REPORTS OF THE SECRETARY OF THE SMITHSONIAN INSTITUTION,

FROM 1847 TO 1853.

To make the operations of the Institution more generally known, it has been thought advisable to append to this Report, for reprinting, the several Annual Reports of the Secretary. They give a connected history of all the operations of the Institution, from its organization to the end of the year 1852. These Reports exhibit the fact that very little change has been made in the plan of active operations originally adopted, and that all the anticipations which were entertained in regard to it have been fully realized.

FIRST REPORT.*

Report of the Secretary of the Smithsonian Institution to the Board of Regents, December 8, 1847.

GENTLEMEN: A statement of the financial condition of the Smithsonian Institution, and of the progress made in the erection of the building, having been presented to your Board by the committees charged with the care of these objects, it becomes my duty, as Secretary of the Institution, to give an account of what has been done relative to the development of the plan of organization, and of the steps which have been taken in the way of carrying it into operation.

In accordance with my instructions, I consulted with men of eminence, in the different branches of literature and science, relative to the details of the plan of organization, and arranged the various suggestions offered in the form of the accompanying programme. This, after having been submitted to a number of persons in whose knowledge and judgment I have confidence, is now presented to the Board, with the concurrence of the Committee on Organization, for consideration and provisional adoption. I regret that my engagements have been such as to render it impossible for me to call upon many persons whose counsel would have been valuable, but I hope hereafter to avail myself of their advice in behalf of the Institution. I also regret that I could not give the names of those whose suggestions have been adopted in the programme; the impossibility of rendering justice to all has prevented

* The first Report of the Secretary was given in the second Report of the Regents to Congress, hence the number of the former is one less than that of the latter.

my attempting this. Many of the suggestions have been offered by different persons, independently of each other; and, indeed, the general plan of the increase and diffusion of knowledge, as adopted by the Board, is such as would naturally arise in the mind of any person conversant with the history of physical science, and with the means usually employed for its extension and diffusion.

The introduction to the programme contains a series of propositions, suggested by a critical examination of the will of Smithson, to serve as a guide in judging of the fitness of any proposed plan for carrying out the design of the testator. The first section of the programme gives the details of the plan proposed for the increase and diffusion of knowledge by means of publication and original researches. The second section furnishes the details, so far as they can be made out at the present time, of the formation of a library, and a collection of objects of nature and art. These two plans combined, embrace the general propositions adopted by the Board of Regents at their last meeting as the basis of future operations. It is intended in the proposed plan to harmonize the two modes of increasing and diffusing knowledge, and to give to the Institution the widest influence compatible with its limited income. That all the propositions will meet with general approval cannot be expected; and that this organization is the best that could be devised is neither asserted nor believed. To produce *a priori* a plan of organization which shall be found to succeed perfectly in practice, and require no amendment, would be difficult under the most favorable circumstances, and becomes almost impossible where conflicting opinions are to be harmonized, and the definite requirements of the act establishing the Institution are to be observed. It is not intended that the details of the organization, as given in the programme, should be permanently adopted without careful trial; they are rather presented as suggestions to be adopted provisionally, and to be carried into operation gradually and cautiously, with such changes, from time to time, as experience may dictate.

PROGRAMME OF ORGANIZATION OF THE SMITHSONIAN INSTITUTION.

[Presented to the Board of Regents, December 8, 1847.]

INTRODUCTION.

General considerations which should serve as a guide in adopting a plan of organization.

1. WILL OF SMITHSON. The property is bequeathed 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."

2. The bequest is for the benefit of mankind. The government of the United States is merely a trustee to carry out the design of the testator.

3. The Institution is not a national establishment, as is frequently

supposed, but the establishment of an individual, and is to bear and perpetuate his name.

4. The objects of the Institution are—1st, to increase, and 2d, to diffuse, knowledge among men.

5. These two objects should not be confounded with one another. The first is to increase the existing stock of knowledge by the addition of new truths; and the second to disseminate knowledge, thus increased, among men.

6. The will makes no restriction in favor of any particular kind of knowledge; hence all branches are entitled to a share of attention.

7. Knowledge can be increased by different methods of facilitating and promoting the discovery of new truths, and can be most efficiently diffused among men by means of the press.

8. To effect the greatest amount of good, the organization should be such as to enable the Institution to produce results in the way of increasing and diffusing knowledge, which cannot be produced by the existing institutions in our country.

9. The organization should also be such as can be adopted provisionally, can be easily reduced to practice, receive modifications, or be abandoned, in whole or in part, without a sacrifice of the funds.

10. In order to make up for the loss of time occasioned by the delay of eight years in establishing the Institution, a considerable portion of the interest which has accrued should be added to the principal.

11. In proportion to the wide field of knowledge to be cultivated, the funds are small. Economy should therefore be consulted in the construction of the building; and not only should the first cost of the edifice be considered, but also the continual expense of keeping it in repair, and of the support of the establishment necessarily connected with it. There should also be but few individuals permanently supported by the Institution.

12. The plan and dimensions of the building should be determined by the plan of the organization, and not the converse.

13. It should be recollected that mankind in general are to be benefitted by the bequest; and that, therefore, all unnecessary expenditure on local objects would be a perversion of the trust.

14. Besides the foregoing considerations, deduced immediately from the will of Smithson, regard must be had to certain requirements of the act of Congress establishing the Institution. These are a library, a museum, and a gallery of art, with a building on a liberal scale to contain them.

SECTION I.

Plan of organization of the Institution, in accordance with the foregoing deductions from the will of Smithson.

To Increase Knowledge. It is proposed—

1. To stimulate men of talent to make original researches, by offering suitable rewards for memoirs containing new truths; and,

2. To appropriate annually a portion of the income for particular researches, under the direction of suitable persons.

To Diffuse Knowledge. It is proposed—

1. To publish a series of periodical reports on the progress of the different branches of knowledge; and,

2. To publish occasionally separate treatises on the subjects of general interest.

DETAILS OF THE PLAN TO INCREASE KNOWLEDGE.

I. *By stimulating researches.*

1. Rewards, consisting of money, medals, &c., offered for original memoirs on all branches of knowledge.

2. The memoirs thus obtained to be published in a series of volumes in a quarto form, and entitled "Smithsonian Contributions to Knowledge."

3. No memoir on subjects of physical science to be accepted for publication which does not furnish a positive addition to human knowledge resting on original research; and all unverified speculations to be rejected.

4. Each memoir presented to the Institution to be submitted for examination to a commission of persons of reputation for learning in the branch to which the memoir pertains, and to be accepted for publication only in case the report of this commission is favorable.

5. The commission to be chosen by the officers of the Institution, and the name of the author, as far as practicable, concealed, unless a favorable decision be made.

6. The volumes of the memoirs to be exchanged for the transactions of literary and scientific societies, and copies to be given to all the colleges and principal libraries in this country. One part of the remaining copies may be offered for sale; and the other carefully preserved, to form complete sets of the volumes, to supply the demand from new institutions.

7. An abstract, or popular account, of the contents of these memoirs to be given to the public, through the annual report of the Regents to Congress.

II. *By appropriating a portion of the income, annually, to special objects of research, under the direction of suitable persons.*

1. The objects, and the amount appropriated, to be recommended by counsellors of the Institution.

2. Appropriations in different years to different objects; so that, in course of time, each branch of knowledge may receive a share.

3. The results obtained from these appropriations to be published, with the memoirs before mentioned, in the volumes of the Smithsonian Contributions to Knowledge.

4. Examples of objects for which appropriations may be made:

(1.) System of extended meteorological observations, for solving the problem for American storms.

(2.) Explorations in descriptive natural history, and geological, magnetical, and topographical surveys, to collect materials for the formation of a Physical Atlas of the United States.

(3.) Solution of experimental problems, such as a new determination of the weight of the earth, of the velocity of electricity and of light; chemical analyses of soils and plants; collection and publication of articles of science, accumulated in the offices of government.

(4.) Institution of statistical inquiries with reference to physical, moral, and political subjects.

(5.) Historical researches, and accurate surveys of places celebrated in American history.

(6.) Ethnological researches, particularly with reference to the different races of men in North America; also, explorations and accurate surveys of the mounds and other remains of the ancient people of our country.

DETAILS OF THE PLAN FOR DIFFUSING KNOWLEDGE.

I. *By the publication of a series of reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge not strictly professional.*

1. These reports will diffuse a kind of knowledge generally interesting, but which, at present, is inaccessible to the public. Some of the reports may be published annually, others at longer intervals, as the income of the Institution, or the changes in the branches of knowledge, may indicate.

2. The reports are to be prepared by collaborators eminent in the different branches of knowledge.

3. Each collaborator to be furnished with the journals and publications, domestic and foreign, necessary to the compilation of his report; to be paid a certain sum for his labors, and to be named on the title-page of the report.

4. The reports to be published in separate parts, so that persons interested in a particular branch can procure the parts relating to it without purchasing the whole.

5. These reports may be presented to Congress for partial distribution; the remaining copies to be given to literary and scientific institutions, and sold to individuals for a moderate price.

The following are some of the subjects which may be embraced in the reports:

I. PHYSICAL CLASS.

1. Physics, including astronomy, natural philosophy, chemistry, and meteorology.

2. Natural history, including botany, zoology, geology, &c.

3. Agriculture.

4. Application of science to arts.

II. MORAL AND POLITICAL CLASS.

5. Ethnology, including particular history, comparative philology, antiquities, &c.

6. Statistics and political economy.
7. Mental and moral philosophy.
8. A survey of the political events of the world, penal reform, &c.

III. LITERATURE AND THE FINE ARTS.

9. Modern literature.
10. The fine arts, and their application to the useful arts.
11. Bibliography.
12. Obituary notices of distinguished individuals.

II. *By the publication of separate treatises on subjects of general interest.*

1. These treatises may occasionally consist of valuable memoirs translated from foreign languages, or of articles prepared under the direction of the Institution, or procured by offering premiums for the best exposition of a given subject.

2. The treatises should in all cases be submitted to a commission of competent judges previous to their publication.

3. As examples of these treatises, expositions may be obtained of the present state of the several branches of knowledge mentioned in the table of reports. Also of the following subjects, suggested by the Committee on Organization, viz: the statistics of labor, the productive arts of life, public instruction, &c.

SECTION II.

Plan of organization, in accordance with the terms of the resolutions of the Board of Regents, providing for the two modes of increasing and diffusing knowledge.

1. The act of Congress establishing the Institution contemplated the formation of a library and a museum; and the Board of Regents, including these objects in the plan of organization, resolved to divide the income into two equal parts.

2. One part to be appropriated to increase and diffuse knowledge by means of publications and researches, agreeably to the scheme before given. The other part to be appropriated to the formation of a library and a collection of objects of nature and of art.

3. These two plans are not incompatible with one another.

4. To carry out the plan before described, a library will be required, consisting—1st, of a complete collection of the transactions and proceedings of all the learned societies in the world; 2d, of the more important current periodical publications, and other works necessary in preparing the periodical reports.

5. The Institution should make special collections, particularly of objects to verify its own publications.

6. Also, a collection of instruments of research in all branches of experimental science.

7. With reference to the collection of books other than those mentioned above, catalogues of all the different libraries in the United States

should be procured, in order that the valuable books first purchased may be such as are not to be found in the United States.

