The description is not yet published. Heriot's Isle, named for Harriot by the early explorers, and shown upon Vaughan's map, in Smith's General History of Virginia, has entirely disappeared. It was situate on the north side of Albemarle Sound, about midway between Roanoke Island and the mouth of Chowan River. Whether it has been swept away by the tides, or has become a part of the mainland, it is difficult to say. The latter supposition seems the most probable, and since it is in all likelihood Reeds Point which now occupies its former location, the propriety is suggested of calling this little cape Harriots Point, in memory of the explorer.

fathers of natural history, let us not do them the injustice to suppose that posthumous fame was the object for which they worked. Like Sir Thomas Browne, they believed that "the world was made to be inhabited by beasts, but to be studied by man." Let us emulate their works and let us share with them the admonitions of the Religio Medici.

"The wisdom of God," says Browne, "receives small honor from those vulgar heads that rudely stray about, and with a gross rusticity admire His works; those highly magnify Him whose judicious inquiry into His acts, and deliberate research into His creatures, return the duty of a devout and learned admiration. Therefore," he continues—

> Search while thou wilt and let thy reason go
> To ransom truth, even to the abysse below,
> Rally the scattered causes, and that line
> Which nature twists be able to untwine.
> It is thy Maker's will, for unto none
> But unto reason can He e'er be known.

PIETRO ANGELO SECCHI.

THE BEGINNINGS OF AMERICAN SCIENCE.

THE THIRD CENTURY.

BY

GEORGE BROWN GOODE,

President of the Biological Society of Washington.

THE BEGINNINGS OF AMERICAN SCIENCE.

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VIII.

In the address which it was my privilege one year ago to read in the presence of this society I attempted to trace the progress of scientific activity in America from the time of the first settlement by the English in 1585 to the end of the Revolution, a period of nearly two hundred years.

Resuming the subject, I shall now take up the consideration of the third century, from 1782 to the present time. For convenience of discussion the time is divided, approximately, into decades, while the decades naturally fall into groups of three. From 1780 to 1810, from 1810 to 1840, from 1840 to 1870, and from 1870 to the close of the century are periods in the history of American thought, each of which seems to be marked by characteristics of its own. These must have names, and it may not be inappropriate to call the first the period of Jefferson, the second that of Silliman, and the third that of Agassiz.

The first was, of course, an extension of the period of Linnæus, the second and third were during the mental supremacy of Cuvier and Von Baer and their schools, and the fourth or present, beginning in 1870, belongs to that of Darwin, the extension of whose influence to America was delayed by the tumults of the civil convulsion which began in 1861 and ended in 1865.

The beginnings of American science do not belong entirely to the past. Our science is still in its youth, and in the discussion of its history I shall not hesitate to refer to institutions and to tendencies which are of very recent origin.

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[1] Annual presidential address delivered at the seventh anniversary meeting of the Biological Society of Washington, January 22, 1887, in the lecture room of the United States National Museum.

It is somewhat unfortunate that the account book of national progress was so thoroughly balanced in the centennial year. It is true that the movement which resulted in the birth of our Republic first took tangible form in 1776, but the infant nation was not born until 1783, when the treaty of Paris was signed, and lay in swaddling clothes until 1789, when the Constitution was adopted by the thirteen States.

In those days our forefathers had quite enough to do in adapting their lives to the changed conditions of existence. The masses were struggling for securer positions near home or were pushing out beyond the frontiers to find dwelling places for themselves and their descendants. The men of education were involved in political discussions as fierce, uncandid, and unphilosophical in spirit as those which preceded the French Revolution of the same period.

The master minds were absorbed in political and administrative problems and had little time for the peaceful pursuits of science, and many of the men who were prominent in science—Franklin, Jefferson, Rush, Mitchill, Seybert, Williamson, Morgan, Clinton, Rittenhouse, Patterson, Williams, Cutler, Maclure, and others—were elected to Congress or were called to other positions of official responsibility.

IX.

The literary and scientific activities of the infant nation were for many years chiefly concentrated at Philadelphia, until 1800 the Federal capital and largest of American cities. Here, after the return of Franklin from France in 1785, the meetings of the American Philosophical Society were resumed. Franklin continued to be its president until his death in 1790, at the same time holding the presidency of the Commonwealth of Pennsylvania and a seat in the Constitutional Convention. The prestige of its leader doubtless gave to the society greater prominence than its scientific objects alone would have secured.

In the reminiscences of Doctor Manasseh Cutler there is to be found an admirable picture of Franklin in 1787. As we read it we are taken back into the very presence of the philosopher and statesman, and can form a very clear appreciation of the scientific atmosphere which surrounded the scientific leaders of the post-Revolutionary period.

Doctor Cutler wrote:

> Doctor Franklin lives in Market Street, between Second and Third Streets, but his house stands up a court-yard at some distance from the street. We found him in his garden, sitting upon a grass plat under a large mulberry tree, with several other gentlemen and two or three ladies. When Mr. Gerry introduced me he rose from his chair, took me by the hand, expressed his joy to see me, welcomed me to the city, and begged me to seat myself close by him. His voice was low, his countenance open, frank, and pleasing. I delivered him my letters. After he had read them he took me again by the hand and, with the usual compliments, introduced me to the other gentlemen, who were, most of them, members of the Convention. Here we entered into a free conversation, and spent the time most agreeably until

BENJAMIN SILLIMAN.

it was dark. The tea table was spread under the tree, and Mrs. Bache, who is the only daughter of the Doctor and lives with him, served it out to the company.

The Doctor showed me a curiosity he had just received, and with which he was much pleased. It was a snake with two heads, preserved in a large vial. It was about ten inches long, well proportioned, the heads perfect, and united to the body about one-fourth of an inch below the extremities of the jaws. He showed me a drawing of one entirely similar, found near Lake Champlain. He spoke of the situation of this snake, if it was traveling among bushes, and one head should choose to go on one side of the stem of a bush and the other head should prefer the other side, and neither of the heads would consent to come back or give way to the other. He was then going to mention a humorous matter that had that day taken place in the Convention, in consequence of his comparing the snake to America, for he seemed to forget that everything in the Convention was to be kept a profound secret; but this was suggested to him, and I was deprived of the story.

After it was dark we went into the house, and he invited me into his library, which is likewise his study. It is a very large chamber and high-studded. The walls were covered with shelves filled with books; besides, there were four large alcoves, extending two-thirds of the length of the chamber, filled in the same manner. I presume this is the largest and by far the best private library in America. He showed us a glass machine for exhibiting the circulation of the blood in the arteries and veins of the human body. The circulation is exhibited by the passing of a red fluid from a reservoir into numerous capillary tubes of glass, ramified in every direction, and then returning in similar tubes to the reservoir, which was done with great velocity, and without any power to act visibly upon the fluid, and had the appearance of perpetual motion. Another great curiosity was a rolling press for taking copies of letters or any other writing. A sheet of paper is completely copied in less than two minutes, the copy as fair as the original, and without effacing it in the smallest degree. It is an invention of his own, and extremely useful in many situations in life. He also showed us his long artificial arm and hand for taking down and putting up books on high shelves, out of reach, and his great armchair with rockers, and a large fan placed over it, with which he fans himself, while he sits reading, with only a slight motion of his foot, and many other curiosities and inventions, all his own, but of lesser note. Over his mantel-tree he has a prodigious number of medals, busts, and casts in wax or plaster of paris, which are the effigies of the most noted characters in Europe. But what the Doctor wished especially to show me was a huge volume on botany, which indeed afforded me the greatest pleasure of any one thing in his library. It was a single volume, but so large that it was with great difficulty that the Doctor was able to raise it from a low shelf and lift it to the table; but, with that senile ambition common to old people, he insisted on doing it himself, and would permit no one to assist him, merely to show how much strength he had remaining. It contained the whole of Linnæus Systema Vegetabilium, with large cuts of every plant colored from nature. It was a feast to me, and the Doctor seemed to enjoy it as well as myself. We spent a couple of hours examining this volume, while the other gentlemen amused themselves with other matters. The Doctor is not a botanist, but lamented that he did not in early life attend to this science. He delights in natural history, and expressed an earnest wish that I would pursue the plan I had begun, and hoped this science, so much neglected in America, would be pursued with as much ardor here as it is now in every part of Europe. I wanted, for three months at least, to have devoted myself entirely to this one volume, but, fearing I should be tedious to the Doctor, I shut the book, though he urged me to examine it longer. He seemed extremely fond, through the course of the visit, of dwelling on philosophical subjects, and particularly that of natural history, while the other gentlemen were swallowed up in politics. This was a favorable circumstance to me, for almost the whole of his conversation was addressed to me, and I was highly delighted with the extensive knowledge he appeared to have of every subject, the brightness of his memory, the clearness and vivacity of all his mental faculties. Notwithstanding his age (eighty-four), his manners are perfectly easy, and everything about him seems to diffuse an unrestrained freedom and happiness. He has an incessant vein of humor, accompanied with an uncommon vivacity, which seems as natural and involuntary as his breathing.

To Franklin, as president of the Philosophical Society, succeeded David Rittenhouse [b. 1732, d. 1796], a man of world-wide reputation, known in his day as *the* American philosopher.[1]

He was an astronomer of repute, and his observatory, built at Norriton in preparation of the transit of Venus in 1769, seems to have been the first in America. His orrery, constructed upon an original plan, was one of the wonders of the land. His most important contribution to astronomy was the introduction of the use of spider lines in the focus of transit instruments.[2]

He was an amateur botanist, and in 1770 made interesting physiological experiments upon the electrical eel.[3]

He was a Fellow of the Royal Society of London, and the first director of the United States Mint.

Next in prominence to Franklin and Rittenhouse were doubtless the medical professors, Benjamin Rush, William Shippen, John Morgan, Adam Kuhn, Samuel Powell Griffiths, and Caspar Wistar, all men of scientific tastes, but too busy in public affairs and in medical instruction to engage deeply in research, for Philadelphia, in those days as at present, insisted that all her naturalists should be medical professors, and the active investigators, outside of medical science, were not numerous. Rush, however, was one of the earliest American writers upon ethnology, and a pathologist of the highest rank. He is generally referred to as the earliest professor of chemistry, having been appointed to the chair of chemistry in the College of Philadelphia in 1769. It seems certain, however, that Doctor John Morgan lectured on chemistry as early as 1765.[4]

Doctor Shippen [b. 1735, d. 1808], the founder of the first medical school [1765] and its professor of anatomy for forty-three years, was still in his prime, and so was Doctor Morgan [b. 1735, d. 1789], a Fellow of the Royal Society, a co-founder of the medical school, and a frequent contributor to the Philosophical Transactions. Morgan was an eminent pathologist, and is said to have been the one to originate the theory of the formation of pus by the secretory action of the vessels of the part.[5] He appears to have been the first who attempted to form a museum of anatomy, having learned the methods of preparation from the Hunters

[1] See obituary in the European Magazine, July, 1796; also Memoirs of Rittenhouse, by William Barton, 1813, and Eulogium by Benjamin Rush, 1796.

[2] Von Zach, Monatliche Correspondenz, II, p. 215.

[3] Philadelphia Medical and Physical Journal, I, Pt. 2, p. 96.

[4] Barton's Memoirs of Rittenhouse, 1813, p. 614.

[5] James Thacher, American Medical Biography, I, 1828, p. 408.

and from Süe in Paris. The beginning was still earlier known, for a collection of anatomical models in wax, obtained by Doctor Abraham Chovet in Paris, was in use by Philadelphia medical students before the revolution.[1]

Another of the physicians of colonial days who lived until after the revolution was Doctor Thomas Cadwallader [b. 1707, d. 1779], whose dissections are said to have been among the earliest made in America, and whose Essay on the West India Dry Gripes, 1775, was one of the earliest medical treatises in America.

Doctor Caspar Wistar [b. 1761, d. 1818] was also a leader, and was at various times professor of chemistry and anatomy. His contributions to natural history were descriptions of bones of *Megalonyx* and other mammals, a study of the human ethmoid, and experiments on evaporation. He was long vice-president of the Philosophical Society, and in 1815 succeeded Jefferson in its presidency. The Wistar Anatomical Museum of the university and the beautiful climbing shrub *Wistaria* are among the memorials to his name.[2]

Still another memorial of the venerable naturalist may perhaps be worthy of mention as an illustration of the social condition of science in Philadelphia in early days. A traveler visiting the city in 1829 thus described this institution, which was continued until the late war and then discontinued, but has been resumed within the last year:

> Doctor Wistar in his lifetime had a party of his literary and scientific friends at his house, one evening in every week—and to this party, strangers visiting the city, were also invited. When he died, the same party was continued, and the members of the Wistar party, in their tour, each have a meeting of the club at his house, on some Saturday night in the year. This club consists of the men most distinguished for learning, science, art, literature, and wealth in the city. It opens at early candle-light, in the evening, where, not only the members themselves appear, but they bring with them all the strangers of distinction then in the city.[3]

The Wistar parties were continued up to the beginning of the civil war, in 1861, and have been resumed since 1887. A history of these gatherings would cover a period of three-quarters of a century at the least, and could be made a most valuable and entertaining contribution to scientific literature.

Packard, in his History of Zoology,[4] states that zoology, the world over, has sprung from the study of human anatomy, and that American zoology took its rise and was fostered chiefly in Philadelphia by the professors in the medical schools.

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[1] This eventually became the property of the university. See Barton's Memoirs of Rittenhouse, 1813, p. 377. Transactions of the American Philosophical Society, II, p. 368.

[2] David Hosack, Tribute to the Memory of the late Caspar Wistar, New York, 1818.

[3] Caleb Atwater, Remarks made on a Tour to Prairie du Chien; thence to Washington City, in 1829. Columbus, Ohio, 1831, p. 238.

[4] Standard Natural History, pp. lxii–lxxii.

It was fully demonstrated, I think, in my former address, that there were good zoologists in America long before there were medical schools, and that Philadelphia was not the cradle of American natural history, although during its period of political preeminence, immediately after the Revolution, scientific activities of all kinds centered in that city. As for the medical schools, it is at least probable that they have spoiled more naturalists than they have fostered.

Doctor Adam Kuhn [b. 1741, d. 1817] was the professor of botany in 1768[1]—the first in America—and was labeled by his contemporaries the favorite pupil of Linnæus. Professor Gray, in a recent letter to the writer, refers to this saying as a myth; and it surely seems strange that a disciple beloved by the great Swede could have done so little for botany. Barton, in a letter, in 1792, to Thunberg, who then occupied the seat of Linnæus in the University of Upsala, said:

> The electricity of your immortal Linné has hardly been felt in this *Ultima Thule* of science. Had a number of the pupils of that great man spread themselves along, and settled in the countries of North America, the riches of this world of natural treasures would have been better known. But alas! the one only pupil of your predecessor that has made choice of America as the place of his residence has added *nothing* to the stock of natural knowledge.[2]

The Rev. Nicholas Collin, rector of the Swedish churches in Pennsylvania, was a fellow-countryman and acquaintance of Linnæus[3] and an accomplished botanist, having been one of the editors of Muhlenberg's work upon the grasses, and an early writer on American linguistics. He read before the Philosophical Society, in 1789, An essay on those inquiries in natural philosophy which at present are most beneficial to the United States of North America, which was the first attempt to lay out a systematic plan for the direction of scientific research in America. One of the most interesting suggestions he made was that the Mammoth was still in existence.

> The vast Mahmot [said he] is perhaps yet stalking through the western wilderness; but if he is no more, let us carefully gather his remains, and even try to find a whole skeleton of this giant, to whom the elephant was but a calf.[4]

General Jonathan Williams, U. S. A. [b. 1750, d. 1815], was first superintendent of the Military Academy at West Point and father of the Corps of Engineers. He was a nephew of Franklin and his secretary of legation in France, and, after his return to Philadelphia, was for many years a judge of the court of common pleas, his military career not beginning till 1801. This versatile man was a leading member of the Philo-

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[1] See previous address, p. 99. [This volume, p. 402.]

[2] Benjamin S. Barton, Transactions of the American Philosophical Society, III, p. 339.

[3] I often heard the great Linnæus wish that he could have explored the continent of North America. Collin, Transactions of the American Philosophical Society, III, p. xv.

[4] Idem., p. xxiv.

SIR HANS SLOANE.

sophical Society and one of its vice-presidents. His paper On the use of the thermometer in navigation was one of the first American contributions to scientific seamanship.

The Rev. Doctor John Ewing [b. 1732, d. 1802], also a vice-president, was provost of the university. He had been one of the observers of the transit in 1769, of which he published an account in the Transactions of the Philosophical Society. He early printed a volume of lectures on natural philosophy, and was the strongest champion of John Godfrey, the Philadelphian, in his claim to the invention of the reflecting quadrant.[1]

Doctor James Woodhouse [b. 1770, d. 1809] was author and editor of several chemical text-books and professor of chemistry in the university, a position which he took after it had been refused by Priestley. He made experiments and observations on the vegetation of plants and investigated the chemical and medical properties of the persimmon tree. He it was who first demonstrated the superiority of anthracite to bituminous coal by reason of its intensity and regularity of heating power.[2]

The Rev. Ebenezer Kinnersley [b. in Gloucester, England, November 30, 1711; d. in Philadelphia, July 4, 1778] survived the Revolution, though, in his latter years, not a contributor to science. The associate of Franklin in the Philadelphia experiments in electricity, his discoveries were famous in Europe as well as in America.[3] It is claimed that he originated the theory of the positive and negative in electricity; that he first demonstrated the passage of electricity through water; and that he first discovered that heat could be produced by electricity; besides inventing numerous mechanical devices of scientific interest. From 1753 to 1772 he was connected with the University of Pennsylvania, where there may still be seen a window dedicated to his memory.

Having already referred to the history of scientific instruction in America,[4] and shown that Hunter lectured on comparative anatomy in Newport in 1754; Kuhn on botany, in Philadelphia, in 1768; Waterhouse on natural history and botany, at Cambridge, in 1788; and some unidentified scholars upon chemistry and natural history, in Philadelphia, in 1785, it would seem unjust not to speak of Kinnersley's career as a lecturer. He seems to have been the first to deliver public scientific

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[1] Thomas Godfrey [says a recent authority] was born in Bristol, Pennsylvania, in 1704, and died in Philadelphia in December, 1749. He followed the trade of a glazier in the metropolis, and, having a fondness for mathematical studies, marked such books as he met with, subsequently acquiring Latin, that he might become familiar with the mathematical work in that language. Having obtained a copy of Newton's Principia, he described an improvement he had made in Davis' quadrant to James Logan, who was so impressed that he at once addressed a letter to Edmund Halley in England, giving a full description of the construction and uses of Godfrey's instrument.

[2] Benjamin Silliman, Jr., American Contributions to Chemistry, p. 13.

[3] See Priestley's History of Electricity.

[4] See previous address, p. 99. [This volume, p. 401.]

lectures in America, occupying the platform in Philadelphia, Newport, New York, and Boston, from 1751 to the beginning of the Revolution. The following advertisement was printed in the Pennsylvania Gazette for April 11, 1751:

> NOTICE is hereby given to the *Curious*, That on *Wednesday* next, Mr. *Kinnersley* proposes to begin a Course of Experiments on the newly-discovered ELECTRICAL FIRE, containing not only the most curious of those that have been made and published in *Europe*, but a considerable Number of new Ones lately made in this City; to be accompanied with methodical LECTURES on the Nature and Properties of that wonderful Element.

Francis Hopkinson [b. 1737, d. 1791], signer of the Declaration of Independence, was treasurer of the Philosophical Society, and among other papers communicated by him was one in 1783, calling attention to the peculiar worm parasitic in the eye of a horse. The horse with a snake in its eye was on public exhibition in Philadelphia in 1782, and was the object of much attention, for the nature and habits of this peculiar *Filaria* were not so well understood then as now.

The father of Francis, Thomas Hopkinson [b. in London, 1709; d. in Philadelphia, 1751], who was overlooked in my previous address, deserves at least a passing mention. Coming to Philadelphia in 1731, he became lawyer, prothonotary, judge of the admiralty, and member of the provincial council. As an incorporator of the Philadelphia Library Company, and original trustee of the College of Philadelphia, and president of the first American Philosophical Society in 1743, his public spirit is worthy of our admiration. He was associated with Kinnersley and Franklin in the Philadelphia experiments, and Franklin said of him:

> The power of points to throw off the electrical fire was first communicated to me by my ingenious friend, Mr. Thomas Hopkinson.[1]

The name of Philip Syng is also mentioned in connection with the Philadelphia experiments, and it would be well if some memorials of his work could be placed upon record.

William Bartram [b. 1739, d. 1823] was living in the famous botanical garden at Kingsessing, which his father, the old King's botanist, had bequeathed him in 1777. He was for some years professor of botany in the Philadelphia College, and in 1791 printed his charming volume descriptive of his travels in Florida, the Carolinas, and Georgia. The latter years of his life appear to have been devoted to quiet observation. William Bartram has been, perhaps, as much underrated as John Bartram has been unduly exalted. He was one of the best observers America has ever produced, and his book, which rapidly passed through several editions in English and French, is a classic, and should stand beside White's Selborne in every naturalist's library. Bartram was doubtless discouraged, early in his career, by the failure of his patrons in London to make any scientific use of the immense botanical collections made

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[1] Cyclopædia of American Biography, III, p. 260.

by him in the South before the Revolution, which many years later was lying unutilized in the Banksian herbarium. Coues has called attention very emphatically to the merits of his bird work, which he pronounces the starting point of a distinctly American school of ornithology. Two of the most eminent of our early zoologists, Wilson and Say, were his pupils; the latter, his kinsmen, and the former his neighbor, were constantly with him at Kingsessing and drew much of their inspiration from his conversation. Many birds which Wilson first fully described and figured were really named and figured by Bartram in his Travels, and several of his designations were simply adopted by Wilson.[1]

Bartram's Observations on the Creek and Cherokee Indians[2] was an admirable contribution to ethnography, and his general observations were of the highest value.