8. Also, catalogues of memoirs, and of books in foreign libraries, and other materials, should be collected, for rendering the Institution a centre of bibliographical knowledge, whence the student may be directed to any work which he may require.

9. It is believed that the collections in Natural History will increase by donation as rapidly as the income of the Institution can make provision for their reception; and, therefore, it will seldom be necessary to purchase any articles of this kind.

10. Attempts should be made to procure for the Gallery of Arts casts of the most celebrated articles of ancient and modern sculpture.

11. The arts may be encouraged by providing a room, free of expense, for the exhibition of the objects of the Art Union, and other similar societies.

12. A small appropriation should annually be made for models of antiquities, such as those of the remains of ancient temples, &c.

13. For the present, or until the building is fully completed, besides the Secretary, no permanent assistant will be required, except one, to act as librarian.

14. The duty of the Secretary will be the general superintendence, with the advice of the Chancellor and other members of the establishment, of the literary and scientific operations of the Institution; to give to the Regents annually an account of all the transactions, of the memoirs which have been received for publication, and of the researches which have been made; and to edit, with the assistance of the Librarian, the publications of the Institution.

15. The duty of the Assistant Secretary, acting as Librarian, will be, for the present, to assist in taking charge of the collections; to select and purchase, under the direction of the Secretary and a committee of the Board, books and catalogues, and to procure the information before mentioned; to give information on plans of libraries, and to assist the Secretary in editing the publications of the Institution, and in the other duties of his office.

16. The Secretary and his assistants, during the session of Congress, will be required to illustrate new discoveries in sciences, and to exhibit new objects of art; also, distinguished individuals should be invited to give lectures on subjects of general interest.

17. 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.

Explanations and illustrations of the programme.

Though the leading propositions of the programme have been fully discussed by the Board, yet it will be important to offer some remarks in explanation and illustration of them in their present connexion.

That the Institution is not a national establishment, in the sense in which institutions dependent on the government for support are so, must

be evident, when it is recollected that the money was not absolutely given to the United States, but intrusted to it for a special object, namely—the establishment of an institution for the benefit of men, to bear the name of the donor, and consequently to reflect upon his memory the honor of all the good which may be accomplished by means of the bequest. The operations of the Smithsonian Institution ought, therefore, to be mingled as little as possible with those of the government, and its funds should be applied exclusively and faithfully to the increase and diffusion of knowledge among men.

That the bequest is intended for the benefit of men in general, and that its influence ought not to be restricted to a single district, or even nation, may be inferred not only from the words of the will, but also from the character of Smithson himself; and I beg leave to quote, from a scrap of paper in his own hand, the following sentiment bearing on this point: "The man of science has no country; the world is his country—all men his countrymen." The origin of the funds, the bequest of a foreigner, should also preclude the adoption of a plan which does not, in the words of Mr. Adams, "spread the benefits to be derived from the Institution not only over the whole surface of this Union, but throughout the civilized world." "Mr. Smithson's reason for fixing the seat of his Institution at Washington obviously was, that *there* is the seat of government of the United States, and *there* the Congress by whose legislation, and the Executive through whose agency, the trust committed to the honor, intelligence, and good faith of the nation, is to be fulfilled." The centre of operations being permanently fixed at Washington, the character of this city for literature and science will be the more highly exalted in proportion as the influence of the Institution is more widely diffused.

That the terms *increase* and *diffusion* of knowledge are logically distinct, and should be literally interpreted with reference to the will, must be evident when we reflect that they are used in a definite sense, and not as mere synonymes, by all who are engaged in the pursuits to which Smithson devoted his life. In England there are two classes of institutions founded on the two ideas conveyed by these terms. The Royal Society, the Astronomical, the Geological, the Statistical, the Antiquarian Societies, all have for their object the increase of knowledge; while the London Institution, the Mechanics' Institution, the Surry Institution, the Society for the Diffusion of Religious Knowledge, the Society for the Diffusion of Useful Knowledge, are all intended to diffuse or disseminate knowledge among men. In our own country, also, the same distinction is observed in the use of the terms by men of science. Our colleges, academies, and common schools, are recognised as institutions partially intended for the diffusion of knowledge; while the express object of some of our scientific societies is the promotion of the discovery of new truths.

The will makes no restriction in favor of any particular kind of knowledge; though propositions have been frequently made for devoting the funds exclusively to the promotion of certain branches of science having more immediate application to the practical arts of life, and the adoption of these propositions has been urged on the ground of the conformity of such objects to the pursuits of Smithson; but an examination

of his writings will show that he excluded from his own studies no branch of general knowledge, and that he was fully impressed with the important philosophical fact, that all subjects of human thought relate to one great system of truth. To restrict, therefore, the operations of the Institution to a single science or art, would do injustice to the character of the donor, as well as to the cause of general knowledge. If preference is to be given to any branches of research, it should be to the higher, and apparently more abstract; to the discovery of new principles, rather than of isolated facts. And this is true even in a practical point of view. Agriculture would have forever remained an empirical art, had it not been for the light shed upon it by the atomic theory of chemistry; and incomparably more is to be expected as to its future advancement from the perfection of the microscope, than from improvements in the ordinary instruments of husbandry.

The plan of increasing and diffusing knowledge, presented in the first section of the programme, will be found in strict accordance with the several propositions deduced from the will of Smithson, and given in the introduction. It embraces, as a leading feature, the design of interesting the greatest number of individuals in the operations of the Institution, and of spreading its influence as widely as possible. It forms an active organization, exciting all to make original researches who are gifted with the necessary power, and diffusing a kind of knowledge, now only accessible to the few, among all those who are willing to receive it. In this country, though many excel in the application of science to the practical arts of life, few devote themselves to the continued labor and patient thought necessary to the discovery and development of new truths. The principal cause of this want of attention to original research is the want, not of proper means, but of proper encouragement. The publication of original memoirs and periodical reports, as contemplated by the programme, will act as a powerful stimulus on the latent talent of our country, by placing in bold relief the real laborers in the field of original research, while it will afford the best materials for the use of those engaged in the diffusion of knowledge.

The advantages which will accrue from the plan of publishing the volumes of the Smithsonian Contributions to Knowledge are various. In the first place, it will serve to render the name of the founder favorably known wherever literature and science are cultivated, and to keep it in continual remembrance with each succeeding volume, as long as knowledge is valued. A single new truth, first given to the world through these volumes, will forever stamp their character as a work of reference. The Contributions will thus form the most befitting monument to perpetuate the name of one whose life was devoted to the increase of knowledge, and whose ruling passion, strong in death, prompted the noble bequest intended to facilitate the labors of others in the same pursuit.

Again: the publication of a series of volumes of original memoirs will afford to the Institution the most ready means of entering into friendly relations and correspondence with all the learned societies in the world, and of enriching its library with their current transactions and proceedings. But perhaps the most important effect of the plan will be that of giving to the world many valuable memoirs, which, on

account of the expense of the illustrations, could not be otherwise published. Every one who adds new and important truths to the existing stock of knowledge must be, of necessity, to a certain degree, in advance of his age. Hence the number of readers and purchasers of a work is often in the inverse ratio of its intrinsic value; and consequently authors of the highest rank of merit are frequently deterred from giving their productions to the world on account of the pecuniary loss to which the publication would subject them. When our lamented countryman, Bowditch, contemplated publishing his commentary on La Place, he assembled his family and informed them that the execution of this design would sacrifice one-third of his fortune, and that it was proper his heirs should be consulted on a subject which so nearly concerned them. The answer was worthy of the children of such a father: "We value," said they, "your reputation more than your money." Fortunately, in this instance, the means of making such a sacrifice existed; otherwise, one of the proudest monuments of American science could not have been given to the world. In the majority of cases, however, those who are most capable of extending human knowledge are least able to incur the expense of the publication. Wilson, the American ornithologist, states, in a letter to Michaux, that he has sacrificed everything to publish his work. "I have issued," he says, "six volumes, and am engaged on the seventh; but as yet I have not received a single cent of the proceeds." In an address on the subject of natural history, by one of our most active cultivators of this branch of knowledge, we find the following remarks, which are directly in point: "Few are acquainted with the fact that from the small number of scientific works sold, and the great expense of plates, our naturalists not only are not paid for their labors, but suffer pecuniary loss from their publications. Several works on different branches of zoology, now in the course of publication, will leave their authors losers by an aggregate of $15,000. I do not include in this estimate works already finished—one, for instance, the best contribution to the natural history of man extant, the publication of which will occasion its accomplished author a loss of several thousand dollars. A naturalist is extremely fortunate if he can dispose of 200 copies of an illustrated work, and the number of copies printed rarely exceeds 250." It may be said that these authors have their reward in the reputation which they thus purchase; but reputation should be the result of the talents and labor expended in the production of a work, and should not in the least depend upon the fact that the author is able to make a pecuniary sacrifice in giving the account of his discoveries to the public.

Besides the advantage to the author of having his memoir published in the Smithsonian Contributions free of expense, his labors will be given to the world with the stamp of approval of a commission of learned men; and his merits will be generally made known through the reports of the Institution. Though the premiums offered may be small, yet they will have considerable effect in producing original articles. Fifty or a hundred dollars awarded the author of an original paper will, in many instances, suffice to supply the books, or to pay for the materials, or the manual labor required, in prosecuting the research.

There is one proposition of the programme which has given rise to

much discussion, and which, therefore, requires particular explanation: I allude to that which excludes from the contributions all papers consisting merely of unverified speculations on subjects of physical science. The object of this proposition is to obviate the endless difficulties which would occur in rejecting papers of an unphilosophical character; and though it may in some cases exclude an interesting communication, yet the strict observance of it will be found of so much practical importance that it cannot be dispensed with. It has been supposed, from the adoption of this proposition, that we are disposed to undervalue abstract speculations: on the contrary, we know that all the advances in true science—namely, a knowledge of the laws of phenomena—are made by provisionally adopting well conditioned hypotheses, the product of the imagination, and subsequently verifying them by an appeal to experiment and observation. Every new hypothesis of scientific value must not only furnish an exact explanation of known facts, but must also enable us to predict, in kind and quantity, the phenomena which will be exhibited under any given combination of circumstances. Thus, in the case of the undulatory hypothesis of light, it was inferred, as a logical consequence, that if the supposition were true that light consisted of waves of an ethereal medium, then two rays of light, like two waves of water under certain conditions, should annihilate each other, and darkness be produced. The experiment was tried, and the anticipated result was obtained. It is this exact agreement of the deduction with the actual result of experience that constitutes the verification of an hypothesis, and which alone entitles it to the name of a theory, and to a place in the transactions of a scientific institution. It must be recollected that it is much easier to speculate than to investigate, and that very few of all the hypotheses imagined are capable of standing the test of scientific verification.

For the practical working of the plan for obtaining the character of a memoir, and the precaution taken before it is accepted for publication, I would refer to the correspondence, given in a subsequent part of this report, relative to the memoir now in process of publication by the Institution. As it is not our intention to interfere with the proceedings of other institutions, but to co-operate with them, so far as our respective operations are compatible, communications may be referred to learned societies for inspection, as in the case of the above mentioned memoir, and abstracts of them given to the world through the bulletins of these societies, while the details of the memoirs and their expensive illustrations are published in the volumes of the Smithsonian Contributions. The officers of several learned societies in this country have expressed a willingness to co-operate in this way.

Since original research is the most direct way of increasing knowledge, it can scarcely be doubted that a part of the income of the bequest should be appropriated to this purpose, provided suitable persons can be found, and their labors be directed to proper objects. The number, however, of those who are capable of discovering scientific principles, is comparatively small; like the poet, they are "born, not made;" and, like him, must be left to choose their own subject, and wait the fitting time of inspiration. In case a person of this class has fallen on a vein of discovery, and is pursuing it with success, the better

plan will be to grant him a small sum of money to carry on his investigations, provided they are considered worthy of assistance by competent judges. This will have the double effect of encouraging him in the pursuit, and of facilitating his progress. The Institution, however, need not depend upon cases of this kind, even if they were more numerous than they are, for the application of its funds in the line of original research. There are large fields of observation and experiment, the cultivation of which, though it may afford no prospect of the discovery of a principle, can hardly fail to produce results of importance both in a practical and theoretic point of view. As an illustration of this remark, I may mention the case of the investigations made a few years ago by a committee of the Franklin Institute, of Philadelphia. The Secretary of the Treasury of the United States placed at the disposal of this society a sum of money, for the purpose of making experiments with reference to the cause of the explosion of steam-boilers. A committee of the society was chosen for this purpose, which adopted the ingenious plan of writing to all persons in the United States engaged in the application of steam, and particularly to those who had observed the explosion of a steam-boiler. In this way opinions and suggestions in great variety, as to the cause of explosions, were obtained. The most plausible of these were submitted to the test of experiment; the results obtained were highly important, and are to be found favorably mentioned in every systematic work on the subject of steam which has appeared in any language, within the last few years. New and important facts were established; and, what was almost of as much consequence, errors which had usurped the place of truth were dethroned.

In the programme, examples are given of a few subjects of original research to which the attention of the Institution may be turned. I will mention one in this place, which, in connection with the contents of our first memoir, may deserve immediate attention. I allude to a small appropriation made annually for researches with reference to the remains of the ancient inhabitants of our country. This is a highly interesting field, and what is done in regard to it should be done quickly. Every year the progress of civilization is obliterating the ancient mounds; cities and villages are rising on the spots they have so long occupied undisturbed, and the distinctive marks of these remains are every year becoming less and less legible.

In carrying out the spirit of the plan adopted—namely, that of affecting men in general by the operations of the Institution—it is evident that the principal means of diffusing knowledge must be the *press*. Though lectures should be given in the city in which Smithson has seen fit to direct the establishment of his Institution, yet, as a plan of general diffusion of knowledge, the system of lectures would be entirely inadequate; every village in our extended country would have a right to demand a share of the benefit, and the income of the Institution would be insufficient to supply a thousandth part of the demand. It is also evident that the knowledge diffused should, if possible, not only embrace all branches of general interest, so that each reader might find a subject suited to his taste, but also that it should differ in kind and quality from that which can be readily obtained through the cheap publications of the day. These requisites will be fully complied with

in the publications of the series of reports proposed in the programme. A series of periodicals of this kind, posting up all the discoveries in science from time to time, and giving a well digested account of all the important changes in the different branches of knowledge, is a desideratum in the English language. The idea is borrowed from a partial plan of this kind in operation in Sweden and Germany; and for an example of what the work should be, I would refer to the annual report to the Swedish Academy of its perpetual secretary, Berzelius, on physical science. The reports can be so prepared as to be highly interesting to the general reader, and at the same time of great importance to the exclusive cultivator of a particular branch of knowledge. Full references should be given, in foot-notes, to the page, number, or volume of the work from which the information was obtained, and where a more detailed account can be found. It is scarcely necessary to remark, that the preparation of these reports should be entrusted only to persons pofoundly acquainted with the subjects to which they relate, namely: to those who are devoted to particular branches, while they possess a knowledge of general principles. Sufficient explanations should be introduced to render the report intelligible to the general reader, without destroying its scientific character. Occasionally reports may be obtained from abroad—as, for example, accounts of the progress of certain branches of knowledge in foreign countries; and these may be translated, if necessary, and incorporated into other reports by some competent person in this country.

Besides the reports on the progress of knowledge, the programme proposes to publish occasionally brief treatises on particular subjects. There are always subjects of general interest, of which brief expositions would be of much value. The preparation of these, however, should be entrusted to none but persons of character and reputation, and should be subjected to a revision by competent and responsible judges before they are given to the public. They may be presented in the form of reports on the existing state of knowledge relative to a given subject, and may sometimes consist of memoirs and expositions of particular branches of literature and science, translated from foreign languages. The reports and treatises of the Institution, sold at a price barely sufficient to pay the expense of printing, will find their way into every school in our country, and will be used not as first lessons for the pupil, but as sources of reliable information for the teacher.

The second section of the programme gives, so far as they have been made out, the details of the part of the plan of organization directed by the act of Congress establishing the Institution. The two plans, namely, that of publication and original research, and that of collections of objects of nature and art, are not incompatible, and may be carried on harmoniously with each other. The only effect which they will have on one another is that of limiting the operation of each, on account of the funds given to the other. Still, with a judicious application and an economical expenditure of the income, and particularly by rigidly observing the plan of finance suggested by Dr. Bache, in the construction of the building, much good may be effected in each of the two branches of the Institution. To carry on the operations of the first, a working library will be required, consisting of the past volumes of the transactions and proceedings of all the learned societies in every language. These

are the original sources from which the most important principles of the positive knowledge of our day have been drawn. We shall also require a collection of the most important current literature and science for the use of the collaborators of the reports; most of these, however, will be procured in exchange for the publications of the Institution, and, therefore, will draw but little from the library fund. For other suggestions relative to the details of the library, I would refer you to the annexed communication from Professor Jewett, Assistant Secretary, acting as librarian.

The collections of the Institution, as far as possible, should consist of such articles as are not elsewhere to be found in this country, so that the visitors at Washington may see new objects, and the spirit of the plan be kept up, of interesting the greatest possible number of individuals. A perfect collection of all objects of nature and of art, if such could be obtained and deposited in one place, would form a museum of the highest interest; but the portion of the income of the bequest which can be devoted to the increase and maintenance of the museum will be too small to warrant any attempt towards an indiscriminate collection. It is hoped 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. For the present, it should be the object of the Institution to confine the application of the funds, first, to such collections as will tend to facilitate the study of the memoirs which may be published in the Contributions, and to establish their correctness; secondly, to the purchase of such objects as are not generally known in this country, in the way of art, and the illustration of antiquities, such as models of buildings, &c.; and, thirdly, to the formation of a collection of instruments of physical research, which will be required both in the illustration of new physical truths and in the scientific investigations undertaken by the Institution.

Much popular interest may be awakened in favor of the Institution at Washington, by throwing the rooms of the building open on stated evenings during the session of Congress, for literary and scientific assemblies, after the manner of the weekly meetings of the Royal Institution in London. At these meetings, without the formality of a regular lecture, new truths in science may be illustrated, and new objects of art exhibited. Besides these, courses of lectures may be given on particular subjects by the officers of the Institution, or by distinguished individuals invited for the purpose.

Commencement of the operations of the Institution.

I was authorized, in connexion with the Committee on Organization, to commence the publication of the Smithsonian Contributions to Knowledge, and to receive any memoir which might be presented on any subject, provided it was found, on examination, to furnish an interesting addition to the sum of human knowledge, resting on original research. The first memoir presented, and found to be of the character prescribed by the resolution of the Board, was one on the remains of the ancient inhabitants of the North American continent. It contains

the result of several years' labor in the survey and exploration of the mounds and earthworks of the Mississippi valley, and will furnish a highly interesting addition to the antiquities of our country, which could not have been given to the world but for the timely aid extended to it by this Institution. The memoir was referred to the American Ethnological Society, with a request that a committee of its members might be appointed to examine and report on its character, as to fitness for publication in the Smithsonian Contributions to Knowledge. On the favorable report of this committee, and on the responsibility of the society, the memoir has been accepted for publication. The following correspondence will serve to give an account of the work, and to illustrate the manner in which it is proposed to submit the papers which may be presented for publication to a commission of competent judges.

CORRESPONDENCE RELATIVE TO THE ACCEPTANCE FOR PUBLICATION OF THE ETHNOLOGICAL MEMOIR OF MESSRS. SQUIER AND DAVIS.

From Messrs. Squier and Davis to the Secretary of the Smithsonian Institution.

CHILLICOTHE, OHIO, *May* 15, 1847.

DEAR SIR: It is proposed in the recognised plan of organization of the Smithsonian Institution, of which you are the executive officer, to publish, under the title of "*Smithsonian Contributions to Knowledge*," such original papers and memoirs "as shall constitute valuable additions to the sum of human knowledge." Under the belief that it falls legitimately within the scope of the above plan, the undersigned herewith submit for acceptance and publication, subject to the prescribed rules of the Institution, a MS. memoir, entitled "ANCIENT MONUMENTS OF THE MISSISSIPPI VALLEY, *comprising the results of Extensive Original Surveys and Explorations:* by E. G. Squier and E. H. Davis." The extent of these investigations, and their general character, are sufficiently indicated in the prefatory remarks to the volume.

With high consideration, we are truly yours,

E. GEO. SQUIER,
E. H. DAVIS.

JOSEPH HENRY, Esq.,
Secretary Smithsonian Institution.

From the Secretary of the Smithsonian Institution to the President of the American Ethnological Society.

WASHINGTON, *June* 2, 1847.

DEAR SIR: I am authorized by the Regents of the Smithsonian Institution to publish, in the numbers of the "*Smithsonian Contributions to Knowledge*," any memoir which may be presented for this purpose, provided that, on careful examination by a commission of competent

judges, the memoir shall be found to furnish a new and interesting addition to knowledge, resting on original research. The accompanying memoir, entitled "*Ancient Monuments of the Mississippi Valley*," &c., having been presented for publication, I beg leave to refer the same, through you, to the American Ethnological Society, with a request that a committee of the members may be appointed to examine and report on its character, in reference to the particulars above mentioned. If the report of the committee is favorable, the memoir will be accepted for publication; full confidence being placed in the ability of the committee to judge of the character of the article, and in their caution in making up their opinion.

I have the honor to be, very respectfully, your obedient servant,

JOSEPH HENRY,
Secretary Smithsonian Institution.

Hon. ALBERT GALLATIN,
President American Ethnological Society.

Extracts of a letter from the President of the American Ethnological Society to the Secretary of the Smithsonian Institution.

NEW YORK, *June* 12, 1847.

"DEAR SIR: I have the honor to enclose a copy of the proceedings and resolutions of the New York Ethnological Society upon the MS. work on American antiquities, by Messrs. E. G. Squier and E. H. Davis, submitted with your letter of the 2d instant.

"I approve entirely of the resolutions and recommendations of the society.

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"Whatever may be the intrinsic value of the remains of former times which are found in the United States, it is necessary that they should at least be correctly described, and that existing gross errors should be corrected; and I repeat my conviction that, though ardent, Messrs. Squier and Davis are animated by that thorough love of truth which renders their researches worthy of entire confidence.

* * * * * * * * * * *

"I have the honor to be, &c.,

"ALBERT GALLATIN.