In the introduction to his Travels, and interspersed through this volume, are reflections which show him to have been the possessor of a very philosophic and original mind.

His Anecdotes of an American Crow and his Memoirs of John Bartram[3] were worthy products of his pen, while his illustrations to Barton's Elements of Botany show how facile and truthful was his pencil.

His love for botany was such, we are told, that he wrote a description of a plant only a few minutes before his death, a statement which will be readily believed by all who know the nature of his enthusiasm. Thus, for instance, he wrote of the Venus's Flytrap:

> Admirable are the properties of the extraordinary Dionea muscipula! See the incarnate lobes expanding, how gay and sportive they appear! ready on the spring to intrap incautious, deluded insects! What artifice! There! behold one of the leaves just closed upon a struggling fly; another has gotten a worm; its hold is sure; its prey can never escape—carnivorous vegetable! Can we, after viewing this object, hesitate a moment to confess that vegetable beings are endowed with some sensible faculties or attributes, similar to those that dignify animal nature; they are organical, living, and self-moving bodies, for we see here, in this plant, motion and volition.[4]

Moses Bartram, a cousin of William, and also a botanist, was also living near Philadelphia, and in 1879 published Observations on the Native Silk Worms of North America, and Humphrey Marshall [1722–1801], the farmer-botanist, had a botanical garden of his own, and in 1785 published The American Grove—Arbustrium Americanum—a treatise on the forest trees and shrubs of the United States, which was the first strictly American botanical book, and which was republished in France a few years later, in 1789.

Gotthilf Muhlenberg [b. 1753, d. 1815], a Lutheran clergyman, living

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[1] Elliott Coues, Key to North American Birds, 1887, p. xvii.

[2] Transactions of the American Ethnological Society, III, 1851.

[3] Nicholson's Journal, 1805.

[4] Travels through North and South Carolina, Georgia, East and West Florida, 1794, p. xiii.

at Lancaster, was an eminent botanist, educated in Germany, though a native of Pennsylvania. His Flora of Lancaster was a pioneer work. In 1813 he published a full catalogue of the plants of North America, in which about 2,800 species were mentioned. He supplied Hedwig with many of the rare American mosses, which were published either in the Stirpes Cryptogamicæ of that author or in the Species Muscorum. To Sir J. E. Smith and Mr. Dawson Turner he likewise sent many plants. He made extensive preparations, writing a general flora of North America, but death interfered with his project. The American Philosophical Society preserves his herbarium, and the moss *Funeria muhlenbergii*, the violet *Viola muhlenbergii*, and the grass *Muhlenbergia* are among the memorials to his name.[1]

To Pennsylvania, but not to Philadelphia, came in 1794 Joseph Priestley [1733–1804], the philosopher, theologian, and chemist. Although his name is more famous in the history of chemistry than that of any living contemporary, American or European, his work was nearly finished before he left England. He never entered into the scientific life of the country which he sought as an exile, and of which he never became a citizen, and he is not properly to be considered an element in the history of American science.

His coming, however, was an event of considerable political importance, and William Cobbett's Observations on the Emigration of Doctor Joseph Priestley, by Peter Porcupine, was followed by several other pamphlets equally vigorous in expression. McMaster is evidently unjust to some of the public men who welcomed Priestley to America, though no one will deny that there were unprincipled demagogues in America in the year of grace 1794. Jefferson was undoubtedly sincere when he wrote to him the words quoted elsewhere in this address.

Another eminent exile welcomed by Jefferson, and the writer, at the President's request, of a work on national education in the United States, was M. Pierre Samuel Dupont de Nemours [b. in Paris, 1739; d. 1817]. He was a member of the Institute of France, a statesman, diplomatist, and political economist, and author of many important works. He lived in the United States at various times from 1799 till 1817, when he died near Wilmington, Delaware. Like Priestley, he was a member of the American Philosophical Society, and affiliated with its leading members.

The gunpowder works near Wilmington, Delaware, founded by his son in 1798, are still of great importance, and the statue of one of his grandsons, an Admiral in the United States Navy, adorns one of the principal squares in the national capital.

Among other notable names on the roll of the society in the last century were those of General Anthony Wayne and Thomas Payne. His Excellency General Washington was also an active member, and seems

[1] William J. Hooker, On the Botany of America, Edinburgh Journal of Science, II, p. 108.

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to have taken sufficient interest in the society to nominate for foreign membership the Earl of Buchan, president of the Society of Scottish Antiquarians, and Doctor James Anderson, of Scotland.

The following note written by Washington is published in the Memoirs of Rittenhouse:

> The President presents his compliments to Mr. Rittenhouse, and thanks him for the attention he has given to the case of Mr. Anderson and the Earl of Buchan.
> SUNDAY AFTERNOON, *20th April, 1794.*

Of all the Philadelphia naturalists of those early days the one who had the most salutary influence upon the progress of science was perhaps Benjamin Smith Barton [b. 1766, d. 1815]. Barton was the nephew of Rittenhouse and the son of Rev. Thomas Barton, a learned Episcopal clergyman of Lancaster, who was one of the earliest members of the Philosophical Society, and a man accomplished in science.

He studied at Edinburgh and Göttingen, and at the age of nineteen, in 1785, he was the assistant of Rittenhouse and Ellicott in the work of establishing the western boundary of Pennsylvania, and soon after was sent to Europe, whence, having pursued an extended course of scientific and medical study, he returned in 1789, and was elected professor of natural history and botany in the University of Pennsylvania. He was a leader in the Philosophical Society, and the founder of the Linnæan Society of Philadelphia, before which in 1807 he delivered his famous Discourse on some of the Principal Desiderata in Natural History, which did much to excite an intelligent popular interest in the subject. His essays upon natural history topics were the first of the kind to appear in this country. He belonged to the school of Gilbert White and Benjamin Stillingfleet, and was the first in America of a most useful and interesting group of writers, among whom may be mentioned John D. Godman, Samuel Lockwood, C. C. Abbott, Nicholas Pike, John Burroughs, Wilson Flagg, Ernest Ingersoll, the Rev. Doctor McCook, Hamilton Gibson, Maurice Thompson, and W. T. Hornaday, as well as Matthew Jones, Campbell Hardy, Charles Waterton, P. H. Gosse, and Grant Allen, to whom America and England both have claims.

Barton published certain descriptive papers, as well as manuals of botany and materia medica, but in later life had become so absorbed in medical affairs that he appears to have taken no interest in the struggles of the infant Academy of Natural Sciences, which was founded three years before his death, but of which he never became a member.

His nephew and successor in the presidency of the Linnæan Society and the University professorship, William P. C. Barton [b. 1786, d. 1856], was a man of similar tendencies, who in early life published papers on the flora of Philadelphia [Floræ Philadelphiæ Prodromus, 1815], but later devoted himself chiefly to professional affairs, writing copiously upon materia medica and medical botany.

The admirers of Benjamin Smith Barton have called him the father of American natural history, but the propriety of this designation, is questioned, since it is equally applicable to Mitchill or Jefferson, and perhaps still more so to Peter Collinson, of London. The praises of Barton have been so well and so often sung that there can be no injustice in passing him briefly by.[1]

The most remarkable naturalist of those days was Rafinesque [b. 1784, d. 1872], a Sicilian by birth, who came to Philadelphia in 1802.

Nearly fifty years ago this man died, friendless and impoverished in Philadelphia. His last words were these: Time renders justice to all at last. Perhaps the day has not yet come when full justice can be done to the memory of Constantine Rafinesque, but his name seems yearly to grow more prominent in the history of American zoology. He was in many respects the most gifted man who ever stood in our ranks. When in his prime he far surpassed his American contemporaries in versatility and comprehensiveness of grasp. He lived a century too soon. His spirit was that of the present period. In the latter years of his life, soured by disappointments, he seemed to become unsettled in mind, but as I read the story of his life his eccentricities seem to me the outcome of a boundless enthusiasm for the study of nature. The picturesque events of his life have been so well described by Jordan,[2] Chase,[3] and Audubon[4] that they need not be referred to here. The most satisfactory gauge of his abilities is perhaps his masterly Survey of the Progress and Actual State of Natural Sciences in the United States of America, printed in 1817.[5] His own sorrowful estimate of the outcome of his mournful career is very touching:

> I have often been discouraged, but have never despaired long. I have lived to serve mankind, but have often met with ungrateful returns. I have tried to enlarge the limits of knowledge, but have ofted met with jealous rivals instead of friends. With a greater fortune I might have imitated Humboldt or Linnæus.

Doctor Robert Hare [b. 1781, d. 1858] began his long career of usefulness in 1801, at the age of twenty, by the invention of the oxyhydrogen blowpipe. This was exhibited at a meeting of the Chemical Society of Philadelphia in 1801.[6]

This apparatus was perhaps the most remarkable of his original contributions to science, which he continued without interruption for more than fifty years. It belongs to the end of the post-Revolutionary period, and is therefore noticed, although it is not the purpose of this essay to consider in detail the work of the specialists of the present century.

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[1] William P. C. Barton, Biography of Benjamin S. Barton, Philadelphia, 1815.

[2] David Starr Jordan, Bulletin U. S. National Museum, No. IX; also see article in Popular Science Monthly, XXIX, p. 212, reprinted in Jordan's Science Sketches, p. 143.

[3] Chase, Potter's American Monthly, VI, pp. 97–101.

[4] Audubon, The Eccentric Naturalist, Ornithological Biography, p. 455.

[5] American Monthly Magazine, II, p. 81.

[6] Idem., I, p. 80.

Doctor Hugh Williamson [b. December 5, 1735; d. in New York May 22, 1719] was a prominent but not particularly useful promoter of science, a writer rather than a thinker. His work has already been referred to. The names of Maclure, who came to Philadelphia about 1797, the Rev. John Heckewelder, and Albert Gallatin [b. 1761, d. in 1849], a native of Switzerland, a statesman and financier, subsequently identified with the scientific circles of New York, complete the list of the Philadelphia savants of the last century.

There is not in all American literature a passage which illustrates the peculiar tendencies in the thought of this period so thoroughly as Jefferson's defense of the country against the charges of Buffon and Raynal, which he published in 1783, which is particularly entertaining because of its almost pettish depreciation of our motherland.

> On doit etre etonné [says Raynal] que l'Amerique n'ait pas encore produit un bon poëte, un habile mathematicien, un homme de génie dans un seul art, ou une seule science.
>
> When we shall have existed as a people as long as the Greeks did before they produced a Homer, the Romans a Virgil, the French a Racine and Voltaire, the English a Shakespeare and Milton, should this reproach be still true, we will inquire from what unfriendly causes it has proceeded, that the other countries of Europe and quarters of the earth shall not have inscribed any name in the rôle of poets.
>
> In war we have produced a Washington, whose memory will in future ages assume its just station among the most celebrated worthies of the world, when that wretched philosophy shall be forgotten which would have arranged him among the degeneracies of nature.
>
> In physics we have produced a Franklin, than whom no one of the present age has made more important discoveries, nor has enriched philosophy with more, or more ingenious solutions of the phenomena of nature.
>
> We have supposed Mr. Rittenhouse second to no astronomer living; that in genius he must be the first, because he is self-taught. He has not indeed made a world; but he has by imitation approached nearer its Maker than any man who has lived from the creation to this day. There are various ways of keeping the truth out of sight. Mr. Rittenhouse's model of the planetary system has the plagiary appellation of an orrery; and the quadrant invented by Godfrey, an American also, and with the aid of which the European nations traverse the globe, is called Hadley's quadrant.
>
> We calculate thus: The United States contain three millions of inhabitants; France twenty millions; and the British Islands ten. We produce a Washington, a Franklin, a Rittenhouse. France then should have half a dozen in each of these lines, and Great Britain half that number, equally eminent. It may be true that France has; we are but just becoming acquainted with her, and our acquaintance so far gives us high ideas of the genius of her inhabitants.
>
> The present war having so long cut off all communication with Great Britain, we are not able to make a fair estimate of the state of science in that country. The spirit in which she wages war is the only sample before our eyes, and that does not seem the legitimate offspring either of science or of civilization. The sun of her glory is fast descending to the horizon. Her philosophy has crossed the channel, her freedom the Atlantic, and herself seems passing to that awful dissolution whose issue is not given human foresight to scan.[1]

This was one phase of public sentiment. Another, no less instructive,

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[1] Notes on the State of Virginia, 1788, pp. 69–71.

is that shown forth in the publications of Jefferson's fierce political opponents in 1790, paraphrased, as follows, by McMaster in his History of the People of the United States:

Why, it was asked, should a philosopher be made President? Is not the active, anxious, and responsible station of Executive illy suited to the calm, retired, and exploring tastes of a natural philosopher? Ability to impale butterflies and contrive turn-about chairs may entitle one to a college professorship, but it no more constitutes a claim to the Presidency than the genius of Cox, the great bridge-builder, or the feats of Ricketts, the famous equestrian. Do not the pages of history teem with evidences of the ignorance and mismanagement of philosophical politicians? John Locke was a philosopher, and framed a constitution for the colony of Georgia; but so full was it of whimsies that it had to be thrown aside. Condorcet, in 1793, made a constitution for France; but it contained more absurdities than were ever before piled up in a system of government, and was not even tried. Rittenhouse was another philosopher; but the only proof he gave of political talents was suffering himself to be wheedled into the presidency of the Democratic Society of Philadelphia. But, suppose that the title of philosopher is a good claim to the Presidency, what claim has Thomas Jefferson to the title of philosopher? Why, forsooth!

He has refuted Moses, disproved the story of the Deluge, made a penal code, drawn up a report on weights and measures, and speculated profoundly on the primary causes of the difference between the whites and blacks. Think of such a man as President! Think of a foreign minister surprising him in the act of anatomizing the kidneys and glands of an African to find out why the negro is black and odoriferous!

He has denied that shells found on the mountain tops are parts of the great flood. He has declared that if the contents of the whole atmosphere were water, the land would only be overflowed to the depth of fifty-two and one-half feet. He does not believe the Indians emigrated from Asia.

Every mail from the South brought accounts of rumblings and quakes in the Alleghanies and strange lights and blazing meteors in the sky. These disturbances in the natural world might have no connection with the troubles in the political world; nevertheless it was impossible not to compare them with the prodigies all writers of the day declare preceded the fatal Ides of March.

X

In New York, although a flourishing medical school had been in existence from 1769, there was an astonishing dearth of naturalists until about 1790. Governor Colden, the botanist and ethnologist, had died in 1776, and the principal medical men of the city, the Bards, Clossy, Jones, Middleton, Dyckman, and others confined their attention entirely to professional studies. A philosophical society was born in 1787, but died before it could speak. A society for the promotion of agriculture, arts, and manufactures, organized in 1791, was more successful, but not in the least scientific. Up to the end of the century New York State had but six men chosen to membership in the American Philosophical Society, and up to 1809 but five in the American Academy. Leaders, however, soon arose in Mitchill, Clinton, and Hosack.

Samuel Latham Mitchill, the son of a Quaker farmer [b. 1764, d. 1831], was educated in the medical schools of New York and Edinburgh, and in


THE PORTRAICTUER OF CAPTAYNE IOHN SMITH ADMIRALL OF NEW ENGLAND.
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1792 was appointed professor of chemistry, natural history, and philosophy in Columbia College. Although during most of his long life a medical professor and editor and for many years Representative and Senator in Congress, he continued active in the interests of general science. He made many contributions to systematic natural history, notably a History of the Fishes of New York, and his edition of Bewick's General History of Quadrupeds, published in New York in 1804 with notes and additions, and some figures of American animals, was the earliest American work of the kind. He was the first in America to lecture upon geology, and published several papers upon this science. His mineralogical exploration of the banks of the Hudson River in 1796, under the Society for the Promotion of Agriculture, Manufactures, and Useful Arts, founded by himself, was our earliest attempt at this kind of research, and in 1794 he published an essay on the Nomenclature of the New Chemistry, the first American paper on chemical philosophy, and engaged in a controversy with Priestley in defense of the nomenclature of Lavoisier, which he was the first American to adopt.

His discourse on The Botanical History of North and South America was also a pioneer effort. He was an early leader in ethnological inquiries and a vigorous writer on political topics. His Life of Tammany, the Indian chief (New York, 1795), is a classic, and he was well known to our grandfathers as the author of An Address to the Fredes or People of the United States, in which he proposed that Fredonia should be adopted as the name of the nation.

Doctor Mitchill was a poet[1] and a humorist and a member of the literary circles of his day. In The Croakers, Rodman Drake thus addressed him as The Surgeon-General of New York:

> It matters not how high or low it is
> Thou knowest each hill and vale of knowledge,
> Fellow of forty-nine societies
> And lecturer in Hosack's College.

Fitz-Greene Halleck also paid his compliments in the following terms:

> Time was when Doctor Mitchill's word was law,
> When Monkeys, Monsters, Whales and Esquimaux,
> Asked but a letter from his ready hand,
> To be the theme and wonder of the land.

These and other pleasantries, of which many are quoted in Fairchild's admirable History of the New York Academy of Sciences, gives us an idea of the provinciality of New York sixty years ago, when every citizen would seem to have known the principal local representatives of science, and to have felt a sense of personal proprietorship in him and in his projects.

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[1] Examples of his verses may be found in Duyckinck's Cyclopædia of American Literature, I, p. 520.

Mitchill was a leader in the New York Historical Society, founder of the Literary and Philosophical Society, and of its successor, the Lyceum of Natural History, of which he was long president. He was also president of the New York Branch of the Linnæan Society of Paris, and of the New York State Medical Society, and surgeon-general of the State militia; a man of the widest influence and universally beloved. He served four terms in the House of Representatives, and was five years a member of the United States Senate.[1]

De Witt Clinton [b. 1769, d. 1828], statesman and philanthropist, United States Senator and governor of New York, was a man of similar tastes and capacities. What Benjamin Franklin was to Philadelphia in the middle of the eighteenth century, De Witt Clinton was to New York in the beginning of the nineteenth. He was the author of the Hibernicus Letters on the Natural History and Internal Resources of the State of New York (New York, 1822), a work of originality and merit. As president of the Literary and Philosophical Society he delivered, in 1814, an Introductory Discourse, which, like Barton's, in Philadelphia, ten years before, was productive of great good. It was, moreover, laden with the results of original and important observations in all departments of natural history. Another important paper was his Memoirs on the Antiquities of Western New York, printed in 1818.

Clinton's attention was devoted chiefly to public affairs, and especially to the organization of the admirable school system of New York, and other internal improvements. He did enough in science, however, to place him in the highest ranks of our early naturalists.[2]

Hosack has been referred to elsewhere as a pioneer in mineralogy and the founder of the first botanic garden. He was long president of the Historical Society, and exercised a commanding influence in every direction. His researches were, however, chiefly medical.

Samuel Akerly [b. 1785, d. 1845], the brother-in-law of Mitchill, a graduate of Columbia College, 1807, was an industrious worker in zoology and botany, and the author of the Geology of the Hudson River. John Griscom [b. 1774, d. 1852], one of the earliest teachers of chemistry,

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[1] See John W. Francis, Life of Doctor Mitchill, in Williams's American Medical Biography, pp. 401–411, and eulogy in Discourse in Commemoration of Fifty-third Anniversary of the New York Historical Society, 1857, pp. 56–60; and in his Old New York; also—

Sketch by H. L. Fairchild, in History of the New York Academy of Sciences, 1887, pp. 57–67; also Doctor Mitchill's own pamphlet: Some of the Memorable Events and Occurrences in the Life of Samuel L. Mitchill, of New York, from the year 1786 to 1827.

A biography by Akerly was in existence, but has never been printed.

Numerous portraits are in existence, which are described by Fairchild.

[2] David Hosack, Memoirs of De Witt Clinton, New York, 1829. James Renwick, Life of De Witt Clinton, New York, 1840. William W. Campbell, Life and Writings of De Witt Clinton, New York, 1849.

began in 1806 a career of great usefulness. "For thirty years," wrote Francis, "he was the acknowledged head of all other teachers of chemistry among us (in New York), and he kept pace with the flood of light which Davy, Murray, Gay Lussac, and Thenard and others shed on the progress of chemical philosophy at that day." About 1820 he went abroad to study scientific institutions, and his charming book, A Year in Europe, supplemented by his regular contributions to Silliman's Journal, commenting on scientific affairs in other countries, did much to stimulate the growth of scientific and educational institutions in America.

Francis tells us that he was for thirty years the acknowledged head of the teachers of chemistry in New York.[1]

A zealous promoter of zoology in those days was F. Adrian Vanderkemp, of Oldenbarnavelt, New York, who, in 1795, we are told, delivered an address before an agricultural society in Whitesburg, New York, in which he offered premiums for essays upon certain subjects, among which was one for the best anatomical and historical account of the moose, $50, or for bringing one in alive, $60.[2]

Having mentioned several American naturalists of foreign birth, it may not be out of place to refer to the American origin of an English zoologist of high repute, Doctor Thomas Horsfield, born in Philadelphia, in 1773, and after many years in the East became, in 1820, a resident of London, where he died in 1859. His name is prominent among those of the entomologists, botanists, and ornithologists of this century, especially in connection with Java.

XI.

In New England science was more highly appreciated than in New York. Massachusetts had in John Adams a man who, like Franklin and Jefferson, realized that scientific institutions were the best protection for a democratic government, and to his efforts America owes its second scientific society—the American Academy of Arts and Sciences, founded in 1780. When Mr. Adams traveled from Boston to Philadelphia, in the days just before the Revolution, he several times visited at Norwalk, we are told, a curious collection of American birds and insects made by Mr. Arnold. This was afterwards sold to Sir Ashton Lever, in whose apartments in London Mr. Adams saw it again, and felt a new regret at our imperfect knowledge of the productions of the three kingdoms of nature in our land. In France his visits to the museums and other establishments, with the inquiries of academicians and other men of science and letters respecting this country and their encomiums on the Philosophical Society of Philadelphia, suggested to him the idea of engag-

[1] John H. Griscom, Memoir of John Griscom, New York, 1859, p. 424.

[2] De Witt Clinton, Transactions of the Literary and Philosophical Society, New York, I, p. 59.

ing his native state to do something in the same good but neglected cause.[1]

The academy, from the first, was devoted chiefly to the physical sciences, and the papers in its memoirs for the most part relate to astronomy and meteorology.

Among its early members I find the names of but two naturalists: The Rev. Manasseh Cutler, pastor of Ipswich Hamlet, one of the earliest botanists of New England,[2] and William Dandridge Peck [b. 1763, d. 1882], the author of the first paper on systematic zoology ever published in America, a Description of Four Remarkable Fishes taken near the Piscataqua in New Hampshire, published in 1794.[3] Peck, after graduating at Harvard, lived at Kittery, New Hampshire, and first became interested in natural history by reading a wave-worn copy of Linnæus's System of Nature, which he obtained from the ship which was wrecked near his house. He became a good entomologist, and communicated much valuable material to Kirby in England, and was also one of our first writers on the fungi. He was the first to occupy the chair of natural history in Harvard University, to which he was appointed in 1800.

The Rev. Doctor Jedediah Morse [b. 1761; graduate of Yale, 1783; d. 1826] was the earliest of American geographers, and appears, especially in the later gazetteers published by him, to have printed important facts concerning the number and geographical distribution of the various Indian tribes.

The Connecticut Academy of Arts and Sciences was founded in 1799, one of the chief promoters being President Dwight [b. 1752, d. 1817], whose Travels in New England and New York, printed in 1821, abounds with scientific observations.

Another was E. C. Herrick [b. 1811, d. 1862], for many years librarian and subsequently treasurer of Yale College, whose observations upon the aurora, made in the latter years of the last century, are still frequently quoted; and later an active investigator of volcanic phenomena, and the author of a treatise on the Hessian fly and its parasites, the results of nine years' study; and of another on the existence of a planet between Mercury and the Sun.

Benjamin Silliman [b. in Trumbull, Connecticut, August 8, 1779; d. in New Haven, November 27, 1869], who, in 1802, became professor of chemistry at Yale, began there his career of usefulness as an organizer, teacher, and critic. One of his introductions to popular favor was the paper which he, in conjunction with Professor Kingsley, published, An account of the meteor which burst over Weston, in Connecticut, in December, 1807. This paper attracted attention everywhere, for the nature of meteors was not well understood in those days. Jefferson was reputed

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[1] John T. Kirkland, Memoirs of the American Academy, New Series, I, p. xxii.

[2] See previous address, p. 95. [This volume, p. 399.]

[3] Memoirs of the American Academy of Sciences, II, Pt. 2, 1797, p. 46.

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to have said in reference to it, that it was easier to believe that two Yankee professors could lie than to admit that stones could fall from heaven, but I think this must be pigeonholed with the millions of other slanders to which Jefferson was subjected in those days. I find in the papers by Rittenhouse and Madison, published twenty years before, by the Philosophical Society, matter-of-fact allusions to the falling of meteors to the earth.

Silliman was the earliest of American scientific lecturers who appeared before popular audiences, and, as founder and editor of the Journal of Science, did a service to science the value of which is beyond estimate or computation.

Benjamin Waterhouse, professor of the theory and practice of medicine in Harvard, 1783–1812, was one of the earliest teachers of natural history in America, and the author of a poem entitled The Botanist.[1] The Rev. Jeremy Belknap [b. 1744, d. 1798], in his History of New Hampshire, and the Rev. Samuel Williams [b. 1743, d. 1817], in his Natural and Civil History of Vermont,[2] made contributions to local natural history, and Captain Jonathan Carver [b. 1732, d. 1780], in his Travels Through the Interior Parts of America, 1778, gave some meager information as to the zoology and botany of regions previously unknown.

In the South the prestige of colonial days seemed to have departed. Except Jefferson, the only naturalist in Virginia was Doctor James Greenway, of Dinwiddie County, a botanist of some merit. Mitchell returned to England before the Revolution, and Garden followed in 1784. H. B. Latrobe, of Baltimore, was an amateur ichthyologist, and Doctor James MacBride, of Pineville, South Carolina [b. 1784, d. 1817], was an active botanist. Doctor Lionel Chalmers [b. 1715, d. 1777], who was for many years the leader of scientific activity in South Carolina, was omitted in the previous address. A graduate of Edinburgh, he was for forty years a physician in Charleston. He recorded observations on meteorology from 1750 to 1760, the foundation of his Treatise on the Weather and Diseases of South Carolina [London, 1776], and published also valuable papers on pathology. He was the host and patron of many naturalists, such as the Bartrams.

There was no lack of men in the South who were capable of appreciating scientific work. Virginia had fourteen members in the American Philosophical Society from 1780 to 1800, while Massachusetts and New York had only six each, the Carolinas had eight, and Maryland six. The population of the South was, however, widely dispersed and no concentration of effort was possible. To this was due, no doubt, the speedy dissolution of the Academy of Arts and Sciences founded in Richmond in 1788.[3]

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[1] Biography in Polyanthus, II.

[2] Walpole, New Hampshire, 1794, 8vo, p. 416.

[3] See previous discourse, p. 98. [This volume, p. 401.]

A name which should, perhaps, be mentioned in connection with this is that of Doctor William Charles Wells, whom it has been the fashion of late to claim as an American. It would be gratifying to be able to vindicate this claim, for Wells was a man of whom any nation might be proud. He was the originator of the generally accepted theory of the origin of dew, and was also, as Darwin has shown, the first to recognize and announce the theory of evolution by natural selection.[1] Unfortunately, Wells's science was not American science. We might with equal propriety claim as American the art of James Whistler, the politics of Parnell, the fiction of Alexandre Dumas, the essays of Grant Allen, or the science of Rumford and Le Vaillant.

Wells was the son of an English painter who emigrated in 1753 to South Carolina, where he remained until the time of the Revolution, when, with other loyalists, he returned to England. He was born during his father's residence in Charleston, but left the country in his minority; was educated at Edinburgh, and though he, as a young physician, spent four years in the United States, he was permanently established in London practice fully twenty-eight years before he read his famous letter before the Royal Society.

The first American naturalist who held definite views as to evolution was, undoubtedly, Rafinesque. In a letter to Doctor Torrey, December 1, 1832, he wrote:

> The truth is that species, and perhaps genera also, are forming in organized beings by gradual deviations of shapes, forms, and organs taking place in the lapse of time. There is a tendency to deviation and mutation in plants and animals by gradual steps, at remote, irregular periods. This is a part of the great universal law of perpetual mutability in everything.

It is pleasant to remember that both Darwin and Wallace owed much of their insight into the processes of nature to their American explorations. It is also interesting to recall the closing lines, almost prophetic as they seem to-day, of the Epistle to the author of the Botanic Garden,[2] written in 1798 by Elihu Hubbard Smith, of New York, and prefixed to the American editions of The Botanic Garden:

> Where Mississippi's turbid waters glide
> And white Missouri pours its rapid tide;
> Where vast Superior spreads its inland sea
> And the pale tribes near icy empires sway;
> Where now Alaska lifts its forests rude
> And Nootka rolls her solitary flood.
> Hence keen incitement prompt the prying mind
> By treacherous fears, nor palsied nor confined;
> Its curious search embrace the sea and shore
> And mine and ocean, earth and air explore.

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[1] Charles Darwin, Origin of Species, 6th Amer. ed., p. xv. Edward S. Morse, Proceedings of the American Association for the Advancement of Science, XXV, p. 141.

[2] Erasmus, grandfather of Charles Darwin.

Thus shall the years proceed—till growing time
Unfold the treasures of each different clime;
Till one vast brotherhood mankind unite
In equal bonds of knowledge and of right;
Thus the proud column, to the smiling skies
In simple majesty sublime shall rise,
O'er ignorance foiled, their triumph loud proclaim,
And bear inscribed, immortal, Darwin's name.

XII.

During the three decades which made up the post-revolutionary period there were several beginnings which may not well be referred to in connection with individuals or localities.

The first book upon American insects was published in 1797, a sumptuously illustrated work, in two volumes, with 104 colored plates, entitled The Natural History of the rarer Lepidopterous Insects of Georgia. This was compiled by James E. Smith from the notes and drawings of John Abbot [b. about 1760], living in England in 1840, an accomplished collector and artist, who had been for several years a resident of Georgia, gathering insects for sale in Europe. Mr. Scudder characterizes him as the most prominent student of the life histories of insects we have ever had.[1]

There had, however, been creditable work previously done in what our entomologists are pleased to call the biological side of the science. As early as 1768, Colonel Landon Carter, of Sabine Hall, Virginia, prepared an elaborate paper, Observations concerning the Fly Weevil that Destroys the Wheat, which was printed by the American Philosophical Society,[2] accompanied by an extended report by The committee of husbandry. In the same year Moses Bartram presented his Observations on the Native Silkworms of North America.[3]

Organized effort in economic entomology appears to date from the year 1792, when the American Philosophical Society appointed a committe to collect materials for a natural history of the Hessian fly, at that time making frightful ravages in the wheat field, and so much dreaded in Great Britain that the import of wheat from the United States was forbidden by law. The Philosophical Society's committee was composed of Thomas Jefferson, at that time Secretary of State in President Washington's cabinet, Benjamin Smith Barton, James Hutchinson, and Caspar Wistar. In their report, which was accompanied by large drawings, the history of the little marauder was given in considerable detail.

The publication of Wilson's American Ornithology, beginning in 1808,

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[1] There is a whole series of quarto or folio volumes in the British Museum done by him, and a few volumes are extant in this country. Besides, all the biological material in Smith-Abbot's Insects of Georgia is his.—Letter of S. H. Scudder.

[2] Transactions of the American Philosophical Society, I, 1789, p. 274.

[3] Idem., 1789, p. 294.

was an event of great importance. It was in 1804 that the author, a schoolmaster near Philadelphia, decided upon his plan. In a letter to Lawson he wrote:

> I am most earnestly bent on pursuing my plan of making a Collection of all the Birds of North America. Now, I don't want you to throw cold water on this notice, Quixotic as it may appear. I have been so long accustomed to the building of Airy Castles and brain Windmills that it has become one of my comforts of life, a sort of tough Bone, that amuses me when sated with the dull drudgery of Life.

I need not eulogize Wilson. Everyone knows how well he succeeded. He has had learned commentators and eloquent biographers. Our children pore over the narrative of the adventurous life of the weaver naturalist, and we all are sensible of the charms which his graceful pen has given to the life histories of the birds.

His poetical productions are immortal, and his lines to the Blue Bird and the Fisherman's Hymn are worthy to stand by the side of Bryant's Waterfowl, Trowbridge's Wood Pewee, Emerson's Titmouse, Thaxter's Sandpiper, and, possibly best of all, Walt Whitman's Mocking-Bird in Out of the Cradle endlessly Rocking.

Ichthyology in America dates also from these last years of the century. Garden was our only resident ichthyologist until Peck and Mitchill began their work, but Schœpf, the Hessian military surgeon, printed a paper on the Fishes of New York in 1787, and William Bryant, of New Jersey, and Henry Collins Flagg, of South Carolina, made observations upon the electric eel, in addition to those which Williamson, of North Carolina, laid before the Royal Society in 1775.

Paleontology had its beginning at about the same time in the publication of Jefferson's paper on the Megalonyx or Great Claw in 1797.[1]

This early study of a fossil vertebrate was followed twenty years later by the first paper which touched upon invertebrates—that by Say on Fossil Zoology, in the first volume of Silliman's Journal. Lesueur seems to have brought from France some knowledge of the names of fossils, and identified many species for the early American geologists.

Stratigraphical and physical geology also came in at this time, and will be referred to later.

The science of mineralogy was brought to America in its infancy. The first course of lectures upon this subject ever given in London was in the winter of 1793–94, by Schmeisser, a pupil of Werner. Doctor David Hosack, then a student of medicine at Edinburgh, was one of his hearers, and inspired by his enthusiasm began at once to form the collection of minerals which he brought to America on his return in 1794,

[1] The first vertebrate fossils were found in Virginia. Samuel Maverick, of Massachusetts, reported to the colony at Boston in 1636 that, at a place on the James River, about 60 miles above its mouth, the colonists had found shells and bones, among these bones that of a whale 18 feet below the surface.—Neill's Virginia Carolorum, p. 131.

ISAAC INGALLS STEVENS.

which was the first mineralogical cabinet ever seen on this side of the Atlantic. This collection was exhibited for many years in New York (and in 1821 was given to Princeton College). Howard soon after obtained a select cabinet from Europe, and the museum of the American Philosophical Society acquired the Smith collection. In 1802 Mr. B. D. Perkins, a New York bookseller, brought from London a fine collection, which soon passed into the possession of Yale College, and in 1803 Doctor Archibald Bruce brought over one equally fine, which was made the basis of lectures when, in 1806, he became professor of mineralogy in Columbia College. George Gibbs, in 1805, imported the magnificent collection which was long in the custody of the American Geological Society. Seybert about the same time brought to Philadelphia the cabinet which, in 1813, was bought by the Academy of Natural Sciences and was lectured upon by Troost in 1814.

Much of the early botanical exploration was, however, carried out by European botanists: André Michaux [b. near Versailles, 1746; d. Madagascar, 1802], a pupil of the Jussieus and an experienced explorer, was sent by his Government, in 1785, to collect useful trees and shrubs for naturalization in France. He remained eleven years, made extensive explorations in the regions then accessible and as far west as the Mississippi, sent home immense numbers of living plants; and after his return, in 1796, published his treatise on the American Oaks,[1] and prepared the materials for his posthumous Flora Boreali-Americanas.

François André Michaux [b. near Versailles, 1770; d. at Vauréal, 1855] was his father's assistant in these early travels, and in 1802 and 1806 himself made botanical explorations in the Mississippi Valley. His botanical works were of great importance,[2] especially that known in its English translation as the North American Sylva, afterwards completed by Nuttall, and still the only work of the kind, though soon to be supplemented, we hope, by Professor Sargent's projected monographs.

Frederick Pursh [b. 1774, in Tobolsk, Siberia; d. June 11, 1820, in Montreal, Canada] carried on botanical explorations between 1799 and 1819, living from 1802 to 1805 in Philadelphia and from 1807 to 1810 in New York. In 1814 he published in London his Flora Americæ Septentrionalis. Pursh's Flora was largely based upon the labors of the American botanists Barton, Hosack, Le Conte, Peck, Clayton, Walter, and Lyon, and the botanical collection of Lewis and Clarke, and enumerated about 3,000 species of plants, while Michaux's, printed eleven years before, had only about half that number.

A. von Enslen collected plants at this time, in the South and West, for the Imperial Cabinet in Vienna. C. C. Robin, who traveled from 1802 to 1806 in what are now the Gulf States, wrote a botanical appen-

[1] Histoire des Chênes de l'Amerique Septentrionale, 1801; 36 plates.

[2] Voyage à l'ouest des Monts Alléghanys, etc., octavo, pp. 684. Paris, 1808. Histoire des Arbres Foréstières de l'Amerique Septentrionale.

dix to his Travels, published in 1807, on which Rafinesque founded his Florula Ludoviciana (New York, 1817).

Thaddeus Hænke [b. 1761, d. in Cochabamba, Bolivia, 1817] visited western North America with the Spaniards late in the last century, and made large collections of plants, which were sent to the National Museum of Bohemia, at Prague, and in part described in Presl's Reliquiæ Hænkianæ, 72 plates.

Archibald Menzies [b. 1754, d. 1842], an English naval surgeon, also collected on our Pacific Coast, under Vancouver, in 1780–1795, and his plants found their way to Edinburgh and Kew.

Captain Wangenheim, Surgeon Schoepf, of the Hessian contingent of the British army, Olaf Swartz, a Swedish botanical explorer, and others, also gathered plants in these early days, and in some instances published in Europe their botanical observations.

Other collectors of this same class were L. A. G. Bosc [1759–1828], who made botanical researches in the Carolinas during the last two years of the century, and returned to France in 1800 with a herbarium of 1,600 species. He also collected fishes, and his name is perpetuated in connection with at least two well known American fauna. Another was M. Milbert, who collected for Cuvier in New York, Canada, the Great Lake region, and the Mississippi Valley from 1817 to 1823.

The Baron Palisot de Beauvois [b. 1755, d. 1820] came from Santo Domingo to America in 1791. He traveled extensively, and being a zoologist as well as a botanist, made observations upon our native animals, particularly the reptiles.

It is to him that we owe the most carefully recorded of existing observations of young rattlesnakes crawling down their parent snakes' throats for protection from enemies.

Most of these men did not contribute largely to the advancement of American scientific institutes or affiliate with the naturalists of the day.

Of quite another type was the Count Luigi Castiglioni, who traveled, soon after the Revolution, throughout the Eastern States and published in 1790 two volumes of his travels.[1]

The Count Volney [b. at Craon February 3, 1757, d. in Paris April 25, 1820], traveler, statesman, and historian, traveled in this country from 1795 to 1798, and in 1803, while a senator of the French Republic, published his famous work upon the United States, containing his observations upon its soil and its climate, and upon the Indians, together with the first doctrines of the language of the Miamis,[2] and also giving a description of the physical and botanical features of the country. Volney

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[1] Viaggio negli Stati Uniti del l'America Settentrionale.

[2] Tableau du climat et du sol des Etats-Unis d'Amérique, suivi d'éclaircissements sur la Floride, sur la colonie française à Scioto sur quelques colonies canadiennes, et sur les sauvages. Paris, 1803. Octavo, 2 vols. 2d edition. Paris. Octavo, 1 vol., pp. 494. Map.

was an admirer and intimate friend of Franklin, and it was in his home at Passy, we are told, that he conceived the idea of his most famous book, Les Ruines.[1]

Among the traditions of Fauquier County, Virginia, is one which is of interest to naturalists, since it relates to an incident showing the interest of our first President in science:

> About the year 1796 [runs the story], at the close of a long summer's day, a stranger entered the village of Warrenton. He was alone and on foot, and his appearance was anything but prepossessing. His garments, coarse and dust covered, indicated an individual in the humble walks. From a cane across his shoulders was suspended a handkerchief containing his clothing. Stopping in front of Turner's tavern, he took from his hat a paper and handed it to a gentleman standing on the steps; it read as follows:
>
> The celebrated historian and naturalist
> Volney needs no recommendation from
>
> G. WASHINGTON.

In 1801 Jefferson began his eight years of Presidency. Since he was the only man of science who has ever occupied the Chief Magistracy, he has a right to a high place in the esteem of such a society as ours, and I only regret that, having spoken of him at length a year ago, I can not now discuss his scientific career in all its aspects.

I then spoke of the credit which was due to him for beginning so early as 1780 to agitate the idea of a Government exploring expedition to the Pacific, which culminated in the sending out by Congress of the expedition of Lewis and Clarke, in 1803. Captain Lewis [b. 1774, d. 1809], the leader of this expedition, was a young Virginian, the neighbor and for some years the private secretary of President Jefferson. He set out in the summer of 1803, accompanied by his associate, Captain Clarke, and twenty-eight men. They entered the Missouri May 14, 1804, before the middle of the following July had reached the great falls, and by October were upon the western slope, where, embarking in canoes upon the Kouskousky, a branch of the Columbia, they descended to its mouth, where they arrived on the 15th of November, 1805. The following spring they retraced their course, arriving in St. Louis in September.[2] The results of the expedition were first made known in Jefferson's message to Congress read February 19, 1806.

Doctor Asa Gray, in a recent letter, says:

> I have reason to think that Michaux suggested to Jefferson the expedition which the latter was active in sending over to the Pacific. I wonder if he put off Michaux for the sake of having it in American hands?[3]

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[1] John Bigelow, Franklin's Home and Host in France. The Century Magazine, May, 1888, p. 743.

[2] See a complete bibliography of the various reports of this expedition, by Elliott Coues, in the Bulletin of the United States Geological Survey.

[3] See American Journal of Science, XLII, 1842, p. 5.

The idea of an expedition to the Pacific was one which was likely to occur to any thoughtful American, and was, after all, simply the continuance of a plan as old as the Spanish days of discovery. Jefferson, at all events, was an active promoter of all such enterprises, and after a quarter of a century's effort the expedition was dispatched, while in 1805 General Z. M. Pike was sent to explore the sources of the Mississippi River and the western parts of Louisiana, penetrating as far west as Pike's Peak, a name which still remains as a memento of this enterprise.

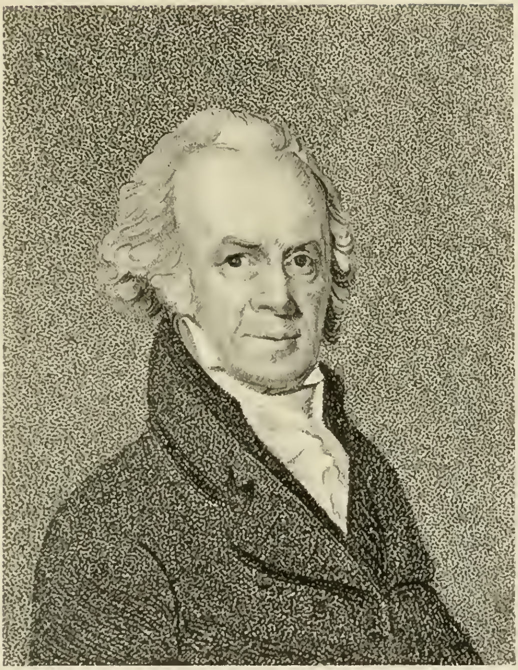
The organization of these early expeditions marked the beginning of one of the most important portions of the scientific work of our Government—the investigation of the resources and natural history of the public domain. The expeditions of Lewis and Clarke and of Pike were the precursors and prototypes of the magnificent organization now accomplishing so much for science under the charge of Major J. W. Powell.