"Prof. J. HENRY,
"*Secretary of Smithsonian Institution.*"

At a regular meeting of the American Ethnological Society, held at the house of the Hon. Albert Gallatin, on the evening of the 4th of June, the president laid before the members a communication from Professor J. Henry, Secretary of the Smithsonian Institution, transmitting, for the examination and opinion of the society, a MS. work on the Ancient Aboriginal Monuments of the United States. On motion, the letter and accompanying MS. were referred to a committee consist-

ing of Edward Robinson, D. D., John R. Bartlett, Professor W. W. Turner, Samuel G. Morton, M. D., and Hon. George P. Marsh, to report upon the same. At a subsequent meeting of the society, this committee submitted the following report and resolutions, which were unanimously accepted and adopted:

REPORT.

The committee of the American Ethnological Society, to which was referred the communication of the Secretary of the Smithsonian Institution, transmitting a manuscript work, entitled "ANCIENT MONUMENTS OF THE MISSISSIPPI VALLEY, *comprising the results of Extensive Original Surveys and Explorations*," by E. G. Squier and E. H. Davis, beg leave to report:

That they have examined the work in question, and regard it not only as a new and interesting, but as an eminently valuable addition to our stock of knowledge on a subject little understood, but in which is felt a deep and constantly increasing interest, both in our country and abroad. In their judgment, the work is worthy of the subject, and highly creditable to the authors. Its chief features are, a scientific arrangement, simplicity, and directness of statement, and legitimate deduction from facts, while there is no attempt at mere speculation or theory. If published, it will be an enduring monument to connect the names of the investigators in honorable and lasting remembrance with the great subject of American Archæology.

The existence and progress of these investigations were made known to the society by correspondence early in the year 1846; and in June of that year specimens of the relics recovered, accompanied by numerous maps and plans of ancient earthworks and sectional views of the mounds from which the remains were taken, were laid before the society by Mr. Squier in person. These excited deep interest and surprise in all who saw them; and the society immediately took measures to encourage further investigation, and secure the publication, under its own auspices, of the important results already obtained. A few months later, the chairman of the present committee, being in Ohio, was enabled, through the kindness of Messrs. Squier and Davis, to visit several of the more important monuments in the immediate vicinity of Chillicothe, and, among these, "Mound City," so-called, from which very many of the minor relics and specimens were procured. He was struck with the accuracy of the plans and drawings, as well as of the accounts which had been laid before the society, and bears full testimony to the fidelity and integrity with which the process of investigation and delineation has been conducted.

During the last and present season the researches of these gentlemen have been actively prosecuted and widely extended, and the above work, largely illustrated, comprising the results, has been prepared. These results are so numerous and important, and consequently such is the extent and magnitude of the work itself, as to put its publication beyond any means which the society can command. Under these circumstances, your committee learn with pleasure that preliminary arrangements have been made for its publication by the Smithsonian

Institution among its "contributions to knowledge." It can only be a matter of sincere gratification to this society to see that which it cannot itself accomplish for the history and antiquities of our country taken up and carried out under such favorable auspices; and they cannot but rejoice that an opportunity is thus afforded to that noble Institution of opening its high career by fostering scientific researches into the interesting problems connected with the ante-Columbian history and aboriginal monuments of our own country.

In view of these facts, your committee would recommend the adoption of the following resolutions by the society:

Resolved, That this society regard the researches of Messrs. Squier and Davis as of very great importance in American Archæology, and as casting much light upon our aboriginal antiquities, especially upon the character and habits of the earliest races which had their seat in the Mississippi valley.

Resolved, That we regard the work prepared upon this subject as one of great general interest, and as worthy to be adopted for publication by the Smithsonian Institution, both as resting on original researches, and as affording remarkable illustrations of the history of the American continent.

Your committee would also append to this report the accompanying letters from Samuel G. Morton, M. D., of Philadelphia, and Hon. George P. Marsh, of Vermont, both members of this society, and joint members of this committee.

All of which is respectfully submitted.

EDWARD ROBINSON,
JOHN R. BARTLETT,
W. W. TURNER,
Committee.

NEW YORK, *June*, 1847.

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NEW YORK, *June* 9, 1847.

I have examined with much interest and attention the manuscripts, drawings, and ancient relics in the possession of Mr. E. G. Squier, and am happy to say that my previous impressions concerning the value of the researches of that gentleman and his associate are fully confirmed. It is fortunate for the cause of American Archæology that the first systematic attempt at its elucidation should have been conceived and executed in so truly philosophical a spirit; and rich as this age already is in antiquarian lore, it has, I think, received few more important contributions than that which the enlightened and generous zeal of these two private gentlemen is about to confer upon it. The Smithsonian collections could not begin with a more appropriate or creditable essay; and I hope that every facility may be afforded to the authors in bringing before the public the results of their honorable labors in as suitable a form and with as little delay as possible.

GEO. P. MARSH.

PHILADELPHIA, *June* 8, 1847.

As a member of the committee of the American Ethnological Society, appointed to report on the memoir on American Archæology, by Messrs. E. G. Squier and E. H. Davis, I have great pleasure in saying, that after a careful and repeated inspection of the materials in the hands of those gentlemen, I am convinced they constitute by far the most important contribution to the Archæology of the United States that has ever been offered to the public. The number and accuracy of their plans, sketches, &c., have both interested and surprised me, and it is gratifying to learn that the preliminary arrangements have been made for their publication under the honorable auspices of the Smithsonian Institution.

SAML. GEORGE MORTON.

The memoirs of Messrs. Squier and Davis will occupy the greater portion, if not the whole, of the first volume of the Contributions. The illustrations will consist of fifty-five quarto plates of the mounds, earthworks, and maps of the adjacent country; also, of about two hundred wood-cuts, principally delineations of the various articles found in the mounds. Those who consider no branch of knowledge of any value but such as relates to the immediate gratification of our physical wants, have objected to the acceptance of this memoir as one of the first publications of the Institution; but it must be recollected that the will of Smithson makes no restriction in favor of any particular kind of knowledge, and that each branch is, therefore, entitled to a share of his bequest. The ethnological memoir of Messrs. Squier and Davis was the first, of the proper character, presented for publication, and hence it was entitled to the first place in the series of Smithsonian Contributions. Besides this, it furnishes an addition to a branch of knowledge which is at this time occupying the attention of a large class of minds, and which cannot fail to be interesting to every intelligent person who would learn something of the changes to which man has been subjected.

It is proposed to insert in one of the volumes of the Contributions a sketch of the life of Smithson. The materials for this have been collected from the several volumes of the Transactions of the Royal Society, and the scientific journals of the beginning of the present and the latter part of the last century. The first volume will be published as soon as the wood-cuts and plates, now in the course of preparation, are finished.

Besides the memoirs before mentioned, a number of others have been presented, some of which, though apparently of interest, and the product of thought and labor, were not of the character required by the resolution of the Board, and these have either been returned to their authors, or are in the possession of the Secretary. A number of others have also been provisionally adopted, or are in the course of preparation. Some of these are on the most abstruse parts of physical science, and all will do honor to the intellectual character of our country. Though the number of original memoirs which will be found worthy of a place in the Contributions will probably not be large, yet it will, perhaps, be best to set

apart a definite portion of the income of the bequest—as, for example, at present three or four thousand dollars annually—to defray the expense of this part of the plan of increasing knowledge. A considerable portion, however, of the sum thus expended will be returned to the Institution in the form of additions to its library. I may also suggest, in this place, the propriety of the adoption by the Board of a resolution inviting all engaged in original research to send the results of their labors for publication in the Smithsonian Contributions.

The Board also directed me to commence the collection of apparatus; and I accordingly sent orders to Europe, to the amount of twelve hundred dollars, for the purchase of such articles as could not be procured in the United States. Most of the instruments have been received, and will be found of importance not only in the way of original research, but also in illustrating some of the most interesting and recent phenomena of physical science, as well as serving as samples for imitation to the artists of this country. It was thought that these articles would be admitted free of duty, and a petition to this effect was presented to the Secretary of the Treasury; but—though this officer is well known to be much interested in the prosperity of the Institution—such is the nature of the law that the duty could not be remitted.

There is an article of apparatus which, within a few years past, has opened almost a new world of research in the phenomena of life and organization, the use of which is now indispensable in advancing our knowledge of physiology and its kindred branches of science. I allude to the achromatic microscope, to increase the power of which the artists of Germany, France, and England, have vied with each other. On account of the small number of persons who are capable of constructing the proper lenses, the best specimens of this instrument are very scarce in this country, and can be procured only at a great expense. Under these circumstances, it was a matter of much interest to learn, from a source which could be relied on, that an individual in the interior of the State of New York had successfully devoted himself to the study of the microscope, and that he was able to produce instruments of this kind which would compete with the best of those constructed in Europe. In order to do justice to the talents and labors of this person, as well as to furnish the Institution with a valuable instrument of research, I requested him to construct a microscope, to be paid for out of the funds for the purchase of apparatus, provided that a commission, appointed by myself, should find it capable of producing certain effects. This proposition was accepted, and the result will probably be given to the Board at the next meeting.

Preparations have also been made for instituting various lines of physical research. Among the subjects mentioned by way of example in the programme for the application of the funds of the Institution is terrestrial magnetism. I need scarcely say that this is a subject of high interest not only in a theoretical point of view, but also in its direct reference to navigation and the various geodetical operations of civil and military life. A resolution of Congress authorizing the exploration of the mineral lands adjacent to the great lakes has given to us the means of advancing this branch of knowledge with but little expenditure of the funds of the Institution. The Secretary of the Treasury readily agreed

to the proposition that there should be added to the mineralogical and geological surveys of these regions, determinations of the dip, the variation, and the intensity of the magnetic forces, provided that the Smithsonian Institution would furnish one set of the instruments, and take charge of the direction of the observations, and of reducing and publishing them. In the survey of the mineral lands in the vicinity of Lake Michigan, under Dr. Jackson, Dr. Locke, of Cincinnati, has been employed with his own apparatus; and, to make provision for the survey in Wisconsin, preliminary steps have been taken to procure other instruments from London.

Another subject of research mentioned in the programme, and which has been urged upon the immediate attention of the Institution, is that of an extensive system of meteorological observations, particularly with reference to the phenomena of American storms. Of late years, in our country, more additions have been made to meteorology than to any other branch of physical science. Several important generalizations have been arrived at, and definite theories proposed, which now enable us to direct our attention, with scientific precision, to such points of observation as cannot fail to reward us with new and interesting results. It is proposed to organize a system of observations which shall extend as far as possible over the North American continent; and in order to do this, it will be necessary to engage the co-operation of the British government. I have accordingly addressed a letter to Lieutenant Colonel Sabine, Corresponding Secretary of the Royal Society, who assures me that, as soon as the plan is fully matured for this country, there will be no difficulty in establishing a system of corresponding observations in the British provinces. I have also addressed letters to several gentlemen distinguished for their attainments in meteorology, asking for suggestions as to the plan of observation; and I beg leave to refer the Board to the accompanying report of Professor Loomis, of New York University, and also to the communication of Professor Espy, received in answer. The former contains an exposition of the advantages which may be derived from the study of meteorology, and what has been done in this branch of science in this country, and what encouragement there is for the further prosecution of the same subject, together with a general plan of operations. The present time appears to be peculiarly auspicious for commencing an enterprise of the proposed kind. The citizens of the United States are now scattered over every part of the southern and western portion of North America, and 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.