As early as 1806 Jefferson, inspired by Patterson and Hassler, urged the establishment of a national coast survey, and in this was earnestly supported by his Secretary of the Treasury, Albert Gallatin, who drew up a learned and elaborate project for its organization, and an act authorizing its establishment was passed in 1807. During his Administration, in 1802 the first scientific school in this country was established—the Military Academy at West Point. The Military Academy was a favorite project of General Washington, who is said to have justified his anxiety for its establishment by the remark that "An army of asses led by a lion is vastly superior to an army of lions led by an ass."

Jefferson has been heartily abused for not gratifying Alexander Wilson's request to be appointed naturalist to Pike's expeditions. It is possible that even in those days administrators were hampered by lack of financial resources. It must also be remembered that in 1804 Wilson was simply an enthusiastic projector of ornithological undertakings, and had done nothing whatever to establish his reputation as an investigator.

One of Jefferson's first official acts was to throw his Presidential mantle over Priestley. Two weeks after he became President of the United States he wrote these words:

> It is with heartfelt satisfaction that, in the first moments of my public action, I can hail you with welcome to our land, tender to you the homage of its respect and esteem, cover you under the protection of those laws which were made for the wise and good like you, and disclaim the legitimacy of that libel on legislation which, under the form of a law, was for sometime placed among them.
>
> . . . Yours is one of the few lives precious to mankind, and for the continuance of which every thinking man is solicitous. Bigots may be an exception. What an effort, my dear sir, of bigotry in politics and religion have we gone through. . . . All advances in science were prescribed as innovations. They pretended to praise and encourage education, but it was to be the education of our ancestors. We were to look backwards, not forwards for improvement; the President [Washington] himself declaring in one of his answers to addresses that we



ISAIAH THOMAS.

were never to expect to go beyond them in real science. This was the real ground of all the attacks on you; those who live by mystery and *charlatanerie* fearing you would render them useless by simplifying the Christian philosophy, the most sublime and benevolent but most perverted system that ever shone on man, endeavored to crush your well-earned and well-deserved fame.[1]

XIII.

With the close of the first decade ended the first third of a century since the Declaration of Independence. We have now passed in review a considerable number of illustrious names and have noted the inception of many worthy undertakings.

"Still, however," in the words of Silliman, "although individuals were enlightened, no serious impression was produced on the public mind; a few lights were indeed held out but they were lights twinkling in an almost impervious gloom.[2]

This was a state of affairs not peculiar to America. A gloom no less oppressive had long obscured the intellectual atmosphere of the Old World. There were a goodly number of men of science, and many important discoveries were being made, but no bonds had yet been formed to connect the interests of the men of science and the men of affairs.

Speculative science, in the nature of things, can only interest and attract scholarly men, and though its results, concisely and attractively stated, may have a passing interest to a certain portion of every community, it is only by its practical applications that it secures the hearty support of the community at large.

Huxley, in his recent discourse upon The Advance of Science in the last Half Century,[3] has touched upon this subject in a most suggestive and instructive manner, and has shown that Bacon, with all his wisdom, exerted little direct beneficial influence upon the advancement of natural knowledge, which has after all been chiefly forwarded by men like Galileo and Harvey, Boyle and Newton, "who would have done their work quite as well if neither Bacon nor Descartes had ever propounded their views respecting the manner in which scientific investigation should be pursued."

I think we should look upon Bacon as the prophet of modern scientific thought, rather than its founder. It is no doubt true, as Huxley has said, that his "scientific insight" was not sufficient to enable him to shape the future course of scientific philosophy, but it is scarcely true that he attached any undue value to the practical advantages which the world as a whole and incidentally science itself were to reap from the applications of scientific methods to the investigation of nature.

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[1] Jefferson's Works (edited by T. J. Randolph), 1830, III, p. 461.

[2] American Journal of Science, I, 1819, 37.

[3] T. H. Wood, The Reign of Victoria; a survey of Fifty Years of Progress. London, 1887.

Even though the investigations of Descartes, Newton, Leibnitz, Boyle, Torricelli, and Malpighi had directly helped no man to either wealth or comfort, the cumulative results of their labors, and those of their pupils and associates, resulted in a condition of scientific knowledge from which, sooner or later, utilitarian results must necessarily have sprung.

It is true, as Huxley tells us, that at the beginning of this century weaving and spinning were still carried on with the old appliances; true that nobody could travel faster by sea or by land than at any previous time in the world's history, and true that King George could send a message from London to York no faster than King John might have done. Metals were still worked from their ores by immemorial rule of thumb, and the center of the iron trade of these islands was among the oak forests of Sussex, while the utmost skill of the British mechanic did not get beyond the production of a coarse watch.

It can not be denied that although the middle of the eighteenth century was illuminated by a host of great names in science, chemists—biologists, geologists—English, French, German, and Italian, the deepening and broadening of natural knowledge had produced next to no immediate practical benefits. Still I can not believe that Bacon, the prophet, would have been so devoid of "scientific insight" as to have failed to foresee at this time the ultimate results of all this intellectual activity.

But Huxley says:

> Even if, at this time, Francis Bacon could have returned to the scene of his greatness and of his littleness, he must have regarded the philosophic world which praised and disregarded his precepts with great disfavor. If ghosts are consistent he would have said, "these people are all wasting their time, just as Gilbert and Kepler and Galileo and my worthy physician Harvey did in my day. Where are the fruits of the restoration of science which I promised? This accumulation of bare knowledge is all very well, but *cui bono?* Not one of these people is doing what I told him specially to do, and seeking that secret of the cause of forms which will enable him to deal at will with matter and superinduce new nature upon old foundations."

As Huxley, however, proceeds himself to show in the discussion which immediately follows this passage, a "new nature, begotten by science upon fact," has been born within the past few decades, and, pressing itself daily and hourly upon our attention, has worked miracles which have not only modified the whole future of the lives of mankind, but has reacted constantly upon the progress of science itself.

It is to the development of this new nature, then in its very infancy, that we must look for the revival of interest in science on this side of the Atlantic.

The second decade of the century was marked by a great accession of interest in the sciences. The second war with Great Britain having ended, the country, for the first time since colonial days, became sufficiently tranquil for peaceful attention to literature and philosophy. The end of the Napoleonic wars and the restoration of tranquillity to Europe tended to scientific advances on the other side of the Atlantic, and the results of the labors of Cuvier, whose glory was now approaching its zenith, of Brongniart, of Blainville, of Jussieu, of Decandolle, of Werner, of Hutton, of Buckland, of De la Beche, of Magendie, of Humboldt, Daubuisson, Berzelius, Von Buch, of Herschel, of Laplace, of Young, of Fresnel, of Oersted, of Cavendish, of Lavoisier, Wollaston, Davy, and Sir William Hooker, were eagerly welcomed by hundreds in America.

"In truth," wrote one who was among the most active in promoting these tendencies—"a thirst for the natural sciences seemed already to pervade the United States like the progress of an epidemic."

The author of these enthusiastic words was Amos Eaton [b. in Chatham, New York, 1776, d. May 6, 1842], one of the most interesting men of his day. In 1816, at the age of forty, he abandoned the practice of law and went to New Haven to attend Silliman's lectures on mineralogy and geology. He was a man of great force and untiring energy, and one of the pioneers of American geology; though the name, Father of American Geology, sometimes applied to him, would seem to belong more appropriately to Maclure, or, perhaps, to Mitchill. He was, however, only some eight years later than Maclure in beginning geological field work. Eaton's Index to the Geology of the Northern States of America, printed in 1817, was the first strictly American treatise, and seems to have had a very stimulating effect. He was preeminently an agitator and an educator. He traveled many thousands of miles on foot throughout New England and New York, delivering in the meantime, at the principal towns, short courses of lectures on natural history. In March, 1817, having received an invitation to aid in the introduction of the natural sciences in Williams College, his Alma Mater, he delivered a course of lectures in Williamstown. "Such," he remarks, "was the zeal at this institution, that an uncontrolable enthusiasm for Natural History, took possession of every mind; and other departments of learning were, for a time, crowded out of College. The College authorities allowed twelve students each day (72 per week) to devote their whole time to the collection of minerals, plants, etc., in lieu of all other exercises."[1]

In April, 1818, he went to Albany, on the special invitation of Governor De Witt Clinton, and delivered a course of letures on natural history. "In Albany I found," wrote he, "Doctor T. Romeyn Beck, and in Troy, Doctors Burrett, Robbins, and Dale, zealous beyond description in the cause of natural science. By the exertions of these gentlemen a taste for the study of nature was strongly excited in those two cities, especially for that of geology. They, together with several others, had become members of the New York Lyceum of Natural History, and in the fall of 1818 established a society of the same name and upon a similar plan in Troy. Collections were made with such zeal that in the course of a few

[1] Geological Text-Book, 2d edition, 1832, p. 16.

months Troy could boast of a more extensive collection of American geological specimens than Yale College or any other institution upon this continent." [1]

"In this period," remarked Bache, "the prosecution of mathematics and physical science was neglected; indeed, barely kept alive by the calls for boundary and land surveys of the more extended class, by the exertions necessary in the lecture room, or by isolated volunteer efforts.

"As the country was explored and settled the unworked mine of natural history was laid open, and the attention of almost all the cultivators of science was turned toward the development of its riches.

"Descriptive natural history is the pursuit which emphatically marks that period. As its exponent, may be taken the admirable descriptive mineralogy of Cleaveland, which seemed to fill the measures of that day and be, as it were, its chief embodiment, appearing just as the era was passing away." [2]

The leading spirits of the day seem to have been Silliman, Hare, Maclure, Mitchill, Gibbs, Cleaveland, De Witt Clinton, and Caspar Wistar.

Names familiar to us of the present generation began now to appear in scientific literature Isaac Lea began to print his memoirs on the Unionidæ; Edward Hitchcock, principal of the Deerfield Academy, was writing his first papers on the geology of Massachusetts; Professor Chester Dewey, of Williams College [b. 1781, d. 1867], afterwards known to us all from his excellent work upon the Carices, was discussing the mineralogy and geology of Massachusetts; Doctor John Torrey, also to be famous as a botanist, was then devoting his attention to mineralogy and chemistry; Doctor Jacob Porter was making botanical observations in central Massachusetts; quaint old Caleb Atwater, at that time almost the only scientific observer west of the Alleghenies, was discussing the origin of prairies, meteorology, botany, geology, mineralogy, and scenery of the Ohio country, and a little later the remains of mammoths.

Professor J. W. Webster, of Boston, was making general studies in geology; the Rev. Elias Cornelius and Mr. John Grammer were writing of the geology of Virginia; Mr. J. A. Kain, upon that of Tennessee, I. P. Brace, that of Connecticut, and James Pierce, that of New Jersey.

To this period belonged the brilliant Constantine Rafinesque, with Torrey, Silliman, Cleaveland, Gibbs, James, Schoolcraft, Gage, Akerly, Mitchill, Dana, Beck, and Featherstonhaugh.

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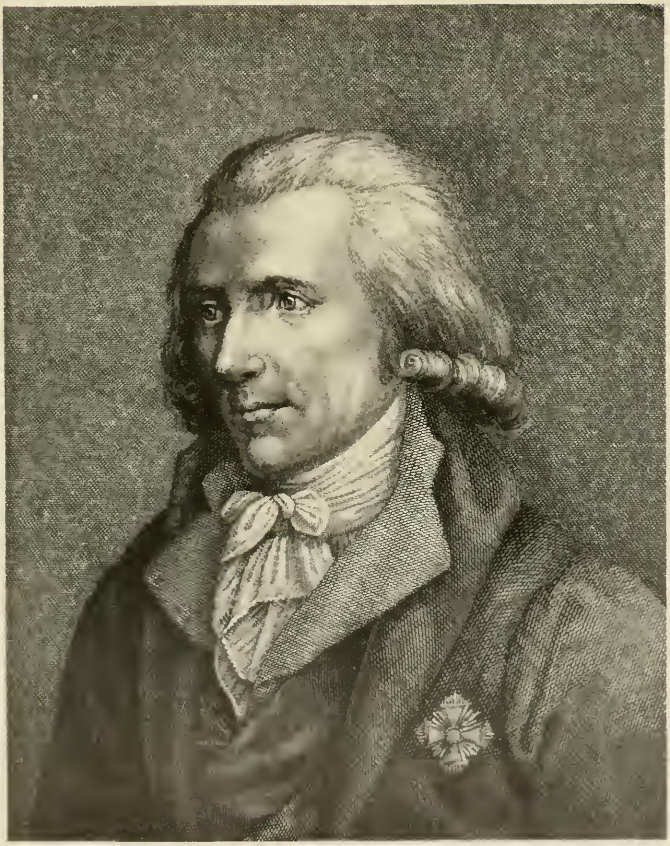
[1] The Troy Lyceum of Natural History was incorporated in 1819, and a lectureship was created, filled by Mr. Eaton (American Journal of Science, II, p. 173). In 1820 a similar association, The Hudson Association for Improvement in Science, was founded in the city of Hudson, and in 1821 the Delaware Chemical and Geological Society.

[2] Proceedings of the American Association for the Advancement of Science, VI, 1851, pp. VI, XLVI.



BENJAMIN THOMPSON, COUNT RUMFORD.

Doctor Henry R. Schoolcraft, afterwards prominent in ethnology, printed, in 1819, his View of the Lead Mines of Missouri, the first from American contributors to economic geology; and in the same year his Transallegania, a mineralogical poem, probably the last as well as the first of its kind written in America. In 1821 he published a scholarly Account of the Native Copper on the Southern Shore of Lake Superior.[1]

Mineralogy and geology were the most popular of the sciences.

American geology dated its beginning from this previous decade. Professor S. L. Mitchill was one of the first to call attention to the teachings of Kirwan and the pioneers of European geology, and very early in the century began to instruct the students of Columbia College in the principles of geology as then understood. He published Observations on the Geology of America, and also edited a New York edition of Cuvier's History of the Earth, contributing to this work an appendix which was constantly quoted by early writers.

The first geological explorer was William Maclure [b. in Ayr, Scotland, 1763; d. in San Angel, Mexico, March 23, 1840], a Scotch merchant who amassed a large fortune by commercial connections with this country, and became a citizen of the United States about 1796. His most important service to American science was that of a patron, for he was a liberal supporter of the infant Academy of Sciences in Philadelphia, and for twenty-two years its president, besides being an upholder of other important enterprises.

The publication, in 1809, of his Observations on the Geology of the United States marks the beginning of American geographical geology and the first attempt at a geological survey of the United States. This had long been the object of his ambition, and in order to prepare himself for the task he had spent several years in travel throughout Europe, making observations and collecting objects in natural history, which he forwarded to the country of his adoption.

His undertaking was undoubtedly a remarkable one. "He went forth with his hammer in his hand and his wallet on his shoulder, pursuing his researches in every direction, visiting almost every State and Territory, wandering often amidst pathless tracts and dreary solitudes until he had crossed and recrossed the Allegheny Mountains not less than fifty times. He encountered all the privations of hunger, thirst, fatigue, and exposure, month after month and year after year, until his indomitable spirit had conquered every difficulty, and crowned his enterprise with success,"[2] and after the publication of his memoir he devoted eight years more to collecting materials for a second and revised edition.

The geological map of the United States, published in 1809, appears to have been the first of the kind ever attempted for an entire country.

[1] American Journal of Science, III, 1821, pp. 201–216.

[2] Martin, Memoir of William Maclure, p. 11.

Smith's geological map of England was six years later, and Greenough's still subsequent in date.

The publication in London in 1813 of Bakewell's Introduction to Geology seems to have given a great stimulus to geological researches in this country, as may be judged from the publication of an American edition a year or two later.

Mitchill, Bruce, and Maclure soon had a goodly band of associates. Naturalists were not confined to limited specialties in those days, and we find all the chemists, botanists, and zoologists absorbed in the consideration of geological problems. Maclure and most of the Americans were disciples of Werner.

Silliman, writing in 1818, said:

> A grand outline has recently been drawn by Mr. Maclure with a masterly hand and with a vast extent of personal observation and labor; but, to fill up the detail, both observation and labor still more extensive are demanded; nor can the object be effected till more good geologists are formed and distributed over our extensive territory.

On the 6th of September, 1819, the American Geological Society was organized in the philosophical room of Yale College, an event of great importance in the history of science, hastening, as it seems to have done, the establishment of State surveys and stimulating observation throughout the country. This society, which continued in existence until about 1826, may fairly be considered the nucleus of the Association of American Geologists and Naturalists, and, consequently, of the American Association for the Advancement of Science. Members appended to their names the symbols M. A. G. S., and it was for a time the most active of American scientific societies.

The characteristics of the leading spirits were summed up by Eaton at the time of its beginning:

> The president of the American Geological Society, William M'Clure, has already struck out the grand outline of North American geographical geology. The first vice-president, Col. G. Gibbs, has collected more facts and amassed more geological and mineralogical specimens than any other individual of the age. The second vice-president, Professor Silliman, gives the true scientific dress to all the naked mineralogical subjects which are furnished to his hand. The third vice-president, Professor Cleaveland, is successfully employed in elucidating and familiarizing those interesting sciences; and thus smoothing the rugged paths of the student. Professor Mitchill has amassed a large store of materials, and annexed them to the labors of Cuvier and Jameson. But the drudgery of climbing cliffs and descending into fissures and caverns, and of traversing in all directions our most rugged mountainous districts, to ascertain the distinctive characters, number, and order of our strata, has devolved on me.[1]

Eaton has very fairly defined his own position among the early geologists, which was that of an explorer and pioneer. The epithet, Father of American Geology, which has sometimes been applied to him, might

[1] Index to the Geology of the Northern States, 2d edition, 1820, p. viii.

more justly be bestowed upon Maclure, or even upon Mitchill. The name of Amos Eaton [b. 1776, d. 1872] will always be memorable, on account of his connection with the geological survey of New York, which was begun in 1820, at the private expense of Hon. Stephen Van Rensselaer; also as the founder, in 1824, of the Rensselaer Polytechnic Institute, the first of its class on the continent.

The State of New York was not preeminently prompt in establishing an official survey, but the liberality of Van Rensselaer and the energy of Eaton gave to New York the honor of attaching the names of its towns and counties to a large number of the geological formations of North America.

In these early surveys Eaton was associated with Doctor Theodore Romeyn Beck and Mr. H. Webster, naturalist and collector, one of the first being a survey of the county of Albany, under the special direction of a County Agricultural Society, followed by similar surveys of Rensselaer County and Saratoga County and others along the Erie Canal.

In July, 1818, Professor Silliman began the publication of the American Journal of Science, which has been for more than two-thirds of a century the most prominent register of the scientific progress of this continent. Silliman's journal succeeded, and far more than replaced, the American Mineralogical Journal, the earliest of American scientific periodicals, which was established in New York in 1810 by Doctor Archibald Bruce, and which was discontinued after the close of the first volume, in 1814, on account of the illness and untimely death of its projector.[1] The Mineralogical Journal was not so limited in scope as in name, and was for a time the principal organ of our scientific specialists.

We can but admire the spirit of Silliman, who remarks in the preface to the third volume:

> It must require several years from the commencement of the work to decide the question [whether it is to be supported], and the editor (if God continues his life and health) will endeavor to prove himself neither impatient nor querulous during the time that his countrymen hold the question undecided, *whether there shall be an American Journal of Science and Arts.*

In the fall of 1822 he announced that a trial of four years had decided the point that the American public would support this journal.

Prior to the establishing of Silliman's journal, the principal organs of American science were the Medical Repository, commenced in 1798, of which Doctor Mitchill was the chief proprietor; the New York Medical and Physical Journal, conducted chiefly by Doctor Hosack; the Boston Journal of Philosophy and the Arts, and other similar periodicals. Our students looked chiefly, however, to the English journals: Tilloch's

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[1] "No future historian of American science will fail to commemorate this work as our earliest *purely scientific* Journal, supported by *original American communications*," said Silliman in his prospectus, 1817.

Philosophical Magazine and Nicholson's Journal of Natural Philosophy, and later, Thomson's Annals of Philosophy, the Annales de Chimie.

The American Monthly Magazine, established in 1814 by Charles Brockden Brown, was fully as much devoted to science as to literature, and an examination of this and other journals of the early portion of the century will, I think, satisfy the student that scientific subjects were more seriously considered by our ancestors than by the Americans of to-day. The American Monthly published elaborate reviews of technical works, such as Cleaveland's Mineralogy, and summaries of the world's progress in science, as well as the monthly proceedings of all the scientific societies in New York, and papers on systematic zoology and botany by Rafinesque.

In 1812 the American Antiquarian Society was established at Worcester, and before 1820, when its first volume of Transactions appeared, had collected 6,000 books and "a respectable cabinet." This was a pioneer effort in ethnological science. Archæologia Americana contained papers by Mitchill, Atwater, and others, chiefly relating to the aboriginal population of America. The name of Isaiah Thomas, LL.D. [b. in Boston 1749, d. in Worcester 1831], the founder and first president of the society, who at his own expense erected a building for its accommodation and endowed its first researches, should be remembered with gratitude by American naturalists. He was one of the most eminent of American printers, and was styled by DeWarville The Didot of America.

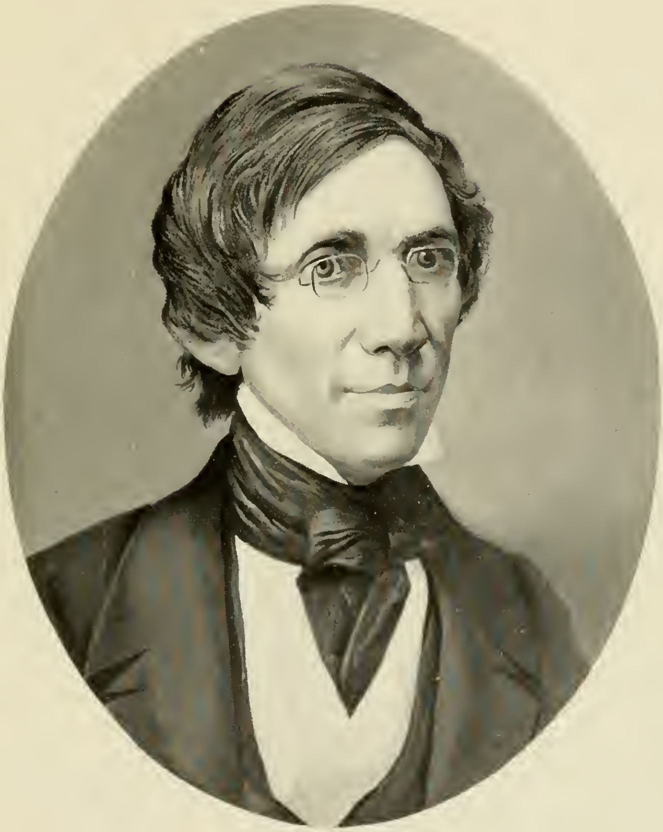
In 1812 the Academy of Natural Sciences of Philadelphia was founded, the outgrowth of a social club whose members, we are told, had no conception of the importance of the work they were undertaking when, in a spirit of burlesque, they assumed the title of an academy of learning.

In 1816 the Coast Survey, after years of discussion, was placed in action under the supervision of Hassler (who had been appointed its head as early as 1811), but two years later, the work going on too slowly to please the Government, it was stopped.

The Linnæan Society of New England, established in Boston about this time, was the precursor of the Boston Society of Natural Science.

The publication of an American edition of Rees's Cyclopædia, in Philadelphia, was begun in 1810, and the forty-seventh volume completed in 1824. This was an event in the history of American science, for it furnished employment and thus fostered the investigations of several eminent naturalists, among whom were Alexander Wilson, Thomas Say, and Ord, while at the same time it fostered a taste for science in the United States and gave currency to several rather epoch-making articles, such as Say's upon Conchology and Entomology.

Mr. Bradbury, the publisher of this cyclopædia, was the first of a goodly company of liberal and far-seeing publishers, who have done much for science in this country by their patronage of important scientific publications.



John Torrey

In 1817 Josiah Meigs, Commissioner of the Land Office, issued a circular to the several registers of the land offices of the United States requiring them to keep daily meteorological observations, and also to report upon such phenomena as the times of the unfolding of leaves of plants and the dates of flowering, the migrations of birds and fishes, the dates of spawning of fishes, the hibernation of animals, the history of locusts and other insects in large numbers, the falling of stones and other bodies from the amosphere, the direction of meteors, and discoveries relative to the antiquities of the country.

It does not appear that anything ever resulted from this step, but it is referred to as an indication that, seventy years ago, our Government was willing to use its civil-service officials in the interest of science. A few years later the same idea was carried into effect by the Smithsonian Institution.

In those early days each of the principal cities had public museums founded and supported by private enterprise. Their proprietors were men of scientific tastes, who affiliated with the naturalists of the day and placed their collections freely at the disposal of investigators.

The earliest was the Philadelphia Museum, established by Charles Willson Peale, and for a time housed in the building of the American Philosophical Society. In 1800 it was full of popular attractions:

> There were a mammoth's tooth from the Ohio, and a woman's shoe from Canton; nests of the kind used to make soup of, and a Chinese fan 6 feet long; bits of asbestus, belts of wampum, stuffed birds and feathers from the Friendly Islands, scalps, tomahawks, and long lines of portraits of great men of the Revolutionary war. To visit the Museum, to wander through the rooms, play upon the organ, examine the rude electrical machine, and have a profile drawn by the physiognomitian, were pleasures from which no stranger to the city ever refrained.

Doctor Hare's oxyhydrogen blowpipe was shown in this museum by Mr. Rubens Peale as early as 1810.

The Baltimore Museum was managed by Rembrandt Peale, and was in existence as early as 1815 and as late as 1830.[1]

Earlier efforts were made, however, in Philadelphia. Doctor Chovet, of that city, had a collection of wax anatomical models made by him in Europe, and Professor John Morgan, of the University of Pennsylvania, who learned his methods from the Hunters in London and Sué in Paris, was also forming such a collection before the Revolution.[2]

The Columbian Museum and Turrell's Museum, in Boston, are spoken of in the annals of the day, and there was a small collection in the attic of the State House in Hartford.

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[1] Baltimore has a handsome museum, superintended by one of the Peale family, well known for their devotion to natural science and to works of art. It is not their fault if the specimens which they are enabled to display in the latter department are very inferior to their splendid exhibitions in the former.—Mrs. Trollope, Domestic Manners of the Americans. London, I, 1832, p. 296.

[2] Transactions of the American Philosophical Society, II, p. 366.

The Western Museum, in Cincinnati, was founded about 1815, by Robert Best, M. D., afterwards of Lexington, Kentucky, who seems to have been a capable collector, and who contributed matter to Godman's American Natural History. In 1818 a society styled the Western Museum Society was organized among the citizens, which, though scarcely a scientific organization, seems to have taken a somewhat liberal and public-spirited view of what a museum should be. To the naturalists of to-day there is something refreshing in such simple appeals as the following:

In collecting the fishes and reptiles of the Ohio the managers will need all the aid which their fellow-citizens may feel disposed to give them. Although not a very interesting department of zoology, no object of the society offers so great a prospect of novelty as that which embraces these animals.

The obscure and neglected race of insects will not be overlooked, and any specimen sufficiently perfect to be introduced into a cabinet of entomology will be thankfully received.[1]

Major John Eatton LeConte, U. S. A. [b. 1784, d. 1860], was a very successful student of botany and zoology. He published many botanical papers and contributions to descriptive zoology, and also in Paris, in conjunction with Boisduval, the first installment of a work, of which he was really sole author, upon the Lepidoptera of North America.[2]

The elder brother, Doctor Lewis LeConte [b. 1782, d. 1838], was equally eminent as an observer, and was for forty years one of the most prominent naturalists in the South. On his plantation in Liberty County, Georgia, he established a botanical garden and a chemical laboratory. His zoological manuscripts were destroyed in the burning of Columbia just at the close of the civil war, but his observations, which he was averse to publishing in his own name, were, we are told, embodied in the writings of his brother, of Stephen Elliott, of the Scotch botanist, Gordon,[3] of Doctor William Baldwin and others.[4] [5]

Stephen Elliott, of Charleston, South Carolina [b. 1711, d. 1830], was a graduate of Yale in the class of 1791, and, while prominent in the political and financial circles of his State, found time to cultivate science. He founded in 1813 the Literary and Philosophical Society of South Carolina, and was its first president; and in 1829 was elected professor

[1] An address to the people of the Western Country, dated Cincinnati, September 15, 818, and signed by Elijah Slack, James Findlay, William Steele, Jesse Embrees, and Daniel Drake, managers.

[2] Histoire Générale et Iconographie des Lépidoptères et des Chenilles de l'Amérique Septentrionale, Paris, 1830.

[3] Loudon's Gardeners' Magazine.

[4] A. H. Stephens in Johnson's New Universal Cyclopædia, New York, 1876, II, p. 1702.

[5] The LeConte family deserves a place in Galton's Hereditary Genius. Professor John LeConte, the physicist, and Professor Joseph LeConte, the geologist, were sons of Doctor Lewis LeConte, while Doctor J. L. LeConte was the son of Major John Eatton LeConte.

of natural history and botany in the South Carolina Medical College, which he aided to establish. He published the Botany of South Carolina and Georgia (Charleston, 1821–1827), having been assisted in its preparation by Doctor James McBride; and had an extensive museum of his own gathering. The Elliott Society of Natural History, founded in 1853, or before, and subsequently continued under the name of the Elliott Society of Science and Art, 1859–1875, was named in memory of this public-spirited man.

Jacob Green [b. 1790, d. 1841], at different times professor in the College of New Jersey and in Jefferson Medical College, was one of the old school naturalists, equally at home in all of the sciences. His paper on Trilobites (1832) was our first formal contribution to invertebrate paleontology; his Account of some new Species of Salamanders,[1] one of the earliest steps in American herpetology; his Remarks on the Unios of the United States,[2] the beginning of studies subsequently extensively prosecuted by Lea and some other entomologists. He also wrote upon the crystallization of snow, and was the author of Chemical Philosophy, Astronomical Researches, and a work upon Botany of the United States. The earlier volumes of Silliman's Journal were filled with notes of his observations in all departments of natural history.

José Francisco Correa da Serra, secretary of the Royal Academy of Lisbon, was resident in Philadelphia in 1813, in the capacity of Portuguese minister, and affiliated with our men of science in botanical and geological interests. In 1814 he lectured on botany in the place of B. S. Barton, and also published several botanical papers, as well as one upon the soil of Kentucky.

Alire Raffenau Delile, formerly a member of Napoleon's scientific expedition to Egypt and the editor of the Flora of Egypt, was in New York about this time, for the purpose of completing his medical education, and seems to have done much to stimulate interest in botanical studies.

To this as well as to the subsequent period belonged Doctor Gerard Troost [b. in Holland, March 15, 1776; educated in Leyden; d. in Nashville, August 17, 1850], a naturalist of Dutch birth and education, who came to Philadelphia in 1810, and was a founder and the first president of the Philadelphia Academy. In 1826 he founded a geological survey of the environs of Philadelphia; in 1827 became professor of chemistry, mineralogy, and geology in the University of Nashville. As State geologist of Tennessee from 1831 to 1849 he published some of the earliest State geological reports.

Another expedition well worthy of mention, though not exceedingly fruitful, was one made under the direction of Mr. Maclure, president of the Philadelphia Academy, to the sea islands of Georgia and the Florida

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[1] Contributions of the Maclurian Lyceum, I, January, 1827, p. 3.

[2] Idem., I, p. 41.

peninsula. The party consisted of Maclure, Say, Ord, and Titian R. Peale, and the results, though not embodied in a formal report, may be detected in the scientific literature of the succeeding years. This was early in 1818, while Florida was still under the dominion of Spain, and the expedition was finally abandoned, owing to the hostile attitude of the Seminole Indians in that territory.

XIV.

The third decade of the century, beginning with 1820, was marked by a continuation of the activities of that which preceded. In 1826 there were in existence twenty-five scientific societies, more than half of them especially devoted to natural history[1] and nearly all of very recent origin.

The leading spirits were Mitchill, Maclure, Webster, Torrey, Silliman, Gibbs, LeConte, Dewey, Hare, Hitchcock, Olmsted, Eliot, and T. R. Beck.

Nathaniel Bowditch [b. 1773, d. 1838], in 1829, began the publication of his magnificent translation of the Mécanique Celeste of La Place, with those scholarly commentations which secured him so lofty a place among the mathematicians of the world.

Still more important was the lesson of his noble devotion of his life and fortune to science. The greater part of his monumental work was completed, we are told, in 1817, but he found that to print it would cost $12,000, a sum far beyond his means. A few years later, however, he began its publication from his own limited means, and the work was continued, after his death, by his wife. The dedication is to his wife, and tells us that "without her approbation the work would not have been undertaken."

Another person was W. C Redfield [b. 1789, d. 1857], who, in 1827, promulgated the essential portions of the theory of storms, which is now pretty generally accepted, and which was subsequently extended by Sir William Reid in Barbados and Bermuda, and greatly modified by Professor Loomis, of New Haven. An eloquent eulogy of Redfield was pronounced by Professor Denison Olmsted at the Montreal meeting of the American Association in 1857.[2]

Among the rising young investigators of this period were Joseph Henry, A. D. Bache, C. U. Shepard, the younger Silliman, Henry Seybert, William Mather, Ebenezer Emmons, Percival, the poet geologist, DeKay, Godman, and Harlan.

The organization, in 1824, of the Rensselaer School, afterwards the Rensselaer Polytechnic Institute, at Troy, marked the beginning of a new era in scientific and technological education. Its principal professors were Amos Eaton and Doctor Lewis C. Beck.

In 1820 an expedition was sent by the General Government to explore

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[1] American Journal of Science, X, 1826, p. 369.

[2] See History of the New York Academy of Sciences, 1887, p. 76.

JOHN TRADESCANT.

the Northwestern Territory, especially the region around the Great Lakes and the sources of the Mississippi. This was under charge of General Lewis Cass, at that time governor of Michigan Territory. Henry R. Schoolcraft accompanied this expedition as mineralogist, and Captain D. B. Douglass, U. S. A., as topographical engineer; and both of these sent home considerable collections reported upon by the specialists of the day. Cass himself, though better known as a statesman, was a man of scientific tastes and ability, and his Inquiries respecting the History, Traditions, Languages, etc., of the Indians, published at Detroit in 1823, is a work of high merit.

Long's expeditions into the far West were also in progress at this time, under the direction of the General Government; the first, or Rocky Mountain, exploration in 1819–20; the second to the sources of the St. Peter's, in 1823. In the first expedition Major Long was accompanied by Edwin James as botanist and geologist, who also wrote the Narrative published in 1823. The second expedition was accompanied by William H. Keating, professor of mineralogy and chemistry in the University of Pennsylvania, who was its geologist and historiographer. Say was the zoologist of both explorations. De Schweinitz worked up the botanical material which he collected.

The English expeditions sent to Arctic North America under the command of Sir John Franklin were also out during these years, the first from 1819 to 1822, the second from 1825 to 1827, and yielded many important results. To naturalists they have an especial interest, because Sir John Richardson, who accompanied Franklin as surgeon and naturalist, was one of the most eminent and successful zoological explorers of the century, and had more to do with the development of our natural history than any other man not an American.

His natural history papers in Franklin's reports, 1823 and 1828, his Fauna Boreali Americana, published between 1827 and 1836, his report upon the Zoology of North America, are all among the classics of our zoological literature.[1]

The third decade was somewhat marked by a renewal of interest in zoology and botany, which had, during the few preceding years, been rather overshadowed by geology and mineralogy.

Rafinesque had retired to Kentucky, where, from his professor's chair in Transylvania University, he was issuing his Annals of Nature and his Western Minerva; and his brilliancy being dimmed by distance, other students of animals had a chance to work.

One of the most noteworthy of the workers was Thomas Say [b. 1787, d. 1834], who was a pioneer in several departments of systematic zoology. A kinsman of the Bartram's, he spent many of his boyhood days in the old botanic garden at Kingsessing, in company with the old naturalist,

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[1] See Rev. John McIlwraith's Life of Sir John Richardson, C. B., LL. D. London, 1868. Also Obituary in London Reader, 1865, p. 707.

William Bartram, and the ornithologist Wilson. At the age of twenty-five, having been unsuccessful as an apothecary, he gave his whole time to zoology. He slept in the hall of the Academy of Natural Sciences, where he made his bed beneath the skeleton of a horse, and fed himself upon bread and milk. He was wont, we are told, to regard eating as an inconvenient interruption to scientific pursuits, and to wish that he had been created with a hole in his side through which his food might be introduced into his system. He built up the museum of the society, and made extensive contributions to biological science.

His article on conchology, published in 1816 in the American edition of Nicholson's Cyclopædia, was the foundation of that science in this country, and was republished in Philadelphia in 1819, with the title, A Description of the land and fresh-water Shells of the United States.

> This work [remarked a contemporary] ought to be in the possession of every American lover of natural science. It has been quoted by M. Lamarck and adopted by M. de Ferrusac, and has thus taken its place in the scientific world.

Such was fame in America in the year of grace 1820.

In 1817 he did a similar service for systematic entomology, and his contributions to herpetology, to the study of marine invertebrates, especially the crustacea, and to that of invertebrate paleontology, were equally fundamental.

As naturalist of Long's expeditions he described many Western vertebrates, and also collected Indian vocabularies, and it is said that the narrative of the expeditions was chiefly based upon the contents of his note books.

In 1825 he removed from Philadelphia to New Harmony, Indiana, and, in company with Maclure and Troost, became a member of the community founded there by Owen of Lanark. Comparatively little was thenceforth done by him, and we can only regret the untimely close of so brilliant a career.[1]

Charles Alexander Lesueur [b. at Havre-de-Grace, France, January 1, 1778; d. at Havre, December 12, 1846], the friend and associate of Maclure and Say, accompanied them to New Harmony. The romantic life of this talented Frenchman has been well narrated in his biography by Ord.[2] He was one of the staff of the Baudin expedition to Australia in 1800, and to his efforts, seconding those of Peron, his associate, were due most of the scientific results which France obtained from that ill-fated enterprise. Lesueur, though a naturalist of considerable ability, was, above all, an artist. The magnificent plates in the reports prepared

[1] See a Memoir by B. H. Coates, read before American Philosophical Society, December 16, 1834; a memoir by George Ord; also a tribute to his memory in Dall's presidential address before the Biological Society of Washington in January, 1888.

[2] George Ord, Memoir of Charles Alexander Lesueur. American Journal of Science, VIII, 1849, p. 189.

by Peron[1] and Freycinet[2] were all his. He was called the Raffaelle of zoological painters, and his removal to America in 1815 was greatly deplored by European naturalists. He traveled for three years with Maclure, exploring the West Indies and the eastern United States, making a magnificent collection of drawings of fishes and invertebrates, and in 1818 settled in Philadelphia, where, supporting himself by giving drawing lessons, he became an active member of the Academy of Sciences and published many papers in its Journal.

No one ever drew such exquisite figures of fishes as Lesueur, and it is greatly to be regretted that he never completed his projected work upon North American Ichthyology. He issued a prospectus, with specimen plates, of a Memoir on the Medusæ, and his name will always be associated with the earliest American work upon marine invertebrates and invertebrate paleontology, because it was to him that Say undoubtedly owed his first acquaintance with these departments of zoology. In 1820, while at Albany in the service of the United States and Canadian Boundary Commission, he gave lessons to Eaton and identified his fossils, thus laying the foundations for the future work of the rising school of New York paleontologists.

Twelve years of his life were wasted at New Harmony, and in 1837, after the death of Say, he returned to France, carrying his collections and drawings to the Natural History Museum at Havre, of which he became curator. His period of productiveness was limited to the six years of his residence in Philadelphia. But for their sacrifice to the socialistic ideas of Owen, Say and Lesueur would doubtless be counted among the most distinguished of our naturalists, and the course of American zoological research would have been entirely different.

The Reverend Daniel H. Barnes [b. 1785, d. 1828], of New York, a graduate of Union College and a Baptist preacher, was one of Say's earliest disciples, and from 1823 he published papers on conchology, beginning with an elaborate study of the fresh-water mussels. This group was taken up in 1827 by Doctor Isaac Lea, and discussed from year to year in his well-known series of beautifully illustrated monographs.

Mr. Barnes published, also, papers on the Classification of the Chitonidæ, on Batrachian Animals and doubtful Reptiles, and on Magnetic Polarity.

The officers of the Navy had already begun their contributions to natural history which have been so serviceable in later years. One of the earliest contributions by Barnes was a description of five species of *Chiton*, collected in Peru by Captain C. S. Ridgely of the *Constellation*.

In this period (1828+) was begun the publication of Audubon's folio volumes of illustrations of North American birds—a most extraordinary

[1] Voyage des Decouvertes aux Terres Australes.

[2] Voyage aux Terres Australes, Paris, 1807.

work, of which Cuvier enthusiastically exclaimed: "C'est le plus magnifique monument que l'Art ait encore élevé a la Nature."

Wilson was the Wordsworth of American naturalists, but Audubon was their Rubens. With pen as well as with brush he delineated those wonderful pictures which have been the delight of the world.

Born in 1781, in Louisiana, while it was still a Spanish colony, he became, at an early age, a pupil of the famous French painter David, under whose tuition he acquired the rudiments of his art. Returning to America, he began the career of an explorer, and for over half a century his life was spent, for the most part, in the forests or in the preparation of his ornithological publications—occasionally visiting England and France, where he had many admirers. His devotion to his work was as complete and self-sacrificing as that of Bowditch, the story of whose translation of La Place has already been referred to. It was a great surprise to his friends (though his own fervor did not permit him to doubt) that the sale of his folio volumes was sufficient to pay his printer's bills. Audubon was not a very accomplished systematic zoologist, and when serious discriminations of species was necessary, sometimes formed alliances with others. Thus Bachman became his collaborator in the study of mammals, and the youthful Baird was invited by him, shortly before his death in 1851, to join him in an ornithological partnership. His relations with Alexander Wilson form the subject of a most entertaining narration in the Ornithological Biography.[1]

Thomas Nuttall [b. in Yorkshire, 1786; d. in St. Helens, Lancashire, September 10, 1859] was so thoroughly identified with American natural history and so entirely unconnected with that of England that, although he returned to his native land to die, we may fairly claim him as one of our own worthies. He crossed the ocean when about twenty-one years of age, and traveled in every part of the United States and in the Sandwich Islands studying birds and plants. From 1822 to 1828 he was curator and lecturer at the Harvard Botanical Garden. Besides numerous papers in the Proceedings of the Philadelphia Academy, he published in Philadelphia, in 1818, his Genera of North American Plants, in his Geological Sketch of the Valley of the Mississippi, in 1821; his Journal of Travels into the Arkansas Territory, a work abounding in natural history observations; in 1832–1834 his Manual of the Ornithology of the United States and Canada; and in 1843–1849 his North American Sylva, a continuation of the Sylva of Michaux. About 1850 he retired to a rural estate in England, where he died in 1859.

Nuttall was not great as a botanist, as a geologist, or as a zoologist, but was a man useful, beloved, and respected.