All which is respectfully submitted.

JOSEPH HENRY, *Secretary.*

To the REGENTS *of the Smithsonian Institution.*

REPORT

OF THE

COMMITTEE OF THE AMERICAN ACADEMY OF ARTS AND SCIENCES

APPOINTED TO

CONSIDER THE PLAN PROPOSED FOR THE ORGANIZATION OF THE SMITHSONIAN INSTITUTION.

SUBMITTED TO THE ACADEMY, DECEMBER 7, 1847.

The Committee of the American Academy of Arts and Sciences, to whom was referred a letter of Professor Henry, of the 30th September, together with the *programme* of the organization of the Smithsonian Institution accompanying the said letter, have had the same under consideration, and beg leave to submit the following report:

Professor Henry is understood to be desirous of ascertaining the opinions of the scientific bodies of the country on the subject of the proposed organization of the Smithsonian Institution; and the free expression of their views is invited by him.

The interesting nature and high importance of this foundation, and the novel and peculiar circumstances attending its establishment, make it highly expedient, in the opinion of the committee, that every step taken in its organization should be deliberately considered. They think it no more than just to express their satisfaction, that the control of the infant establishment has been placed in the hands of a Board of Regents of the highest intelligence, respectability, and weight of character; and in the wise selection made of the officers on whom the active executive duties of the Institution will devolve, the committee perceive a satisfactory pledge as far as they are concerned.

Professor Henry's *programme* commences with "General considerations which should serve as a guide in adopting the plan of organization." He points out the nature of the bequest as made to the United States for the purpose of founding at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men. The bequest is accordingly for the benefit of mankind. The government of the United States is but a trustee to carry out this noble design. Even the people of the United States are interested only so far as they constitute one of the great families of the human race.

The objects of the Institution are twofold: first, the increase; and second, the diffusion of knowledge; objects which, although frequently in a vague way confounded with each other, (inasmuch as it often happens that knowledge is diffused by the same acts which increase it,) are nevertheless logically distinct, and require to be separately regarded. No particular kind of knowledge is specified by the founder as entitled

to preference; all branches are entitled to a share of attention; and the order and degree in which they are cultivated must be decided by a wise regard to means and circumstances. Knowledge may be increased by various modes of encouraging and facilitating the discovery of new truths; it is diffused chiefly, though not exclusively, through the instrumentality of the press. The organization should be such as to produce results not within the province of the existing institutions of the country. It was, for instance, evidently not the design of the liberal founder to establish a collegiate institution or a place of education, nor would it be wise to appropriate his bequest for such an object, already sufficiently attained by the ordinary resources of public and private liberality. Considering the novelty of the undertaking, it would be manifestly unwise to stake too much on the success of the first efforts. The organization should be such as to admit of changes and modifications under the light of experience. As several years have elapsed since the fund came into the possession of the United States, it seems no more than equitable that a considerable portion of the accruing interest should be added to the principal, to make up for the loss of time. The committee consider this suggestion as perfectly reasonable, and trust it will receive the favorable consideration of Congress. Liberal as is the original bequest, the sum is but small compared with the great objects to be accomplished. This consideration suggests the absolute necessity of economy in any outlay on buildings and fixtures; in reference to which a prudent regard must be had, not merely to the first cost, but to the future expenses of repairs, and the support of the establishment. Great care must be taken not to multiply the number of persons to be permanently supported by the Institution. A clear and settled idea of its organization and mode of operation must precede the adoption of a plan of building; lest after the completion of a costly edifice it should be found nearly or quite useless, or worse than useless, by forcing a character upon the Institution which would not otherwise have been given it. All view to mere local ornament or advantage should be discarded at the outset, in the management of a trust created for the benefit of mankind.

Such, very slightly expanded in a few of the propositions, are the general considerations proposed by Professor Henry as guides in adopting a plan of organization. They command the entire assent of the committee, and none of them more so than those which refer to the necessity of strict economy in the expenditure of the fund on a building, and the exclusion of undue regard to local ornament. It would not be difficult to point to a memorable instance in which the most munificent bequest ever made for the purposes of education has been rendered comparatively unavailing, in a sister city of the Union, by the total disregard of these wise principles. It is an additional reason for observing them, that the attempt to erect a highly imposing building for local ornament will not only crush in the bud all hope of fulfilling the ulterior objects of the bequest, but will be almost sure to fail of a satisfactory result, as far as the edifice itself is concerned.

The Secretary's plan of organization in reference to the increase of knowledge is so accurately digested and so thoroughly condensed, that the committee think it would be best to quote his own words:

"To INCREASE KNOWLEDGE, it is proposed—

"1st. To stimulate men of talent to make original researches, by offering suitable rewards for memoirs containing new truths; and,

"2d. To appropriate annually a portion of the income for particular researches under the direction of suitable persons."

These methods of *increasing knowledge* are further unfolded in the following "detail of the plan" for that purpose:

"I. *By stimulating researches.*

"1st. Rewards, consisting of money, medals, &c., offered for original memoirs on all branches of knowledge.

"2d. The memoirs thus obtained to be published in a series of volumes in a quarto form, and entitled 'Smithsonian Contributions to Knowledge.'

"3d. No memoir on subjects of physical science to be accepted for publication which does not furnish a positive addition to human knowledge; and all unverified speculation to be rejected.

"4th. Each memoir presented to the Institution to be submitted for examination to a committee of persons of reputation for learning in the branch to which the memoir pertains, and to be accepted for publication only in case the report is favorable.

"5th. The commission to be chosen by the officers of the Institution, and the name of the author, as far as practicable, concealed until a favorable decision shall have been made.

"6th. The volumes of the memoirs to be exchanged for the transactions of all literary and scientific societies, and copies to be given to all the colleges and principal libraries in this country. One part of the remaining copies may be offered for sale, and the other carefully preserved to form complete sets of the work to supply the demand from new institutions.

"7th. An abstract or popular account of the contents of these memoirs should be given to the public through the annual report of the Regents to Congress.

"II. *By appropriating a portion of the income annually to special objects of research, under the direction of suitable persons.*

"1st. The objects and the amounts appropriated to be recommended by counsellors of the Institution.

"2d. Appropriation in different years to different objects, so that in course of time each branch of knowledge may receive a share.

"3d. The results obtained from these appropriations to be published with the memoirs before mentioned, in the volumes of the Smithsonian Contributions to knowledge.

"4th. Examples of objects for which appropriations may be made:

"(1.) System of extended meteorological observations, for solving the problem of American storms.

"(2.) Geological, magnetical, and topographical surveys, to collect materials for a physical atlas of the United States.

"(3.) Solution of experimental problems, such as weighing the earth, new determination of the velocity of electricity and light, chemical analyses of soils and plants, collection and publication of articles of science accumulated in the offices of the government.

"(4.) Institution of statistical inquiries, with reference to physical, moral, and political subjects.

"(5.) Historical researches and accurate surveys of places celebrated in history.

"(6.) Ethnological researches, particularly with reference to the present races of men in North America; also, explorations and accurate surveys of the mounds and other remains of the ancient people of our country."

The committee have made this long extract from Professor Henry's *programme* in order to give to the Academy an adequate idea of the proposed plan, as far as it refers to the first branch, or the *increase of knowledge*. It has, in some of its features, been already adopted. It is already announced that one voluminous memoir, copiously illustrated by engravings, is already on its passage through the press, under the auspices of the Smithsonian Institution. The committee refer to an elaborate memoir, by Messrs. Squier and Davis, on the aboriginal mounds discovered in large numbers in various parts of the United States, and especially in the region northwest of the Ohio. This memoir was accepted on the favorable report of the Ethnological Society of New York, to which it had been referred by the Secretary of the Institution, and in whose Transactions an abridgment of it has appeared. It is also understood that a memoir on one of the most interesting subjects which engages the attention of geometers and mathematicians at the present moment, viz: the planet Neptune, has been invited by the Secretary from one of our own members.

While the committee would deprecate all attempts unduly to stimulate the increase of knowledge as sure to prove abortive, and to result at best in the publication of crude investigations, they believe it quite possible to remove some of the obstructions to its progress. Narrow circumstances are too apt to be the lot of genius when devoted to scientific pursuits; and the necessity of providing for personal and domestic wants too often absorbs the time and faculties of those who might, if relieved from cares of this kind, have adorned their age and benefited mankind. To such men a moderate pecuniary advantage derived from a successful investigation, might be of vast importance. The efficacy of market upon production is not limited to the creations of physical labor. It is seen in the history of science and literature of every age and country. Invention in the mechanical arts and skill in practical science are well paid in this country, and how great is the harvest! The extraordinary effect even of an honorary inducement is seen in the case of the medal offered by the King of Denmark for the discovery of Telescopic Comets. On these principles it may be hoped that by offering a moderate pecuniary compensation for researches of real merit, valuable contributions to knowledge will be produced; while their publication will tend directly to the diffusion of knowledge.

An encouragement somewhat similar towards the promotion of the increase of knowledge would be afforded by another part of the proposed operations—that of providing the requisite apparatus and implements, and especially books, to be placed in the hands of those engaged in particular lines of investigation. In this way it is not unlikely that a considerable amount of talent may be rendered effective, which at

present is condemned to inactivity from local position unfavorable to scientific research.

It is not the purpose of the committee to engage in minute criticism of the details of the *programme;* but it may not be out of place to suggest a doubt of the practicability or expediency of carrying into rigid execution "the rejection of all unverified speculations," as proposed in the third paragraph of the first section above cited; while it is obviously advisable to discountenance all theoretical speculations not directly built upon observation, it might be too much to exact, in all cases, that these speculations should have been actually verified. No small portion of modern geology is an ingenious structure of speculative generalizations. The undulatory theory of light can hardly claim any other character. The nebular theory, though proposed and illustrated by the highest astronomical talent of the past and present generation, is rapidly sinking from the domain of accredited speculations. It may be doubted even whether M. Le Verrier's brilliant memoirs on the perturbations of Uranus would not, as published before the discovery of Neptune, have fallen within this principle of rejection rigorously applied. Upon the whole, the committee think very favorably of all parts of the plan for increasing knowledge, and feel no doubt that it would afford important encouragement to scientific pursuits. To suppose that it will create an era in science, or throw into the shade the ordinary educational and intellectual influences at work in the country, would be extravagant. It is enough, and all that can be expected, if it be a rational plan for appropriating moderate means towards the attainment of a desirable end.

To fulfil the other object of the trust, viz: to "diffuse knowledge," the Secretary proposes to publish "A Series of Reports, giving an account of the new discoveries in science, and of the changes made from year to year in all branches of knowledge not strictly professional." These reports are to be prepared by collaborators, most eminent in their several departments, who are to receive a compensation for their labors; the collaborators to be furnished with all the journals and other publications necessary to the preparation of their reports.

The following enumeration of the proposed subjects of these reports will afford the Academy a full conception of this part of the plan.

I. *Physical class.*

1. Physics, including Astronomy, Natural Philosophy, Chemistry, and Meteorology.
2. Natural History, including Botany, Zoology, and Geology.
3. Agriculture.
4. Application of Science to Art.

II. *Moral and Political class.*

5. Ethnology, including particular History, comparative Philology, Antiquities, &c.
6. Statistics and Political Economy.
7. Mental and Moral Philosophy.
8. A Survey of the Political Events of the World, Penal Reform, &c.

III. *Literature and the Fine Arts.*

9. Modern Literature.
10. The Fine Arts, and their application to the Useful Arts.
11. Bibliography.
12. Obituary notices of distinguished individuals.

Another branch of the plan for the diffusion of knowledge contemplates the offer of premiums for the best essays on given subjects.

The publications of the Institution, of whatever form, are proposed to be presented to all the colleges, and to the principal libraries and scientific institutions throughout the country, and to be exchanged for the transactions of all scientific and literary societies throughout the world; thus laying the foundation of a valuable library. An adequate number are to be preserved to supply the future demand of new institutions, and the remainder are to be placed on sale at a price so low as to render them generally accessible.

For carrying out the plan thus sketched for increasing and diffusing knowledge, the Regents propose to appropriate one half of the income of their fund. The remainder is to be expended in the formation and maintenance of *a library, a collection of instruments of research in all branches of experimental science, and a museum.*

This partition of the income of the fund is stated to be "a compromise between the two modes of increasing and diffusing knowledge."

A library is one of the objects contemplated in the act of Congress establishing the Board for the management of the trust. It is requisite for carrying out the plan above proposed. At the same time, it will be observed that the distribution, by exchange, of the publications, which that scheme of operations will call into existence, will rapidly provide the Institution, without further expense, with the class of works, often of a costly character, which are most directly important as the means of advancing and diffusing positive knowledge. It is accordingly in these that the Secretary proposes to lay the foundations of the library, forming, 1. A complete collection of the transactions and proceedings of all the learned societies in the world; and, 2. A similar collection of all the current periodical publications, and other works necessary in preparing the contemplated periodical reports.

In the next place, it is proposed to procure by preference those books which are not found in the other public libraries of the United States; regarding the want of them as one of more urgency to be supplied than that of a symmetrical and proportionate collection of books in all the departments of science. Such a library as the plan proposes may be fairly regarded as an important instrument for the increase and diffusion of knowledge.

The collection of scientific apparatus and instruments of research is no less needful in the furtherance of the above mentioned plan, which, as it proposes to aid individuals in the prosecution of important researches, may often do so most effectually by the loan of the instruments required for a particular investigation. They will also be needed, especially at Washington, for carrying out, under the most advantageous circumstances, the various experimental investigations in Physics al-

ready pursued by the Secretary with such credit to himself, and such honor to the scientific character of the country.

The Smithsonian Institution is also to be entrusted with the conservation of a National Museum, Congress having, by a clause in the Act of Incorporation, devolved upon it the charge of the immense collections belonging to the public, of which those brought home by Captain Wilkes from the Exploring Expedition form the greater portion, but which are daily increasing from many other sources. These collections, when a proper and convenient place shall have been prepared for their reception and preservation, are likely to accumulate with still greater rapidity in time to come.

While there is an obvious propriety and convenience in thus entrusting the care of the public collections to the officers of the Smithsonian Institution, it will not, the Committee trust, be forgotten by Congress that the income of the Smithsonian bequest—moderate at best, and consecrated to an object distinct as it is elevated—ought not to be burdened with the cost of constructing an edifice for the reception and exhibition of the public collections, or of their preservation and care. These objects would alone absorb a considerable portion of the fund. If drawn upon to carry them into effect, its efficiency for any other purpose will be seriously diminished, if not altogether destroyed.

The plan also contemplates a museum of the fine arts as well as a scientific apparatus. It proposes to procure "casts of the most celebrated articles of ancient and modern sculpture" and "models of antiquities." While it is undoubtedly true that a gallery of this description would find an appropriate place in an establishment devoted to the increase and diffusion of knowledge in its broadest sense, the Committee cannot but hope that the *immediate* execution of this part of the plan will not be attempted; but that it will be deferred till other objects of more decided utility have been provided for, and until a surplus of unappropriated funds shall have accrued.

The Academy will perceive that the most novel and important feature of the plan is that which proposes to insure the publication of memoirs and treatises on important subjects of investigation, and to offer pecuniary encouragement to men of talent and attainment to engage in scientific research. It is believed that no institution in the country effects either of these objects to any great extent. The nearest approach to it is the practice of the Academy, and other Philosophical Societies, of publishing the memoirs accepted by them. These, however, can rarely be works of great compass. No systematic plan of compensation for the preparation of works of scientific research is known by the Committee to have been attempted in this or any other country. It can scarcely be doubted that an important impulse would be given by the Institution, in this way, to the cultivation of scientific pursuits: while the extensive and widely ramified system of distribution and exchange by which the publications are to be distributed throughout the United States and the world, would secure them a circulation which works of science could scarcely attain in any other way.

It is an obvious characteristic of this mode of applying the funds of the Institution, that its influence would operate most widely throughout

the country; that locality would be of comparatively little importance as far as this influence is concerned; and that the Union would become, so to say, in this respect, a great school of mutual instruction.

The Committee would remark, in conclusion, that in a plan of operations of this kind, very much depends upon the activity and intelligence with which it is administered. The characters of the Board of Regents are a sufficient warrant for the prudence and good judgment which will watch over the general interests of the foundation; while the reputation of the Secretary and his assistant, the librarian, is so well established in their respective departments, as to render any tribute from the Committee entirely superfluous.

All which is respectfully submitted by the Committee.

EDWARD EVERETT,
JARED SPARKS,
BENJAMIN PIERCE,
HENRY W. LONGFELLOW,
ASA GRAY.

DECEMBER 4, 1847.

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Read at a meeting of the Academy held December 7, 1847, and accepted.

Ordered to be communicated to the Secretary of the Smithsonian Institution.

O. W. HOLMES,
Recording Secretary.

SECOND ANNUAL REPORT

Of the Secretary of the Smithsonian Institution, giving an account of the operations of the year 1848. *Presented December* 13, 1849.

GENTLEMEN: By a resolution of the Board of Regents, at their last annual meeting, I was charged with the execution of the details of the programme which had been provisionally adopted, and was directed to report annually to the Board the progress made in the execution of the duty assigned to me. In accordance with this resolution, I present the following statement of the operations of the past year.

The programme of the plan of organization of the Institution has been submitted to a number of literary and scientific societies, and in every case has received their unqualified approbation. The principal officers of these societies have expressed a willingness to co-operate with the Smithsonian Institution in carrying out the plans which have been adopted, and it is confidently believed, that as soon as these are fully developed and brought into practical operation, they will meet with general approval.

It was recommended in my last report that the details of the plan should be adopted provisionally, and should be carried into operation gradually and cautiously, with such changes, from time to time, as experience might dictate. The Institution is not one of a day, but is designed to endure as long as our government shall exist; and it is therefore peculiarly important that in the beginning we should proceed carefully and not attempt to produce immediate effects at the expense of permanent usefulness. The process of increasing knowledge is an extremely slow one, and the value of the results of this part of the plan cannot be properly realized until some years have elapsed. Independently of these considerations, the financial arrangements adopted by the Board of Regents are such as to prevent the full operation of the Institution until after three years from next March; up to that time more than one half of the income is to be devoted to the erection of the building, and indirectly to the increase of the permanent fund.

It will be recollected that the programme embraces—

1st. The plan of publishing original memoirs on all branches of knowledge, in a series of quarto volumes.

2d. The institution of original researches under the direction of competent persons.

3d. The publication of a series of reports from year to year, giving an account of the progress of the different branches of knowledge.

4th. The formation of a library and a museum of objects of nature and art.

Publication of original memoirs.

The first volume of the Smithsonian Contributions to Knowledge has been published and partially distributed. It consists of a single memoir on the Ancient Monuments of the Mississippi Valley, comprising

the results of extensive original surveys and explorations by E. G. Squier, A. M., and E. H. Davis, M. D. It is illustrated by forty-eight lithographic plates, and by two hundred and seven wood engravings. The mechanical execution of the volume will bear comparison with that of any publication ever issued from the American press.

In the publication of the first volume of the Contributions, the question occurred as to the propriety of securing the copyright to the Institution. I had not an opportunity of conferring with the Executive Committee on this point, and was therefore obliged to settle it on my own responsibility. I concluded that it would be more in accordance with the spirit of the Institution to decide against the copyright. The knowledge which the Smithsonian Institution my be instrumental in presenting to the world should be free to all who are capable of using it. The republication of our papers ought to be considered as an evidence of their importance, and should be encouraged rather than prohibited.

The first memoir occupies an entire volume, and this accidental circumstance has given rise to a misconception of the plan. It has been supposed that each volume of the Smithsonian Contributions is, in like manner, to consist of a separate treatise on a particular subject selected with a view to popular interest. But such is not the case; each volume will generally contain a number of separate memoirs, on different branches of knowledge, similar to the usual published transactions of learned societies. The only reason why the first volume is occupied with a subject of general interest, rather than one on some more abstruse branch of science, is, that the memoir it contains was the *first* which was presented of the character prescribed by the plan. No preference is to be given to any branch of knowledge. The only questions to be asked, in considering the acceptance of a memoir, are, whether it is a positive addition to knowledge, resting on original research, and of sufficient importance to merit a place in the Smithsonian Contributions.

The rules adopted for the acceptance of a memoir are the same as those generally followed by learned societies. The memoir is surrendered by the author to the Institution, and no additions or alterations are allowed to be made after it has been submitted to the commission appointed to examine it, unless by their consent. A certain number of copies is presented to the author for distribution, with the privilege of striking off, at his own expense, additional copies for sale; which in most cases, particularly when the memoir is of popular interest, will be all the remuneration expected by the author.

From what has been said, it will be evident that the papers published in the Contributions cannot generally be of a popular nature. The popular effects to be produced by the Institution are principally those which may be attained by the reports on the progress of the different branches of knowledge, and by the occasional publications in connexion with these of separate treatises on some subject of special interest.

Applications have been made for the first volume of the Contributions from many academies and private institutions; and were our means sufficient, we would be pleased to supply all demands of this

kind. But this is obviously impossible, for they alone would exhaust all the income of the Institution.

Preparations have been made for the publication of the second volume of the Contributions, and a sufficient number of memoirs have been already accepted, or are in preparation, to furnish the materials. Five of these are on astronomical subjects, and afford as important additions to this science as have ever been made to it in this country. Two of them relate to investigations on the new planet Neptune, which are only second in value to the original discovery of this distant member of our system. Abstracts of these have been given to the world, and have been received with general approbation. A third is a determination of the zodiac of the asteroids, or the zone in the heavens to which the positions of these small planets are confined. This paper is of much practical importance in facilitating the researches now in progress in different parts of the world relative to the nature of these fragments (as they would seem to be) of a large planet between Jupiter and Mars. It may be at once determined, by an inspection of the table annexed to this paper, whether any star mapped in an old catalogue, and now no longer to be found in the same place, can possibly be one of the asteroids. A fourth paper is an account of a new comet, the discovery of which by an American lady is one of the first additions to science of this kind, so far as I am informed, ever made in this country. The fifth memoir is an account of the Georgetown Observatory, the instruments with which it is furnished, the mode of using them which has been adopted, and the results of the observations which have been made. An important paper is also in process of preparation for the same volume on the gigantic fossil cetacean remains which are found in the southern and western States of the Union.