Richard Harlan, M. D. [b. 1796, d. 1843], who, with Mitchill, Say, Rafinesque, and Gosse, was one of the earliest of our herpetologists, and who was one of Audubon's chief friends and supporters, published in

[1] Volume I, p. 439.

GERARD TROOST.

1825 the first installment of his Fauna Americana, which treated exclusively of mammals. This was followed, in 1826, by a rival work on mammals by Godman. Harlan's book was a compilation, based largely on translations of portions of Desmarest's Mammalogie, printed three years before in Paris. It was so severely criticised that the second portion, which was to have been devoted to reptiles, was never published, and its author turned his attention to medical literature. Godman's North American National History, or Mastology, contained much original matter, and, though his contemporaries received it with faint praise, it is the only separate, compact, illustrated treatise on the mammals of North America ever published, and is useful to the present day.

John D. Godman [b. in Annapolis, Maryland, December 20, 1794; d. in Germantown, Pennsylvania, April 17, 1830] died an untimely death, but gave promise of a brilliant and useful career as a teacher and investigator. His Rambles of a Naturalist is one of the best series of essays of the Selborne type ever produced by an American, and his American Natural History is a work of much importance, even to the present day, embodying, as it does, a large number of original observations.

Michaux's Sylva was, as we have seen, continued by Nuttall. Wilson's American Ornithology was, in like manner, continued by Charles Lucien Bonaparte [b. in Paris, May 24, 1803; d. in Paris, July 30, 1857], Prince of Canino, and nephew of Napoleon I, a master in systematic zoology. Bonaparte came to the United States about the year 1822 and returned to Italy in 1828. His contributions to zoological science were of great importance. In 1827 he published in Pisa his Specchio comparativo delle ornithologie di Roma e di Filadelfia, and from 1825 to 1833 his American Ornithology, containing descriptions of over one hundred species of birds discovered by himself.

The publication of Torrey's Flora of the Middle and Northern Sections of the United States was an event of importance, as was also Doctor W. J. Hooker's essay on the Botany of America,[1] the first general treatise upon the America flora or fauna by a master abroad, is pretty sure evidence that the work of home naturalists was beginning to tell.

So also, in a different way, was the appearance in 1829 of the first edition of Mrs. Lincoln's Familiar Lectures on Botany, a work which did much toward swelling the army of amateur botanists.

Important work was also in progress in geology. Eaton and Beck were carrying on the Van Rensselaer survey of New York, and in 1818 the former published his Index to the Geology of the Northern States. Professor Denison Olmsted, of the University of North Carolina, was completing the official survey of that State—the first ever authorized by the government of a State.

Professor Lardner Vanuxem, of North Carolina, in 1828, made an

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[1] David Brewster, Edinburgh Journal of Science, II, 1825, p. 108.

important advance, being the first to avail himself successfully of paleontology for the determination of the age of several of our formations, and their approximate synchronism with European beds.[1]

Horace H. Hayden, of Baltimore [b. 1769, d. 1844], published in 1820 Geological Essays, or an Inquiry into Some of the Geological Phenomena to be Found in Various Parts of America and Elsewhere,[2] which was well received as a contribution to the history of alluvial formations of the globe, and was apparently the first general work on geology published in this country. Silliman said that it should be a text-book in all the schools. He published, also, a New Method of Preserving Anatomical Preparations,[3] A Singular Ore of Cobalt and Manganese,[4] A Description of the Bare Hills near Baltimore,[5] and on Silk Cocoons,[6] and was a founder and vice-president of the Maryland Academy of Sciences.

XV.

In the fourth decade (1830–1840) the leading spirits were Silliman, Hare, Olmsted, Hitchcock, Torrey, De Kay, Henry, and Morse.

Among the men just coming into prominence were J. W. Draper, then professor in Hampden Sidney College, in Virginia, the brothers W. B. and H. D. Rogers, A. A. Gould, the conchologist, and James D. Dana.

Henry was just making his first discoveries in physics, having in 1829 pointed out the possibility of electro-magnetism as a motive power, and in 1831 set up his first telegraphic circuit at Albany. In 1832 the United Coast Survey, discontinued in 1818, was reorganized under the direction of its first chief, Hassler, now advanced in years.[7]

The natural-history survey of New York was organized by the State in 1836, and James Hall and Ebenezer Emmons were placed upon its staff.

G. W. Featherstonhaugh [b. 1780, d. 1866] was conducting (1834–35) a Government expedition, exploring the geology of the elevated country between the Missouri and Red rivers and the Wisconsin territories. He bore the name of United States Geologist, and projected a geological map of the United States, which now, half a century later, is being completed by the United States geologist of to-day. Beside his report upon the survey just referred to, Featherstonhaugh printed a Geological Reconnaissance, in 1835, from Green Bay to Coteau des Prairies, and a Canoe Voyage up the Minnay Sotor, in London, 1847.

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[1] Theodore Gill.

[2] Reviewed in American Journal of Science, III, 1821, p. 47, and in Blackwood's Magazine, XVI, 1824, p. 420; XVII, 1825, p. 56.

[3] American Medical Recorder, VII, 1824, p. 223.

[4] American Journal of Science, IV, 1822, p, 283.

[5] Idem., XXIV, 1833, p. 349.

[6] Journal of the American Silk Company, I, May, 1839, p. 179.

[7] Proceedings of the American Association for the Advancement of Science, II, 1849, p. 163.

In 1838 the United States Exploring Expedition under Wilkes was sent upon its voyage of circumnavigation, having upon its staff a young naturalist named Dana, whose studies upon the crustaceans and radiates of the expedition have made him a world-wide reputation, entirely independent of that which he has since gained as a mineralogist and geologist.

It is customary to refer to the Wilkes expedition as having been sent out entirely in the interests of science. As a matter of fact it was organized primarily in the interests of the whale fishery of the United States.

Dana, before his departure with Wilkes, had published, in 1837, the first edition of his System of Mineralogy, a work which, in its subsequent editions, has become the standard manual of the world.

The publication of Lyell's Principles of Geology at the beginning of this decade (1830) had given new direction to the thoughts of our geologists, and they were all hard at work under its inspiration.

With 1839 ended the second of our thirty-year periods—the one which I have chosen to speak of as the period of Silliman—not so much because of the investigations of the New Haven professor, as on account of his influence in the promotion of American science and scientific institutions.

This was a time of hard work, and we must not withhold our praise from the noble little company of pioneers who were in those years building the foundations upon which the scientific institutions of to-day are resting.

The difficulties and drawbacks of scientific research at this time have been well described by one who knew them :[1]

> The professedly scientific institutions of our country issued from time to time, though at considerable intervals, volumes of Transactions and Proceedings unquestionably not without their influence in keeping alive the scarcely kindled flame, but whose contents, as might be expected, were for the most part rather in conformity with the then existing standard of excellence than in advance of it. Natural History in the United States was the mere sorting of genera and species; the highest requisite for distinction in any physical science was the knowledge of what European students had attained;—astronomy was in general confined to observations, and those not of the most refined character, and its merely descriptive departments were estimated far more highly than the study of its laws. Astronomical computation had hardly risen above the ciphering out of eclipses and occultations. Indeed, I risk nothing in saying that Astronomy had lost ground in America since those Colonial times when men like Rittenhouse kept up a constant scientific communication with students of Astronomy beyond the seas. And I believe I may further say, that a single instance of a man's devoting himself to science as the only earthly guide, aim, and object of his life, while unassured of a professor's chair or some analogous appointment, upon which he might depend for subsistence, was utterly unknown.
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> Such was the state of science in general. In Astronomy the expensive appliances requisite for all observations of the higher class were wanting, and there was not in the United States, with the exception of the Hudson Observatory, to which Professor Loomis devoted such hours as he could spare from his duties in the College,

[1] B. A. Gould, Address in Commemoration of Sears Cook Walker. Proceedings of the American Association for the Advancement of Science, VIII, 1854, p. 25.

a single establishment provided with the means of making an absolute determination of the place of any celestial body, or even relative determinations at all commensurate in accuracy with the demands of the times. The only instrument that could be thought of for the purpose was the Yale-College telescope, which, although provided with a micrometer, was destitute of the means of identifying comparison-stars. A better idea of American astronomy a dozen years ago can hardly be obtained than by quoting from an article published at that time by the eminent geometer who now retires from the position of President of this Association. He will forgive me the liberty, for the sake of the illustration. "The impossibility," said he, "of great national progress in Astronomy while the materials are for the most part imported can hardly need to be impressed upon the patrons of science in this country. . . . And next to the support of observers is the establishment of observatories. Something has been done for this purpose in various parts of the country, and it is earnestly to be hoped that the intimations which we have heard regarding the intentions of government may prove to be well founded;—that we shall soon have a permanent national observatory equal in its appointments to the best furnished ones of Europe; and that American ships will ere long calculate their longitudes and latitudes from an American nautical almanac. That there is on this side of the Atlantic a sufficient capacity for celestial observations is amply attested by the success which has attended the efforts, necessarily humble, which have hitherto been made."[1]

XVI.

Just before the middle of the century a wave, or, to speak more accurately, a series of waves, of intellectual activity began to pass over Europe and America. There was a renaissance quite as important as that which occurred in Europe at the close of the middle ages. Draper and other historians have pointed out the causes of this movement, prominent among which were the introduction of steam and electricity, annihilating space and relieving mankind from a great burden of mechanical drudgery. It was the beginning of the "age of science," and political as well as social and industrial changes followed in rapid succession.

In Europe the great work began a little earlier. Professor Huxley, in his address to the Royal Society in 1885, took for a fixed point his own birthday in 1825, which was four months before the completion of the railway between Stockton and Darlington—"the ancestral representative of the vast reticulated fetching and carrying organism which now extends its meshes over the civilized world."

> Since then, [he remarked,] the greater part of the vast body of knowledge which constitutes the modern sciences of physics, chemistry, biology, and geology has been acquired, and the widest generalizations therefrom have been deduced, and, furthermore, the majority of those applications of scientific knowledge to practical ends which have brought about the most striking differences between our present civilization and that of antiquity have been made within that period of time.

It is within the past half century, he continued, that the most brilliant additions have been made to fact and theory and serviceable hypothesis in the region of pure science, for within this time falls the establishment

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[1] Benjamin Peirce, Cambridge Miscellany, April, 1842, p. 25.

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on a safe basis of the greatest of all the generalizations of science, the doctrines of the Conservation of Energy and of Evolution. Within this time the larger moiety of our knowledge of light, heat, electricity, and magnetism has been acquired. Our present chemistry has been, in great part, created, while the whole science has been remodeled from foundation to roof.

It may be natural [continued Professor Huxley] that progress should appear most striking to me among those sciences to which my own attention has been directed, but I do not think this will wholly account for the apparent advance "by leaps and bounds" of the biological sciences within my recollection. The cell theory was the latest novelty when I began to work with the microscope, and I have watched the building of the whole vast fabric of histology. I can say almost as much of embryology, since Von Baer's great work was published in 1828. Our knowledge of the morphology of the lower plants and animals and a great deal of that of the higher forms has very largely been obtained in my time; while physiology has been put upon a totally new foundation and, as it were, reconstructed, by the thorough application of the experimental method to the study of the phenomena of life, and by the accurate determination of the purely physical and chemical components of these phenomena. The exact nature of the processes of sexual and nonsexual reproduction has been brought to light. Our knowledge of geographical and geological distribution and of the extinct forms of life has been increased a hundredfold. As for the progress of geological science, what more need be said than that the first volume of Lyell's Principles bears the date of 1830.

It can not be expected that, within the limits of this address, I should attempt to show what America has done in the last half century. I am striving to trace the beginnings, not the results, of scientific work on this side of the Atlantic. I will simply quote what was said by the London Times in 1876:

In the natural distribution of subjects the history of enterprise, discovery, and conquest, and the growth of republics fell to America, and she has dealt nobly with them. In the wider and more multifarious provinces of art and science she runs neck and neck with the mother country and is never left behind.

It is difficult to determine exactly the year when the first waves of this renaissance reached the shores of America. Silliman, in his Priestley address, placed the date at 1845. I should rather say 1840, when the first national scientific association was organized, although signs of awakening may be detected even before the beginning of the previous decade. We must, however, carefully avoid giving too much prominence to the influence of individuals. I have spoken of this period of thirty years as the period of Agassiz. Agassiz, however, did not bring the waves with him; he came in on the crest of one of them; he was not the founder of modern American natural history, but as a public teacher and organizer of institutions, he exerted a most important influence upon its growth.

One of the leading events of the decade was the reorganization of the Coast Survey in 1844, under the sage administration of Alexander Dallas

Bache,[1] speedily followed by the beginning of investigations upon the Gulf Stream, and of the researches of Count Pourtalès into its fauna, which laid the foundations of modern deep-sea exploration. Others were the founding of the Lawrence Scientific School, the Cincinnati Observatory, the Yale Analytical Laboratory, the celebration of the Centennial Jubilee of the American Philosophical Society in 1843, and the enlargement of Silliman's American Journal of Science.

The Naval Astronomical Expedition was sent to Chili, under Gilliss (1849), to make observations upon the parallax of the sun. Lieutenant Lynch was sent to Palestine (in 1848) at the head of an expedition to explore the Jordan and the Dead Sea.

Frémont conducted expeditions, in 1848, to explore the Rocky Mountains and the territory beyond; and Stansbury, in 1849–50, a similar exploration of the valley of the Great Salt Lake. David Dale Owen was heading a Government geological survey in Wisconsin, Iowa, and Minnesota (1848), and from all of these came results of importance to science and to natural history.

In 1849 Professor W. H. Harvey, of Dublin, visited America and collected materials for his Nereis Boreali-Americana, which was the foundation of our marine botany.

Sir Charles Lyell, ex-president of the Geological Society of London, visited the United States in 1841 and again in 1845, and published two volumes of travels, which were, however, of much less importance than the effects of his encouraging presence upon the rising school of American geologists. His Principles of Geology, as has already been said, was an epoch-making work, and he was to his generation almost what Darwin was to the one which followed.

Certain successes of our astronomers and physicists had a bearing upon the progress of American science in all its departments which was, perhaps, even greater than their actual importance would seem to warrant. These were the discovery, by the Bards of Cambridge, of Bards comet in 1846, of the satellite Hyperion in 1848, of the third ring of Saturn in 1850, the discovery by Herrick and Bradley, in 1846, of the bi-partition of Belas comet, and the application of the telegraph to longitude determination after Locke had constructed (in 1848) his clock for the registration of time observations by means of electro-magnetism.

It is almost ludicrous at this day to observe the grateful sentiments with which our men of science welcomed the adoption of this American method in the observatory at Greenwich. Americans were still writhing under the sting of Sidney Smith's demand, Who reads an American book? and the narrations of those critical observers of national customs, Dickens, Basil Hall, and Mrs. Trollope. The continental approval

[1] Proceedings of the American Association for the Advancement of Science, 1849, II, p. 164.

of American science was like balsam to the sensitive spirits of our countrymen.

John William Draper's versatile and original researches in physics were also yielding weighty results, and as early as 1847 he had already laid the foundations of the science of spectroscopy, which Kirchhoff so boldly appropriated many years later.

Most important of all, by reason of its breadth of scope, was the foundation of the Smithsonian Institution, which was organized in 1846 by the election of Joseph Henry to its secretaryship. Who can attempt to say what the conditions of science in the United States would be to-day but for the bequest of Smithson? In the words of John Quincy Adams "Of all the foundations or establishments for pious or charitable uses which ever signalized the spirit of the age or the comprehensive beneficence of the founder, none can be named more deserving the approbation of mankind."

Among the leaders of this new enterprise and of the scientific activities of the day may be named Silliman, Hare, Henry, Bache, Maury, Alexander, Locke, Mitchel, Peirce, Walker, Draper, Dana, Wyman, Agassiz, Gray, Torrey, Haldeman, Morton, Holbrook, Gibbes, Gould, DeKay, Storer, Hitchcock, Redfield, the brothers Rogers, Jackson, Hays, and Owen.

Among the rising men were Baird, Adams the conchologist, Burnett, Harris the entomologist, and the LeConte brothers among zoologists; Lapham, D. C. Eaton, and Grant, among botanists; Sterry Hunt, Brush, J. D. Whitney, Wolcott Gibbs, and Lesley, among chemists and geologists, as well as Schiel, of St. Louis, who had before 1842 discovered the principle of chemical homology.

I have not time to say what ought to be said of the coming of Agassiz in 1846. He lives in the hearts of his adopted countrymen. He has a colossal monument in the museum which he reared, and a still greater one in the lives and works of pupils such as Agassiz, Allen, Burgess, Burnett, Brooks, Clarke, Cooke, Faxon, Fewkes, Gorman, Hartt, Hyatt, Joseph LeConte, Lyman, McCrady, Morse, Mills, Niles, Packard, Putnam, Scudder, St. John, Shaler, Verrill, Wilder, and David A. Wells.

XVII.

They were glorious men who represented American science at the middle of the century. We may well wonder whether the present decade will make as good a showing forty years hence.

The next decade was its continuation. The old leaders were nearly all active, and to their ranks were added many more.

An army of new men was rising up.

It was a period of great explorations, for the frontier of the United States was sweeping westward, and there was need of a better knowledge of the public domain.

Sitgreaves explored the region of the Zuñi and Colorado rivers in 1852, and Marcy the Red River of the North. The Mexican boundary survey, under Emory, was in progress from 1854 to 1856, and at the same time the various Pacific railroad surveys. There was also the Herndon exploration of the valley of the Amazon, and the North Pacific exploring expedition under Rogers. These were the days, too, when that extensive exploration of British North America was begun through the cooperation of the Hudson's Bay Company with the Smithsonian Institution.

It was the harvest time of the museums. Agassiz was building up with immense rapidity his collections in Cambridge, utilizing to the fullest extent the methods which he had learned in the great European establishments and the public spirit and generosity of the Americans. Baird was using his matchless powers of organization in equipping and inspiring the officers of the various surveys and accumulating immense collections to be used in the interest of the future National Museum.

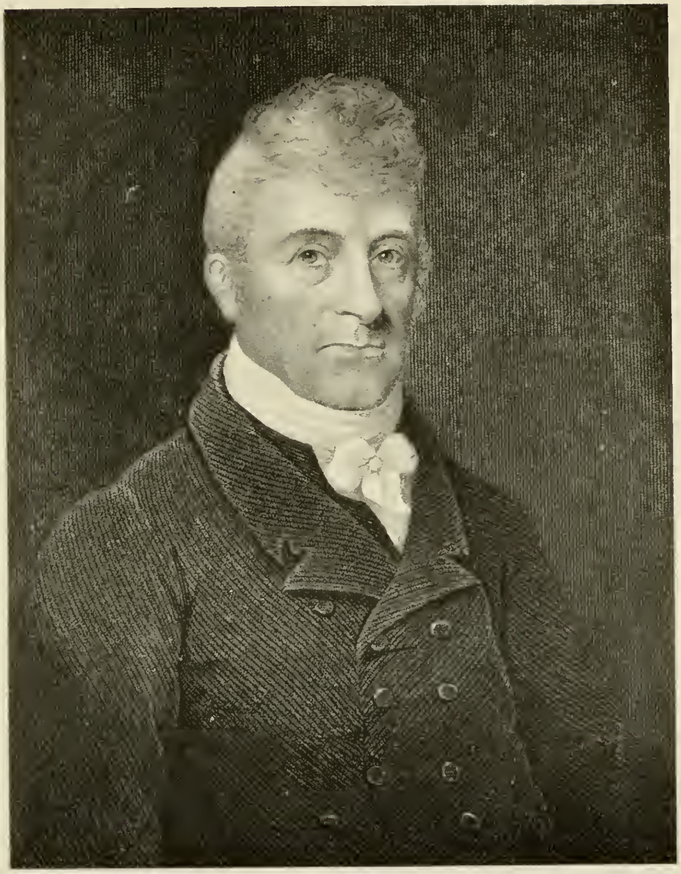
Systematic natural history advanced with rapid strides. The magnificent folio reports of the Wilkes expedition were now being published, and some of them, particularly those by Dana on the crustaceans and the zoophytes and geology, that of Gould upon the mollusks, those by Torrey, Gray, and Eaton upon the plants, were of great importance.

The reports of the domestic surveys contained numerous papers upon systematic natural history, prepared under the direction of Baird, assisted by Girard, Gill, Cassin, Suckley, LeConte, Cooper, and others. The volumes relating to the mammals and the birds, prepared by Baird's own pen, were the first exhaustive treatises upon the mammalogy and ornithology of the United States.

The American Association was doing a great work in popular education through its system of meeting each year in a different city. In 1850 it met in Charleston, and its entire expenses were paid by the city corporation as a valid mark of public approval, while the foundation of the Charleston Museum of Natural History was one of the direct results of the meeting.

In 1857 it met in Montreal, and delegates from the English scientific societies were present. This was one of the earliest of those manifestations of international courtesy upon scientific ground of which there have since been many.

In the seventh decade, which began with threatenings of civil war, the growth of science was almost arrested. A meeting of the American Association was to have been held in Nashville in 1861, but none was called. In 1866, at Buffalo, its sessions were resumed with the old board of officers elected in 1860. One of the vice-presidents, Gibbes, of South Carolina, had not been heard from since the war began, and the Southern members were all absent Many of the Northern members wrote explaining that they could not attend this meeting because they could not afford



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it, "such had been the increase of living expenses, without a corresponding increase in the salaries of men of science." Few scientists were engaged in the war, though one, O. M. Mitchel, who left the directorship of the Dudley Observatory to accept the command of an Ohio brigade, died in service in 1862, and another, Couthouy, sacrificed his life in the Navy. Others, like Ordway, left the ranks of science never to resume their places as investigators.