Other papers are in progress which partake of the character of original researches, since they are, in part, at least, prepared at the expense and under the direction of the Smithsonian Institution. They will be mentioned under the next head.

In a few cases, memoirs have been presented which, though exhibiting research and considerable originality, are not of a character to warrant their adoption as parts of our volumes of Contributions to positive knowledge. The rule given in the programme has been rigidly adhered to, viz: to decline accepting any paper on physical science which consists merely of an unverified hypothesis, however ingenious and plausible such an hypothesis may be. A law of nature is not susceptible of a logical demonstration, like that of a proposition of geometry, but is proved by its fitness to explain old, and to predict new, phenomena. The verification of an hypothesis, as we have stated in the last report, consists in deducing consequences from it, and ascertaining, by a direct appeal to observation or experiment, the truth or falsity of these deductions. Any paper, therefore, on material science, which does not contain original experiments and observations, cannot be admitted as a part of the Contributions to Knowledge. The rule we have adopted is in accordance with the practice of cautious investigators. The law of universal gravitation existed for several years in the mind of Newton as a well conditioned hypothesis before it was given to the world as a verified and established theory. Besides

this, the rules of logic which are employed in discussing the questions of ordinary life are not applicable to the precision of scientific inquiry. The materials in this case, to borrow an expression of an author of celebrity, "must be weighed in the scale of the assayer, and not, like the mixed commodities of the market, on the weight-bridge of common opinion and general usage."

It has been objected to our publishing original memoirs, that in so doing we are merely performing the duties of a learned society. The answer is, that the learned societies in this country have not the means, except in a very limited degree, of publishing memoirs which require expensive illustrations, much less of assisting to defray the cost of the investigations by which the results have been obtained. The real workingmen in the line of original research hail this part of the plan as a new era in the history of American science. The assistance which the Institution will thus render to original research will occupy the place of the governmental patronage of other countries, and will enable true genius, wherever found, to place its productions before the world free of cost, and in a manner most favorable for securing due attention and proper appreciation.

From our experience thus far, I am convinced that, circumscribed as is the class of memoirs accepted by the Institution, we shall have no want of materials to fill at least one quarto volume a year. There has been in our country within the last few years a remarkable increase in the attention given to original research, not only in material science, but in every branch of knowledge susceptible of addition. And this is evinced by the character and variety of the papers which have been presented for publication. The wide difference between the increase of knowledge and its diffusion is beginning to be seen and appreciated, and the time is not far distant when we shall be as distinguished for our additions to science as for its diffusion and application. The revolutions of Europe are not only sending to our shores the choicest specimens of art, but also men of reputation and skill in scientific investigation. Besides this, the present state of France is attended with such an interruption of the ordinary means of scientific publication, that the manuscript volumes on natural history of one of the most distinguished professors of the Jardin des Plantes are offered to us for publication in the Smithsonian Contributions for no remuneration, save a few copies for distribution among friends. Were the Institution fully in operation I should not hesitate, in accordance with the liberality which should characterize an establishment founded on the bequest of a foreigner, to recommend the adoption of these memoirs for publication at the expense of the Institution, and perhaps we might now distribute them through several of our volumes and finish the publication of them in the course of a few years.

Original researches.

The second part of the plan consists in instituting original researches, the results of which are to be published, with the other memoirs, in the volumes of the Smithsonian Contributions. Under this head may be first mentioned the publication of the tables ordered at the last meeting,

of the Board, for facilitating the calculation of the time of appearance of occultations of the fixed stars by the moon. The object of these tables is to assist in the accurate determination of the longitude of important places on the continent of North America, and their value has been attested by the recommendation of some of the most distinguished astronomers of this country. The accurate establishment of the longitude of any place renders it a landmark to the surveyor, the geographer, and the astronomer, and furnishes a most important element in determining its relative position on the map of the country. The observation of occultations affords one of the most ready means of solving this most difficult practical problem. The tables were calculated at the expense and under the direction of the Institution, and were sent to all persons known to be interested in practical astronomy, with a request that the observations which might be made in connexion with them might be sent to the Institution for computation, or published in some accessible journal. These tables have been so well received by astronomers, that, with the concurrence of the Executive Committee, I have ventured to order the computation of a set of the same kind on a more extensive scale for the year 1849. Copies of these will be sent to United States officers on the coast of Oregon and California, and will be distributed among all the other observers in this country. They will be found of much practical importance to the corps engaged by the general government in establishing the boundary lines of our new possessions. It is hoped that the remuneration allowed for the labor of computing these tables will not be considered extravagant, when it is mentioned that it has occupied the whole time of Mr. Downes for nearly six months, at the rate of eight hours a day.

With the concurrence of the Executive Committee, I have also published an ephemeris of the planet Neptune, or, in other words, a table indicating its position in the heavens during each day of the present year, by which those interested in astronomy are enabled readily to find the place of the new planet in the heavens, or the direction in which the telescope must be pointed in order to observe it. Copies of this have been sent to all the principal astronomers in the world, and it has received the highest commendation. It was calculated by Mr. S. C. Walker from the orbit deduced by himself, a full account of which forms one of the papers of the second volume of the Contributions. It is the first accurate ephemeris which has ever appeared of this newly discovered member of our solar system.

An appropriation of one thousand dollars was made at the last meeting of the Board for the commencement of a series of meteorological observations, particularly with reference to the phenomena of American storms. According to the estimate of Prof. Loomis, appended to my last report, three thousand dollars will be required for the purpose of reducing this part of our plan to practice. It is hoped that one thousand dollars in addition will be appropriated this year, and an equal sum the next, so that, at the end of that time, we shall be prepared for full operation. At the last session of Congress an appropriation was made for meteorology under the direction of the Secretary of the Navy; and in order that the observations thus established may not interfere with those undertaken by the Smithsonian Institution, that officer has

directed Professor Espy to co-operate with the Secretary of the Institution.

It is contemplated to establish three classes of observers among those who are disposed to join in this enterprise. One class, without instruments, to observe the face of the sky as to its clearness, the extent of cloud, the direction and force of wind, the beginning and ending of rain, snow, &c. A second class, furnished with thermometers, who, besides making the observations above mentioned, will record variations of temperature. The third class, furnished with full sets of instruments, to observe all the elements at present deemed important in the science of meteorology. It is believed that much valuable information may be obtained in this way with reference to the extent, duration, and passage of storms over the country, though the observer may be possessed of no other apparatus than a simple wind-vane.

With the instruments owned by private individuals, with those at the several military stations, and with the supply of the deficiency by the funds of the Smithsonian Institution, it is believed that observations can be instituted at important points over the whole United States, and that, with the observations which we can procure from Mexico and the British possessions of North America, data will be furnished for important additions to our knowledge of meteorological phenomena. As a beginning to this extended system, six sets of instruments have been forwarded to the coast of Oregon and California, for the purpose of establishing periodical observations on the western side of the Rocky mountains. Also, a set has been forwarded to Bent's Fort, and another to Santa Fe. Circulars have been prepared and will shortly be issued for the purpose of ascertaining the number and locality of all those who, with or without instruments, are willing to join in the enterprise. I am indebted to Prof. Coffin, of Lafayette College, for a list of all persons, as far as they are known, who have heretofore been accustomed to make meteorological observations in North America, which will be of much importance in our future investigations relative to this subject.

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. By this means, not only notice of the approach of a storm may be given to distant observers, but also attention may be directed to particular phenomena, which can only be properly studied by the simultaneous observations of persons widely separated from each other. For example, the several phases presented by a thunderstorm, or by the aurora borealis, may be telegraphed to a distance, and the synchronous appearances compared and recorded in stations far removed from each other. Also, by the same means, a single observatory, at which constant observations are made during the whole twenty-four hours, may give notice to all persons along the telegraphic lines, of the occurrence of interesting meteorological phenomena, and thus simultaneous observations be secured. 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 general government.

Under the head of researches, I may mention that several papers are

in preparation, under the direction and partly at the expense of the Institution. The first of these relates to a series of valuable observations on the temperature and velocity of the Gulf stream, the author of which the science of our country was called to mourn while he was engaged in an important public service. The observations are now in progress of reduction, and the results will furnish an interesting memoir for the next volume of our Contributions.

The drawings and engravings of a paper on the botany of Oregon are also in progress; and as a small advance has been made to assist in completing these, the memoir will fall under the head of original researches, in part conducted by the Institution.

In the last report, it was mentioned that a magnetic survey of the mineral regions of the northern lakes had been added to the geological and mineralogical survey, the results of which were to be submitted to the Smithsonian Institution. An appropriation was made by the Secretary of the Treasury during the past summer for a continuation of this survey; but on account of the lateness of the season at which the arrangement was made, the person to whom the work was entrusted was not enabled to engage in it this year. Operations, however, will probably be commenced as soon as practicable next spring.

There is in the Land Office a large collection of facts relative to the variation of the compass, which have been derived from the observations of the public surveyors, who are directed in all cases to note the variation of the needle from the true meridian, at the several stations of their surveys. The observations are made with an instrument called the solar compass, which probably gives the variation at each place within a quarter of a degree of the truth. The number of these observations, it is believed, will make up in a considerable degree for their want of greater precision; and from the whole, the lines of declination may be determined with considerable accuracy. The Secretary of the Treasury has liberally directed that all the matter relating to this subject in the Land Office may be placed at my disposal, and Mr. Wilson has undertaken to present the whole in a series of maps, the publication of which in the Contributions cannot fail to be received as an interesting addition to terrestrial magnetism.

Among the objects of research enumerated in the programme, is the analysis of soils and plants; but it is the policy of the Smithsonian Institution, in order to employ its funds most effectually in the way of increasing and diffusing knowledge, not to engage in any operation which could be as well if not better carried on under the direction and with the funds of another institution. In accordance with this, an arrangement has been made with the Commissioner of Patents that the two Institutions may not interfere with each other; and as, at the request of Mr. Burke, an appropriation has been made by Congress for a series of experiments on the above mentioned subjects, the Smithsonian Institution will, therefore, for the present abandon this field of research for others less effectually occupied.

I may also mention in this connexion, that the Smithsonian Institution has been the means of starting an important literary enterprise, intended to facilitate the study of the history and literature of our country. Mr. Henry Stevens, who has been engaged for a number of years as the

agent in this country of the British Museum, and other European libraries, has commenced the preparation of a bibliographical work, comprising a description of all books relative to, or published in, America prior to the year 1700, and indicating not only the contents and value of the books, but also the principal libraries in this and other countries where they are to be found. The preparation of a work of this kind will be in accordance with that part of our plan which contemplates rendering the Institution a centre of bibliographical knowledge, and will have a direct influence in promoting the objects of the various historical societies which are now established in almost every State of the Union, and in bringing the Institution into friendly relations with them. A certificate has been given to Mr. Stevens to the effect that this work, if found, by a commission to whom it shall be referred, properly executed, will be accepted for publication as part of the Smithsonian Contributions to Knowledge. Assured by this certificate that the work will be properly executed, a number of gentlemen and institutions, whose libraries will be examined and referred to, have liberally subscribed to defray the necessary expense of its preparation. With this encouragement, Mr. Stevens has started for Europe to commence investigations in foreign libraries. To satisfy ourselves as to the importance of a work of this kind, a circular letter was addressed to a number of individuals distinguished for their knowledge of such subjects, and the answer in all cases was highly favorable to the scheme. Some of these answers I have given in the appendix, together with the details of the plan of the work as proposed by Mr. Stevens.