Scientific effort was paralyzed, and attention was directed to other matters. In 1864, when the Smithsonian building was burned, Lincoln, it is said, looking at the flames from the windows of the Executive Mansion, remarked to some military officers who were present: "Gentlemen, yonder is a national calamity. We have no time to think about it now; we must attend to other things."

The only important events during the war were two; one the organization of the National Academy of Sciences, which soon became what Bache had remarked the necessity for in 1851, when he said: An institution of science, supplementary to existing ones, is much needed in our country to guide public action in reference to scientific matters.[1]

The other was the passage, in 1862, of the bill for the establishment of scientific educational institutions in every State. The agricultural colleges were then, as they still are, unpopular among many scientific men, but the wisdom of the measure is apparently before long to be justified.

Before the end of the decade the Northern States[2] had begun a career of renewed prosperity, and the scientific institutions were reorganized. The leading spirits were such men as Pierce, Henry, Agassiz, Gray, Barnard, the Goulds, Newberry, Lea, Whittlesey, Foster, Rood, Cooke, Newcomb, Newton, Wyman, Winchell.

Among the rising men, some of them very prominent before 1870, were Barker, Bolton, Chandler, Egleston, Hall, Harkness, Langley, Mayer, Pickering, Young, Powell, Pumpelly, Abbe, Collett, Emerson, Hartt, Lupton, Marsh, Whitfield, Williams, N. H. Winchell, Agassiz, the Allens, Beale, Cope, Coues, Canby, Dall, Hoy, Hyatt, Morse, Orton, Perkins, Rey, Riley, Scudder, Sidney Smith, Sterns, Tuttle, Verrill, Wood.

Soon after the war the surveys of the West, which have coalesced to form the United States Geological Survey, were forming under the direction of Clarence King, Lieutenant Wheeler, F. V. Hayden, and Major Powell.

The discovery of the nature of the corona of the sun by Young and Harkness in 1869 was an event encouraging to the rising spirits of our workers.

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[1] Proceedings of the American Association for the Advancement of Science, VI, p. xlviii.

[2] See Andrew D. White's Scientific and Industrial Education in the United States. Popular Science Monthly, V, 1874, p. 170.

XVIII.

With 1869 we reach the end of the third period and the threshold of that in which we are living. I shall not attempt to define the characteristics of the natural history of to-day, though I wish to direct attention to certain tendencies and conditions which exist. Let me, however, refer once more to the past, since it leads again directly up to the present.

In a retrospect published in 1876,[1] one of our leaders stated that American science during the first forty years of the present century was in "a state of general lethargy, broken now and then by the activity of some first-class man, which, however, commonly ceased to be directed into purely scientific channels." This depiction was, no doubt, somewhat true of the physical and mathematical sciences concerned, but not to the extent indicated by the writer quoted. What could be more unjust to the men of the last generation than this? "It is," continues he, "strikingly illustrative of the absence of everything like an effective national pride in science that two generations should have passed without America having produced anyone to continue the philosophical researches of Franklin."

I may not presume to criticise the opinion of the writer from whom these words are quoted, but I can not resist the temptation to repeat a paragraph from Professor John W. Draper's eloquent centennial address upon Science in America:

> In many of the addresses on the centennial occasion [he said], the shortcomings of the United States in extending the boundaries of scientific knowledge, especially in the physical and chemical departments, have been set forth. "We must acknowledge with shame our inferiority to other people," says one. "We have done nothing," says another. . . . But we must not forget that many of these humiliating accusations are made by persons who are not of authority in the matter; who, because they are ignorant of what has been done, think that nothing has been done. They mistake what is merely a blank in their own information for a blank in reality. In their alacrity to depreciate the merit of their own country they would have us confess that, for the last century, we have been living on the reputation of Franklin and his thunder rod.

These are the words of one who, himself an Englishman by birth, could, with excellent grace, upbraid our countrymen for their lack of patriotism.

The early American naturalists have been reproached for devoting their time to explorations and descriptive natural history, and their work depreciated, as being of a character beneath the dignity of the biologists of to-day.

> The zoological science of the country, [said the president of the Natural History section of the American Association a few years since], presents itself in two distinct periods: The first period may be recognized as embracing the lowest stages

[1] North American Review, January, 1876, pp. 100, 107.

of the science; it included, among others, a class of men who busied themselves in taking an inventory of the animals of the country, an important and necessary work to be compared to that of the hewers and diggers who first settle a new country, but in their work demanded no deep knowledge or breadth of view.

It is quite unnecessary to defend systematic zoology from such slurs as this, nor do I believe that the writer quoted would really defend the ideas which his words seem to convey, although, as Professor Judd has regretfully confessed in his recent address before the Zoological Society of London, systematic zoologists and botanists have become somewhat rare and out of fashion in Europe in modern times.

The best vindication of the wisdom of our early writers will be, I think, the presentation of a counter quotation from another presidential address, that of the venerable Doctor Bentham before the Linnæan Society of London, in 1867:

It is scarcely half a century [wrote Bentham], since our American brethren applied themselves in earnest to the investigation of the natural productions and physical condition of their vast continent, their progress, especially during the latter half of that period, had been very rapid until the outbreak of the recent war, so deplorable in its effects in the interests of science as well as on the material prosperity of their country. The peculiar condition of the North American Continent requires imperatively that its physical and biological statistics should be accurately collected and authentically recorded, and that this should be speedily done. It is more than any country, except our Australian colonies, in a state of transition. Vast tracts of land are still in what may be called almost a primitive state, unmodified by the effects of civilization, uninhabited, or tenanted only by the remnants of ancient tribes, whose unsettled life never exercised much influence over the natural productions of the country. But this state of things is rapidly passing away; the invasion and steady progress of a civilized population, whilst changing generally the face of nature, is obliterating many of the evidences of a former state of things. It may be true that the call for recording the traces of previous conditions may be particularly strong in Ethnology and Archæology; but in our own branches of the science, the observations and consequent theories of Darwin having called special attention to the history of species, it becomes particularly important that accurate biological statistics should be obtained for future comparison in those countries where the circumstances influencing those conditions are the most rapidly changing. The larger races of wild animals are dwindling down, like the aboriginal inhabitants, under the deadly influence of civilized man. Myriads of the lower orders of animal life, as well as of plants, disappear with the destruction of forests, the drainage of swamps, and the gradual spread of cultivation, and their places are occupied by foreign invaders. Other races, no doubt, without actually disappearing, undergo a gradual change under the new order of things, which, if perceptible only in the course of successive generations, require so much the more for future proof an accurate record of their state in the still unsettled condition of the country. In the Old World almost every attempt to compare the present state of vegetation or animal life with that which existed in uncivilized times is in a great measure frustrated by the absolute want of evidence as to that former state; but in North America the change is going forward as it were close under the eye of the observer. This consideration may one day give great value to the reports of the naturalist sent by the Government, as we have seen, at the instigation of the Smithsonian Institution and other promoters of science, to accompany the surveys of new territories.

Having said this much in defense of the scientific men of the United States, I wish, in conclusion, to prefer some very serious charges against the country at large, or, rather, as a citizen of the United States, to make some very melancholy and humiliating confessions.

The present century is often spoken of as "the age of science," and Americans are somewhat disposed to be proud of the manner in which scientific institutions are fostered and scientific investigators encouraged on this side of the Atlantic.

Our countrymen have made very important advances in many departments of research. We have a few admirably organized laboratories and observatories, a few good collections of scientific books, six or eight museums worthy of the name, and a score or more of scientific and technological schools, well organized and better provided with officers than with money. We have several strong scientific societies, no one of which, however, publishes transactions worthy of its own standing and the collective reputation of its members. In fact, the combined publishing funds of all our societies would not pay for the annual issue of a volume of memoirs such as appears under the auspices of any one of a dozen European societies which might be named.

Our Government, by a liberal support of its scientific departments, has done much to atone for the really feeble manner in which local institutions have been maintained. The Coast Survey, the Geological Survey, the Department of Agriculture, the Fish Commission, the Army, with its Meteorological Bureau, its Medical Museum and Library, and its explorations; the Navy, with its Observatory, its laboratories and its explorations; and, in addition to these, the Smithsonian Institution, with its systematic promotion of all good works in science, have accomplished more than is ordinarily placed to their credit. Many hundreds of volumes of scientific memoirs have been issued from the Government Printing Office since 1870, and these have been distributed in such a generous and far-reaching way that they have not failed to reach every town and village in the United States where a roof has been provided to protect them.

It may be that some one will accuse the Government of having usurped the work of the private publisher. Very little of value in the way of scientific literature has been issued during the same period by publishers, except in reprints or translations of works of foreign investigators. It should be borne in mind, however, that our Government has not only published the results of investigations, but has supported the investigators and provided them with laboratories, instruments, and material, and that the memoirs which it has issued would never, as a rule, have been accepted by private publishers.

I do not wish to underrate the efficiency of American men of science, nor the enthusiasm with which many public men and capitalists have promoted our scientific institutions. Our countrymen have had wonderful successes in many directions. They have borne their share in the

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battle of science against the unknown. They have had abundant recognition from their fellow-workers in the Old World. They have met perhaps a more intelligent appreciation abroad than at home. It is the absence of home appreciation that causes us very much foreboding in the future.

In Boston or Cambridge, in New York, Philadelphia, Baltimore, Washington, Chicago, or San Francisco, and in most of the college towns, a man interested in science may find others ready to talk over with him a new scientific book or a discovery which has excited his interest. Elsewhere the chances are he will have to keep his thoughts to himself. One may quickly recite the names of the towns and cities in which may be found ten or more people whose knowledge of any science is aught than vague and rudimentary. Let me illustrate my idea by supposing that every inhabitant of the United States over fifteen years of age should be required to mention ten living men eminent in scientific work, would one out of a hundred be able to respond? Does anyone suppose that there are three or four hundred thousand people enlightened to this degree?

Let us look at some statistics, or rather some facts, which it is convenient to arrange in statistical form. The total number of white inhabitants of the United States in 1880 was about 42,000,000. The total number of naturalists, as shown in the Naturalist's Directory for 1886, was a little over 4,600. This list includes not only the investigators, who probably do not exceed 500 in number, and the advanced teachers, who muster perhaps 1,000 strong, but all who are sufficiently interested in science to have selected special lines of study.

We have, then, 1 person interested in science to about 10,000 inhabitants. But the leaven of science is not evenly distributed through the national loaf. It is the tendency of scientific men to congregate together. In Washington, for instance, there is 1 scientific man to every 500 inhabitants; in Cambridge, 1 to 830; and in New Haven, 1 to 1,100. In New Orleans the proportion is 1 to 8,800; in Jersey City, 1 to 24,000; in New York, 1 to 7,000; and in Brooklyn, 1 to 8,500. I have before me the proportions worked out for the seventy-five principal cities of the United States. The showing is suggestive, though no doubt in some instances misleading. The tendency to gregariousness on the part of scientific men may perhaps be further illustrated by a reference to certain societies. The membership of the National Academy of Sciences is almost entirely concentrated about Boston, New York, Philadelphia, Washington, and New Haven. Missouri has one member, Illinois one, Ohio one, Maryland, New Jersey, and Rhode Island three, and California four, while thirty-two States and Territories are not represented. A precisely similar distribution of members is found in the American Society of Naturalists. A majority of the members of the American Association for the Advancement of Science live in New York, Massachusetts, Pennsylvania, the District of Columbia, Michigan, Minnesota, Ohio, Illinois, and New Jersey.

It has been stated that the average proportion of scientific men to the population at large is 1 to 10,000. A more minute examination shows that while fifteen of the States and Territories have more than the average proportion of scientific men, thirty-two have less. Oregon and California, Michigan and Delaware have very nearly the normal number. Massachusetts, Rhode Island, Connecticut, Illinois, Colorado, and Florida have about 1 to 4,000. West Virginia, Nevada, Arkansas, Mississippi, Georgia, Kentucky, Texas, Alabama, and the Carolinas are the ones least liberally furnished. Certain cities appear to be absolutely without scientific men. The worst cases of destitution seem to be Paterson, New Jersey, a city of 50,000 inhabitants; Wheeling, West Virginia, with 30,000; Quincy, Illinois, with 26,000; Newport, Kentucky, with 20,000; Williamsport, Pennsylvania, and Kingston, New York, with 18,000; Council Bluffs, Iowa, and Zanesville, Ohio, with 17,000; Oshkosh, Wisconsin, and Sandusky, Ohio, with 15,000; Lincoln, Rhode Island; Norwalk, Connecticut, and Brockton and Pittsfield, Massachusetts, with 13,000. In these there are no men of science recorded, and eight cities of more than 15,000 inhabitants have only one, namely, Omaha, Nebraska, and St. Joseph, Missouri; Chelsea, Massachusetts; Cohoes, New York; Sacramento, California; Binghamton, New York; Portland, Oregon; and Leadville, Colorado.

Of course these statistical statements are not properly statistics. I have no doubt that some of these cities are misrepresented in what has been said. This much, however, is probably true, that not one of them has a scientific society, a museum, a school of science, or a sufficient number of scientific men to insure even the occasional delivery of a course of scientific lectures.

Studying the distribution of scientific societies, we find that there are fourteen States and Territories in which there are no scientific societies whatever. There are fourteen States which have State academies of science or societies which are so organized as to be equivalent to State academies.

Perhaps the most discouraging feature of all is the diminutive circulation of scientific periodicals. In addition to a certain number of specialists' journals, we have in the United States three which are wide enough in scope to be necessary to all who attempt to keep an abstract of the progress of science. Of these the American Journal of Science has, we are told, a circulation of less than 800; the American Naturalist less than 1,100, and Science less than 6,000. A considerable proportion of the copies printed go, as a matter of course, to public institutions, and not to individuals. Even the Popular Science Monthly and the Scientific American, which appeal to large classes of unscientific readers, have circulations absurdly small.

The most effective agents for the dissemination of scientific intelligence are probably the religious journals, aided to some extent by the agricultural journals and to a very limited degree by the weekly and daily newspapers. It is much to be regretted that several influential journals, which ten or fifteen years ago gave attention to the publication of trustworthy scientific intelligence, have of late almost entirely abandoned the effort. The allusions to science in the majority of our newspapers are singularly inaccurate and unscholarly, and too often science is referred to only when some of its achievements offer opportunity for witticism.

The statements which I have just made may, as I have said, prove in some instances erroneous and to some extent misleading, but I think the general tendency of a careful study of the distribution of scientific men and institutions is to show that the people of the United States, except in so far as they sanction by their approval the work of the scientific departments of the Government and the institutions established by private munificence, have little reason to be proud of the national attitude toward science.

I am, however, by no means despondent for the future. The importance of scientific work is thoroughly appreciated, and it is well understood that many important public duties can be performed properly only by trained men of science. The claims of science to a prominent place in every educational plan are every year more fully conceded. Science is permeating the theory and the practice of every art and every industry, as well as every department of learning. The greatest danger to science is perhaps the fact that all who have studied at all within the last quarter of a century have studied its rudiments and feel competent to employ its methods and its language and to form judgments on the merits of current work.

In the meantime the professional men of science, the scholars, and the investigators seem to me to be strangely indifferent to the questions as to how the public at large is to be made familiar with the results of their labors. It may be that the tendency to specialization is destined to deprive the sciences of their former hold upon popular interest, and that the study of zoology, botany and geology, mineralogy and chemistry, will become so technical, that each will require the exclusive attention of its votaries for a period of years. It may be that we are to have no more zoologists such as Agassiz and Baird, no more botanists such as Gray, and that the place which such men filled in the community will be supplied by combinations of a number of specialists, each of whom knows, with more minuteness, limited portions of the subjects grasped bodily by the masters of the last generation. It may be that the use of the word naturalist is to become an anachronism, and that we are all destined to become generically biologists, and specifically morphologists, histologists, embryologists, physiologists, or it may be cetologists, chiropterologists, oologists, carcinologists, ophiologists, helminthologists, actinologists, coleopterists, caricologists, mycologists, muscologists, bacteriologists, diatomologists, paleobotanists, crystallographers, petrologists, and the like.

I can but believe, however, that it is the duty of every scientific scholar, however minute his specialty, to resist in himself and in the professional circles which surround him, the tendency toward narrowing technicality in thought and sympathy, and above all in the education of nonprofessional students.

I can not resist the feeling that American men of science are in a large degree responsible if their fellow-citizens are not fully awake to the claims of scientific endeavor in their midst.

I am not in sympathy with those who feel that their dignity is lowered when their investigations lead toward improvement in the physical condition of mankind, but I feel that the highest function of science is to minister to their mental and moral welfare. Here in the United States, more than in any other country, it is necessary that sound, accurate knowledge and a scientific manner of thought should exist among the people, and the man of science is becoming more than ever the natural custodian of the treasured knowledge of the world. To him above all others falls the duty of organizing and maintaining the institutions for the diffusion of knowledge, many of which have been spoken of in these addresses—the schools, the museums, the expositions, the societies, the periodicals. To him more than to any other American should be made familiar the words of President Washington in his farewell address to the American people:

"Promote, then, as an object of primary importance, institutions for the general diffusion of knowledge. In proportion as the structure of a government gives force to public opinions it should be enlightened."

BENJAMIN WATERHOUSE.

THE FIRST NATIONAL SCIENTIFIC CONGRESS (WASHINGTON, APRIL, 1844), AND ITS CONNECTION WITH THE ORGANIZATION OF THE AMERICAN ASSOCIATION.

BY

GEORGE BROWN GOODE,

Assistant Secretary, Smithsonian Institution, in charge of the U. S. National Museum.

THE FIRST NATIONAL SCIENTIFIC CONGRESS (WASHINGTON, APRIL, 1844), AND ITS CONNECTION WITH THE ORGANIZATION OF THE AMERICAN ASSOCIATION.[1]

By George Brown Goode,

Assistant Secretary, Smithsonian Institution, in charge of the U. S. National Museum.

In telling the story of the American Association, it is generally said that it was a direct continuation of the old Association of American Geologists and Naturalists.[2] In a certain sense this is true. At its meeting in New York in 1847, the Association of Geologists and Naturalists voted to enlarge its scope, and to change its name to The American Association for the Promotion of Science, and elected an officer to preside at the meeting of the new society in the following year. In September, 1847, the new association held its first meeting, and Professor William B. Rogers, the chairman of the last meeting of the old association, presided during the proceedings, and, after the adoption of a constitution, introduced his successor, William C Redfield, president-elect. Thus was the American Association born on the 26th of September, 1848, in Philadelphia. Its subsequent history is accessible to all, and the thirty-nine stout volumes which contain the records of its annual proceedings are permanent monuments to the wisdom of the founders.

All the circumstances of its origin, the causes of its founding, and the influences which shaped its development have not as yet been exhaustively studied, and it is not impossible that valuable suggestions may be derived from a consideration of the other societies which were organized in the United States during the first half of the century.

Most powerful and important of all of these was the National Institution for the Promotion of Science, established in Washington only three weeks after the Association of Geologists held its first session in Philadelphia—the two societies having been essentially contemporaneous in

[1] A paper presented at the meeting of the American Association for the Advancement of Science, held in Washington on August 19–25, 1891, and reprinted from its Proceedings, volume 40, page 39.

[2] This was organized in 1840, under the name of the Association of American Geologists.

origin. Besides these two there were no others which at that time aspired to national influence. The American Philosophical Society and the American Academy of Arts and Sciences, in earlier days more far-reaching, were already limited by local bonds. The United States Military Philosophical Society, organized in 1803, the first in America to hold meetings from city to city, had disbanded soon after 1810. The American Geological Society, organized in New Haven in 1819, endured only until 1826. Others, like the Academy of Natural Sciences of Philadelphia and the New York Lyceum of Natural History, while not strictly local, were essentially professional societies, with interests already intentionally restricted.

The American Association was undoubtedly a direct outgrowth of the Association of Geologists and Naturalists, but it was not strictly a continuation. The older society was an assemblage of professional men. They were all geologists, for in those days every naturalist was to some extent a geologist, and the already extensive system of State geological surveys offered many opportunities for research. There was not an astronomer, mathematician, physician, anthropologist, or political economist among them. Their object was described in the constitution to be "the advancement of geology and the collateral branches of science," and geology remained always the paramount and controlling interest. The few papers on biological, chemical, and meteorological subjects which were presented were written with geological problems in mind, and in the discussions geological considerations always received the chief attention. This tendency was especially pronounced previous to 1844, when a change of policy began to take place. It is evident to whomsoever may study the records that the American Association of Geologists was the legitimate successor of the American Geological Society, more closely akin to it (though separated by a period of fourteen years of lifelessness) than to its administrative offspring, the American Association. The Geological Society of America, separated from it by a gap of over forty years, is also more closely akin to it than was its outgrowth, the American Association.

The Association of Geologists was only one of the parents of the American Association. For the other we must look to the National Institution; and since the achievements of this organization have hitherto received but slight consideration it seems appropriate on this occasion to call attention to the principal facts in its history.

This society was from its start extremely comprehensive in its scope—even more so, it may be, than the American Association for the Advancement of Science has been at any period in its existence. Although its meetings, like those of the already venerable sister societies of similar purpose, the American Philosophical Society and the American Academy of Arts and Sciences, were always held in one city, its scope was essen-

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tially national, and at the time of its greatest prosperity it had nearly 1,600 names upon its membership roll.

Its most peculiar feature was the circumstance that its active supporters were men of high official rank in the National Government, who attended its meetings, occupied the chair, and delivered addresses and communications. It is much to be regretted that this association of public men with scientific organizations has not been continued in the last half of the present century in the same way that it was in the first seventy-five years of our national existence. The agency of John Adams in founding The American Academy, the labors of Franklin, Jefferson, Washington, Gallatin, Madison, John Quincy Adams in connection with the American Philosophical Society are well known to all. In the closing years of the last century, when the national seat of Government was in Philadelphia, the meetings of the American Philosophical Society were attended and largely kept up by high officials of the Government.

When Washington became the National Capital attempts were made from time to time to supply the want of scientific organizations, and from 1808 when a meeting of the United States Military Philosophical Society—the first national scientific society with a peripatetic system of meetings—was held in Washington City there appears to have been always a place of assemblage for men of scientific tastes at the National Capital, where cultivators of the sciences met together for conference and discussion.

Somewhere between 1810 and 1815 an organization known as the Metropolitan Society was in existence in Washington. This in 1816 became the Columbian Institute for the Promotion of Arts and Sciences, of which John Quincy Adams, Samuel L. Southard, Daniel Webster, Henry Clay, John C. Calhoun, Edward Everett, and many other public men were supporters, and whose meetings were held in a room in the Capitol. The Columbian Institute, dormant after 1825, in 1840 passed into the National Institution for the Promotion of Science.

The National Institution in April, 1844, instituted in Washington the first national congress of scientific men—the first cosmopolitan assemblage of the kind which in any respect foreshadowed the great congresses of the American Association in later years. This gathering was upon the occasion of the first annual or general meeting of the institution, and to it were invited the members of the American Philosophical Society, as the oldest scientific institution in the country; the members of the American Association of Naturalists and Geologists, and the members of all other scientific and learned societies in the United States, and all others engaged and concerned in the increase and diffusion of knowledge among men.

It is not necessary to describe at length the proceedings upon this occasion. They may be found in the Bulletin of the Institution which, though rare, is usually possessed by all the older libraries. The opening address was delivered by John Tyler, President of the United States, and the introductory discourse by the Hon. Robert J. Walker, United States Senator from Mississippi—a learned and judicious essay, which reviewed very carefully the achievements of American science, and is well worthy of a reading, even at the present time. Senator Woodbury of New Hampshire, Ex-President John Quincy Adams, Member of Congress from Massachusetts; the Hon. J. R. Ingersoll, of Pennsylvania, and the Hon. John C. Spencer, Secretary of War, occupied the chair from day to day, and forty-three papers were read. So important were these that it is a matter of regret that few of them appear to have been published. They were prepared by representative men, and related to every branch of scientific inquiry at that time enlisting attention.

They were distributed as follows:

GENERAL.

Prof. Alexander Dallas Bache, Superintendent of the United States Coast Survey. On the Condition of Science in the United States and Europe.

Peter Arrell Browne, LL. D., of Philadelphia. On an Improved Method of Teaching the Natural Sciences.

Hon. Richard Rush. On the Smithsonian Bequest.

Prof. Samuel Stehman Haldeman. On the Necessity of a National Institution for the Encouragement of Science.

MATHEMATICS AND GEODESY.

Prof. Charles Gill, of New York. On the Improvement of the Mathematical Sciences, and the Consequent Advancement of the Natural Sciences.

Capt. William Henry Swift, U.S.A. On the Measurement of Base-Lines.

ASTRONOMY.

Prof. John William Draper, of the University of New York. On the Physical Constitution of the Rays of the Sun.

Prof. Elias Loomis, of Western Reserve College, Ohio. On the Great Comet of 1843.

Prof. Richard Sears McCulloh, of Baltimore. On the Attraction of a Planet upon a Material Point in Space.

Prof. William Augustus Norton, of Delaware College, Newark, Delaware. On the Nebular Hypothesis.

Rev. Prof. James Curley, of Georgetown College, Washington, D. C. Description of a Meridian Circle for the Observatory of Georgetown College, District of Columbia.

PHYSICS.

Prof. Benjamin Hallowell of Maryland. On the Liberation of Caloric in some Chemical Changes that are Attended with an Enlargement of Bulk.

Capt. Alfred Mordecai, U. S. A. Notice of a Ballistic Pendulum, constructed at Washington Arsenal for Experiments in Gunnery.

John Tyler, jr., of Washington. In Support of the Theory of our Electric Fluid.

METEOROLOGY.

Prof. Michael Jacobs of Pennsylvania. On the Indian Summer.

Prof. James Pollard Espy of Washington. On Meteorology.

Prof. James Hamilton of the University of Nashville. On certain Meteorological Facts Observed at Nashville.

Lieut. Matthew Fontaine Maury, U. S. N. On the Gulf Stream.

George Baker and Isaac Thurber of Providence. On the Tides of Providence River and Narragansett Bay.

Prof. Robert Hare of the University of Pennsylvania. A call for Observations of the Lake Storm.

Prof. Alexander Dallas Bache, LL. D. An abstract of Magnetical and Meteorological Observations made under the direction of the War Department, at the Observatory, Girard College, Philadelphia.

GEOLOGY.

Prof. William Williams Mather of Ohio University. On the Physical Geology of the United States.

Rev. Eliphalet Nott, D. D., LL. D., president of Union College. On the Origin, Duration and End of the World.

Prof. John Holmes Agnew of New York. On the Glacier System or Ice Period of Agassiz.

Prof. John Locke of the Medical College of Ohio, Cincinnati. On Lake Superior, embracing an account of Miscellaneous Observations on the Geology, Mineralogy, Topography, Scenery, Climate, Meteorology, etc., of the Lake.

PALEONTOLOGY.

William Ballantyne Hodgson, of Savannah, Georgia. On the Megatheroid Fossils of the Atlantic Coast of Georgia.

Aaron D. Chaloner, M. D., of Philadelphia. A Petrified Forest near Cairo, Egypt.

ZOOLOGY.

Rev. John Gottlieb Morris, D. D., of Baltimore. On the Past and Present State of Entomology in the United States.

Prof. Jacob Whitman Bailey, United States Military Academy. Notes on American Polythalamia.

PHYSIOLOGY, PHARMACOLOGY.

Dr. William Holme Van Buren, U. S. A. On the Effects of Large Doses of Sulphate of Quinine on the Human System as a Remedial Agent.

Prof. John Richard Woodcock Dunbar of Maryland. On the Importance of Physiology as a Branch of General Education.

ANTHROPOLOGY, PHILOLOGY.

James Chamberlain Pickett, United States chargé d'affaires to Peru. Remarkable Ruins in the Province of Chachapoyas, Peru.

George Edward Chase, U. S. A., Pensacola, Florida. A Method of Settling the Orthography and Orthoepy of the English Language.

ADMINISTRATIONS, INSTITUTIONS, STATISTICS, ETC.

Rev. Hector Humphreys, D. D., president of St. John's College, Annapolis, Maryland. On the Economy of Science as Relating to the Government.

Prof. Edward Foreman, of Baltimore. On Domestic Exchanges in Natural History and Geology.

Prof. Thomas Sewall, M. D., of Washington. On the Design of the Medical Department of the National Institute.

Prof. Robert Maskell Patterson of Philadelphia. On a method of determining the center of population of a country.

POLITICAL ECONOMY, HISTORY, ETC.

Prof. George Tucker of the University of Virginia. On the Dangers most to be Guarded Against in the Future Progress of the United States.

Francis Joseph Grund of Philadelphia. On the Modern Historical Schools of France and Germany, and the Philosophy of History.

Prof. Walter Rogers Johnson of Philadelphia. On the Scientific Character and Researches of the late James Smithson.

Hon. Alexander Hill Everett of Massachusetts. On the Moral Tendency of the Science and Learning of the Past and Present Centuries.

Francis Lieber, LL. D., of South Carolina. Remarks on Public Institutions.

At the meeting of the Association of American Geologists, held in Washington in the following month, out of thirty-one formal papers read, while twenty-five were mostly geological or paleontological, four related to zoology and two to chemistry or physics.

It was doubtless intended that the first annual meeting or congress of the National Institution should be followed by a similar gathering each year. This was clearly indicated in Senator Walker's introductory address, in which the opinion is forcibly expressed that the National

David A. Wells

Institution, with its central location, could, better than any other society then in existence, bring together the varied State interests and form a body truly national in its influence.[1]

This Institute is located at the home of the Federal Government, and its operations are designed to embrace the whole Union. Rising above local and sectional influences, it appeals to the friends of science throughout the nation, and asks the support of all, with a view to the general diffusion of knowledge, and advancement of American science. It is not designed to impede the progress or impair the usefulness of any present or future scientific institutions or societies in any of the States, but would desire to establish between them and this Institute the most cordial relations, together with reciprocal aid and encouragement. Experience has proved that no one institution, however distinguished, of any State, can bring to its aid the combined efforts and support of the whole Union. Each State will desire the advancement of its own institutions; and here only can all meet beyond the limits of all the States, and unite, as Americans, in erecting and maintaining an institution which shall be truly national, not only in its location, but in all its operations. Whilst the hopes of this Institute are most elevated for the future, its present pretentions are truly humble. It does not claim to have established the character or assumed the position of a scientific institution; it does not pretend to teach the men of science of the nation, but seeks instruction from them, and appeals to them, for light, and aid, and encouragement. It asks them to come forward in a patriotic spirit, and make this Institute worthy of the great nation at the seat of whose Government it is placed, and where only the now scattered lights of American science can converge at a common centre, and radiate thence throughout the circle of the whole Union.

Disaster soon befell The National Institution. Many of its founders and supporters disappeared from public life. The Smithsonian fund, which it aspired to control, was placed under other authority. The collections and manuscripts of the exploring expeditions were removed from its custody. The magnificent collections in natural history, ethnology, and geology, which had accumulated as a result of its wonderful activity and enthusiam, soon became a burden and a source of danger, for Congress refused the financial aid which its projectors had counted upon as certain, and which they doubtless would have received but for political changes not foreseen at the start. Only one annual meeting was held, and the publication of the bulletin containing its proceedings was its last creditable effort. It lingered along, and in 1861 went out of existence by the termination of its charter, having existed for twenty-one years, the last sixteen of which, inglorious as they were, could not impair the brilliancy of its early history.

Not only did it accomplish a great work in preparing the way for enlightened legislation regarding scientific matters in general, but it achieved definite and tangible results in connection with the founding of the Smithsonian Institution, the National Observatory, the National Museum, the reorganization of the Coast Survey, and the publication of the reports of the exploring expeditions; and it had, as an attempt will

[1] Third Bulletin of the National Institute, 1845, p. 439.

now be made to show, a direct influence upon the origin of The American Association for the Advancement of Science.

Several of the most influential members of the Association of Geologists and Naturalists took part in the general meeting of The National Institution in 1844—Browne, Locke, Maury, Johnson, Morris, Bailey, Mather, Haldeman, and Morton. Others, who joined the Association for the Advancement of Science in its earliest years, were also present, and saw for themselves the advantages and opportunities afforded by such gatherings.

The leaven began to work. In the meeting for 1844 there were four biological and two chemical papers. The Association of Geologists and Naturalists in 1845 announced that "a constant effort has been made to counteract the impression that the objects of the association are exclusively geological or directed to those cognate subjects only which have a direct bearing upon that subject," and to throw open its doors widely for all cultivators of science and the arts who choose to enter. In 1847, at the eighth meeting, the papers belonged to all branches of science. Thirty-seven were read, of which nine related to geology, seven to paleontology, seven to zoology, five to chemistry and physics, three to anthropology, two to meteorology, one to institutions.[1]

The new society was born, and it is significant that the name first adopted was as nearly as possible a combination of the names of the two parent organizations. The one contributed the first half of the name—"The American Association;" the other the second half—"for the promotion of science." The word "advancement" in place of "promotion" was substituted afterwards, probably by the first committee on rules. Even if it were possible it would be scarcely worth while to determine the proportionate extent of the participation of either of the two societies in the early history of The American Association. The influence of The National Institution should, however, have due recognition, and the fact should not be forgotten that under its auspices, and in the city of Washington forty-seven years ago, took place the first national congress of American men of science.

It seems appropriate that the remaining seven years of the first half century of The American Association should be devoted by those concerned in the organization of American science to a unification and concentration of the forces which now, not purposely but actually, are in part centrifugal. The midsummer meeting of the association this year has brought around it a cluster of other meetings of kindred bodies. It is worth the effort to endeavor to induce the other societies of professional men of science to meet in conjunction with our great association. To bring this about it might be necessary to hold two meetings in the year—one in midsummer at some city of hotels, as the seashore or in the

[1]American Journal of Science, 2d ser., IV, 1847, p. 428.

mountains; another in the winter holidays in some large city, where the associations would be brought into relationship with local institutions at the time of greatest activity. A winter meeting would render it possible for all of the kindred societies of specialists and professional workers to meet in connection with the association occasionally, or it may be each year. It would be a glorious occasion if, when the American Association in 1898 enters upon the second half of its first century, it should have actually assumed its natural functions as the central agency for all American scientific effort.

WILLIAM DWIGHT WHITNEY.

THE PUBLISHED WRITINGS OF GEORGE BROWN GOODE, 1869–1896.

BY

RANDOLPH ILTYD GEARE,

Chief of Correspondence and Documents, U. S. National Museum.

THE PUBLISHED WRITINGS OF GEORGE BROWN GOODE, 1869–1896.

By RANDOLPH ILTYD GEARE,

Chief of Division of Correspondence and Documents.

The compilation of the following list of published writings of the late Doctor George Brown Goode was begun some fifteen years ago, and additions have been made to it from time to time as each new publication came to my notice. It has been my endeavor to make the list as complete as I could, although it is quite possible that some titles may still be omitted. I shall be under obligations to anyone who can supply additional titles. It has been found convenient to arrange these papers in the following groups: Papers by George Brown Goode; papers by George Brown Goode and others; papers edited by George Brown Goode; and papers reviewed by George Brown Goode.

PAPERS BY GEORGE BROWN GOODE.

1869. Summer Rambles.
College Argus, II, May 27, 1869, p. 85.

1870. Musca et Medica.
College Argus, III, March 2, 1870, p. 149.

1870. College Men in Congress.
College Argus, III, May 4, 1870, p. 180.

1870. The Colleges of the United States.
College Review, New York, June, 1870.

1870. History of Wesleyan University.
College Review, New York, 1870.
Also published in *College Argus*, IV, October 26, 1870, p. 34; November 9, 1870, p. 49.

1871. Our Museum.
College Argus, IV, March 22, 1871, p. 193.

1871. Rambling.
College Argus, IV, May 3, 1871, p. 210.

1871. The Billfish in Fresh Water.
American Naturalist, V, September, 1871, p. 439.

1871. Stray Glimpses of Old Harvard.
College Argus, V, November 29, 1871, p. 67.

1872. A Sea Bird Inland.
American Naturalist, VI, January, 1872, p. 49.

1873. Animals in the Drinking Water.
Sentinel and Witness, Middletown, Conn., September 18, 1873.

1873. Moon Sickness.
Forest and Stream, I, September 25, 1873, p. 99.

1873. Do Snakes Swallow their Young?
Forest and Stream, I, October 2, 1873, p. 118.
Reprinted in *American Agriculturist*, XXXII, November, 1873, pp. 418, 419.

1873. The Urari Poison [Editorial].
Forest and Stream, I, December 11, 1873, p. 281.

1873. Mimicry in Snakes.
American Naturalist, VII, December, 1873, p. 747.

1874. On the question "Do Snakes Swallow their Young?"
Proceedings of the American Association for the Advancement of Science, XXII 1874, pp. 176–185. (Portland Meeting.)
Reprinted in separate form.

1874. Snakes Shedding their Skins.
Forest and Stream, I, January 15, 1874, p. 356.

1874. Tarpum.
Forest and Stream, II, June 18, 1874, p. 292.

1874. The United States Fish Commission.
American Sportsman, IV, July 25, 1874, p. 266.

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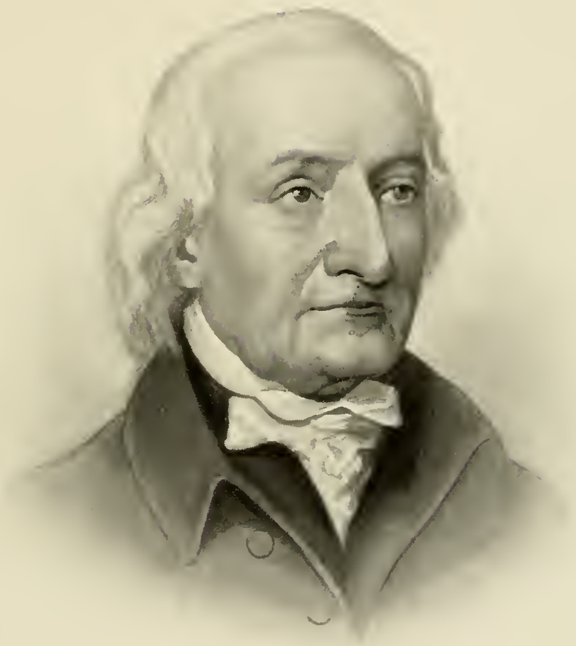

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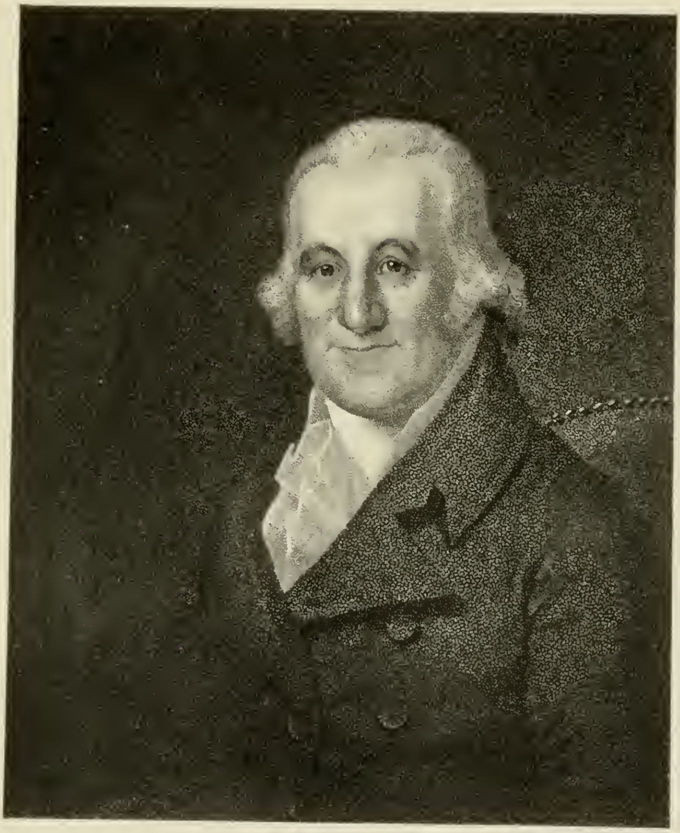

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(8) Census Bulletin No. 298. Commercial Fisheries of the Southern Atlantic States. Prepared by Mr. R. E. Earll and Colonel Marshall McDonald. June 5, 1882. pp. 18. In all, 148 pages, quarto.

In addition to these certain special tables appeared, as follows:

(9) Statistical table. Table showing by States the persons employed, capital invested, and value of products in the oyster industry.

(10) Statistical table. Statistics of the Fisheries of the United States in 1880. Prepared by Messrs. Goode and Earll from the reports of the special agents. Printed in the Compendium of the Tenth Census, p. 1402. pp. 2. Reprinted in *Bulletin of the United States Fish Commission*, III, 1883, pp. 270, 271, and in the *Preliminary Catalogue International Fisheries Exhibition*, facing p. 5.

(11) Statistical table. Table showing by States the quantity of Spanish mackerel taken in 1880 and the total catch for the United States. By R. Edward Earll. *Report of the United States Commissioner of Fish and Fisheries*, Part VIII, 1880. p. 416.

(12) Statistical summary. (Statistics of the Davis Strait Halibut Fishery.) By Newton P. Scudder. *Report of the United States Commissioner of Fish and Fisheries*, Part VIII, 1880. pp. 190–192.

(13) Statistical summary. (Statistics of the Swordfish Fishery.) By G. Brown Goode. *Report of the United States Commissioner of Fish and Fisheries*, Part VIII, 1880. pp. 361–367.

(14) Statistical summaries. Statistics of the Mackerel Fishery in 1880. By R. Edward Earll. *Report of the United States Commissioner of Fish and Fisheries*, Part IX, 1881. p. (124) (127).

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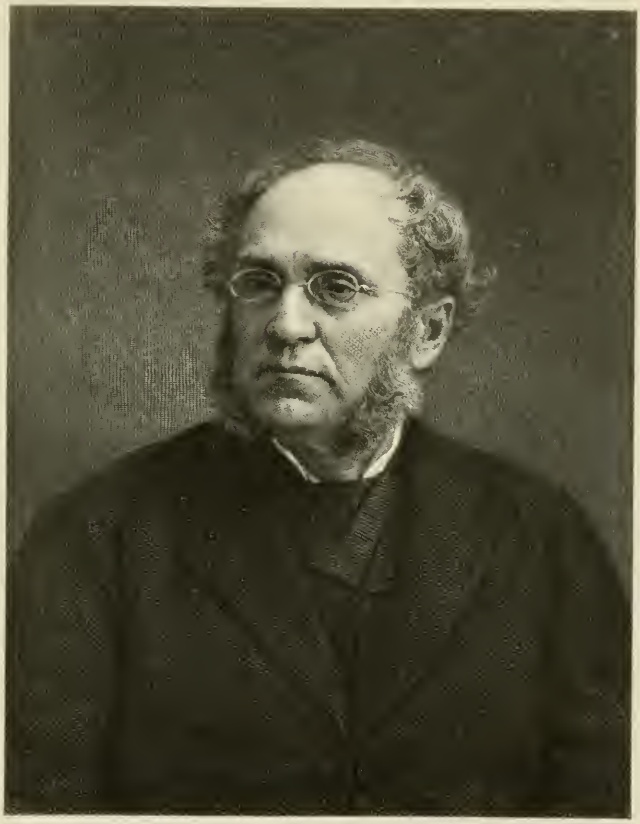
[1] Posthumous.



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