At the last session of Congress an appropriation of $5,000 was made, on motion of Mr. Stanton, for a series of astronomical observations in the southern hemisphere, for the purpose of a new determination of the parallax of the planets, and consequently their distance from the sun, by simultaneous observations on the planets Venus and Mars, made at places situated north and south of the equator. This appropriation has been found inadequate to furnish all the instruments required; and inasmuch as the expedition should not be undertaken unless the observers are provided with all the aids which the latest improvements in modern science can furnish, and since, to wait for an additional appropriation from Congress would cause the delay of a whole year, Lieutenant Gilliss has applied to the Institution to purchase and lend to him an achromatic telescope, which, if not paid for by an additional appropriation from the government, will, after its return from the south, form part of the apparatus of the Institution. This instrument will cost about $2,000, to be paid for at the end of three years. The Executive Committee, to whom I applied for counsel on this subject, agreed with me in opinion, that this was a proper occasion for the application of the funds of the Institution to the promotion of science. The instrument has accordingly been ordered to be constructed by an American artist, and to be accepted only in case its performance shall meet the approval of a commission of practical astronomers appointed to examine it.

The position on the coast of Chili, to be occupied by the southern observers, is peculiarly favorable to the study of the facts connected with one of the most mysterious and interesting phenomena of terrestrial physics—namely, the earthquake. Lieutenant Gilliss has been re-

quested to give particular attention to this subject, and for the purpose of facilitating his inquiries a seismometer, or instrument for measuring the intensity and direction of the *earthwave*, has been ordered at the expense of the Institution, to be placed in charge of the expedition during its absence. The cost of this instrument is not yet ascertained; it will, however, not exceed one hundred and fifty dollars.

I think it highly probable that these instruments will be paid for by the general government. The liberal spirit which dictated the original appropriation will, I doubt not, complete the outfit by the addition of a sum sufficient to defray all the necessary expenses.*

Under the head of original researches, I may call to the Regents the fact of my having been directed to continue my own investigations on physical science, and to report occasionally to the Board my progress therein. In the course of last year I found an opportunity, while at Princeton, to commence a series of investigations on radiant heat, which apparently produced some results of interest, but which my subsequent engagements have prevented me from fully developing. I was also directed to cause to be made a series of experiments on the economical value of building material. It will give me much pleasure to obey this instruction of the Board as soon as a place in the Smithsonian building and the necessary apparatus are procured for properly conducting the research.

Reports on the progress of knowledge.

The Smithsonian Contributions are intended to consist of entirely original additions to the sum of human knowledge, and are to be principally exchanged for the transactions of learned societies, and to be distributed among public institutions. The Reports, on the other hand, are to be of a more popular kind, and are intended for as wide a distribution as the funds of the Institution or the means of publishing them may permit. They will give an account of the progress of the different branches of knowledge in every part of the world, and will supply a desideratum in English literature.

The objects of the Smithsonian Institution are not educational. The press in our country already teems with elementary works on the different branches of knowledge, and to expend our funds in adding to these, would be to dissipate them without perceptible effect. Neither do we believe that the distribution of penny magazines, or tracts on the rudiments of science, can ever supersede the labors of the school-master. As a general rule, knowledge presented in a fragmentary form can only be useful to minds well stored with general principles, to which the isolated facts may be referred; and knowledge, both fragmentary and diluted, is almost worthless, even in the way of popular distribution. The elementary principles of science may be systematically taught to a certain extent in common schools, and the reports we intend to publish will be found of value to the teacher, and through him to the pupil, as well as interesting to the general reader. While these reports are rendered as free as possible from technical terms, they will treat of

* Since writing this report, the appropriation has been made by Congress.

subjects requiring attention and thought to understand them. We think it better that they should be above rather than below the average intelligence of the country; that they should start from a given epoch, and, in most cases, should be preceded by a brief exposition of the previous state of each subject.

Arrangements have been made for commencing some of these preliminary reports, as well as reports on the state of our knowledge of special subjects; among these are:

1. A report on the present state of chemistry as applied to agriculture.
2. A report on the forest trees of North America, giving their economical uses, their mode of propagation, and their history.
3. A report on the present state of our knowledge of lightning and the best means of guarding against accidents from its effects.
4. A report on the late discoveries in astronomy.
5. A report on meteorological instruments, with practical observations and directions with reference to the use of them.

In connexion with this last report, I may mention that a proposition has been made to the Institution by Professor Guyot, of the University of Neufchatel, relative to the importance of commencing at this epoch, and at the beginning of the labors of the Smithsonian Institution, the adoption of the centigrade scale of the thermometer. This is a subject, indeed, worthy of the attention of the Regents. It should, however, be discussed with caution, and be decided only after due deliberation.

The first idea of reports on the progress of knowledge, with which we are acquainted, is due to the Emperor Napoleon, who called upon the French Academy of Sciences to present him with accounts of the progress of the different branches of knowledge within a given period. Until within the last few years the only regular reports of the kind were those presented to the Swedish Academy. Since that time, however, a series of annual reports on chemistry have been commenced by an association of gentlemen in France, and also a series on the different branches of material science, by the Physical Society of Berlin. The several numbers of the latter are now in progress of translation, in order to furnish in part the materials for the reports to be prepared for the Smithsonian Institution during the coming year.

Although comparatively little has been done in our country in the way of original research, yet it might be important that the Institution should call for the preparation of a report on the history of the progress of original science in America down to the end of the present half century. This report would exhibit a constant increase in the number and importance of the researches made in our country, and might be found of much service in giving due credit to the labors of those who have been really engaged in the advance of knowledge among us. A report of this kind, however, would require the association of a number of persons combining literary with scientific attainments.

Occasional publication of separate treatises on subjects of general interest.

This part of the plan of organization requires to be carried into operation with much caution. It is liable to much abuse, unless the pub-

lication be restricted to a well-defined range, viz: to scientific reports on the present state of knowledge of a given subject, to precede the periodical reports; to translations from foreign languages of papers of general interest; and occasionally, perhaps, the exposition of a subject on which, at a particular time, popular knowledge is required. We should be careful not to establish a precedent which may lead us into difficulty, in the way of declining the publication of works which may be presented to us. Scarcely a week passes in which the Institution is not requested to publish some essay or compilation, and the funds which can be devoted to all our publications would not suffice for one-half of those offered of this kind. The only work of this class which has yet been attempted by the Institution, is one entitled "Hints on Public Architecture," under the direction of the Building Committee. Although the Secretary's name was mentioned in the resolution authorizing the publication of this treatise, yet he has thus far had no connexion with it. The publication was authorized before the details of the plan of organization were fully settled. It was at first intended merely as a report of the Building Committee, giving an account of the plans submitted, and the one adopted for the Smithsonian building, together with a report of the investigations of the committee with regard to the materials of construction, &c. It was afterwards changed into the form of a regular treatise, in order that it might be referred to a commission of persons chosen to examine it, and that the Institution might thus be relieved from the responsibility of pronouncing upon its fitness for publication. I think it important that, besides the preface of this work, a full account of its origin should be given in an introductory advertisement.

Library.

During the past year the library has continued to increase by donations, and by the books which have been deposited by publishers, in accordance with the 10th section of the act establishing the Institution. The requirements of this act are, however, not strictly observed by all publishers; and I would direct the attention of the Board to a special report of the Assistant Secretary with reference to this point. The whole subject will probably come before Congress during its present session.

Professor Jewett, the Assistant Secretary, has been industriously engaged during the past year in procuring statistics of the libraries of the United States, and in digesting plans for the details of the library of the Institution, and I beg leave to refer you to the able and interesting report of the results of his labors herewith submitted. A considerable portion of the copies of the Smithsonian Contributions will be presented to public institutions which publish transactions, and which are able to present us in return with additions to our library. The volume now in process of distribution has been preceded by a circular requesting exchanges of the works of all institutions which issue transactions and catalogues of all libraries to which the Contributions may be sent.

Preparation for lecturing.

The plan of organization contemplates a series of free lectures, particularly during the session of Congress. These will be commenced as soon as the building is ready for the purpose. This part of the plan also cannot be put into full operation until after the building is completed. A number of gentlemen have consented to favor us with their services. Men of talents, however, cannot be expected to leave their homes and subject themselves to the expense of visiting Washington, and to the trouble of preparing a course of lectures, without a proper remuneration. It will be necessary, therefore, that an annual appropriation be made for this purpose. The amount, however, must necessarily be small until the building is completed, or until all the interest of the fund can be devoted to the primary objects of the Institution. Besides this, the lecture-room in the east wing, now finished, will scarcely hold more than five hundred persons, while the one in the main building is intended to accommodate twice as many.

Donation.

Dr. Robert Hare, of Philadelphia, having resigned the chair of chemistry in the University of Pennsylvania, which he had filled with honor to himself and his country for nearly thirty years, has presented to the Smithsonian Institution the instruments of research and illustration collected and used by himself during his long and successful scientific career. Many of these instruments are the invention of the donor, are connected with his reputation, and belong to the history of the science of our day. The gift is important, not only on account of its intrinsic value, but also as establishing a precedent of liberality, which we trust will be frequently observed by others, as well as being an expression of Dr. Hare's approbation of the plan and confidence in the stability of the Institution. A number of other donations have been received, of which a list, with the names of the donors, will be given in a subsequent report.

In view of what has been stated in the foregoing report, the Secretary trusts that the Board of Regents will be satisfied, if ever they had any doubts on the subject, that the plan adopted is one well calculated to carry out the benevolent intentions of the donor, of increasing and diffusing knowledge among men; and that a satisfactory answer has been given to the question frequently asked, namely: When is the Institution to begin? It will be seen that it has commenced the most important part of its operations, and the results are now in progress of dissemination in every part of the civilized world.

Respectfully submitted:

JOSEPH HENRY,
Secretary of the Smithsonian Institution.

THIRD ANNUAL REPORT

Of the Secretary of the Smithsonian Institution, for the year 1849.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: In accordance with the resolution that the Secretary shall present at each annual meeting of the Board of Regents an account of the operations of the Institution during the past year, I respectfully submit the following.

Agreeably to the scheme of finance adopted by the Board, the greater portion of all the income of the Smithsonian fund is at present devoted to the erection of the building; and until this is paid for, the money which can be appropriated to the active operations of the Institution will be comparatively small; not only small in proportion to the demands made upon it, but small in reference to the results which the public generally expect it to produce. It is believed, however, that a proper consideration of the facts presented in the following report will warrant the conclusion, that the Institution, during the past year, has been gradually extending its sphere of usefulness, and successfully bringing into operation the different parts of its plan of organization.

It will be recollected that the several propositions of the programme were adopted provisionally, and it is gratifying to be able to state that experience thus far has indicated no important changes. The general plan has continued to receive the approbation of the enlightened public both in this country and in Europe, and to increase general confidence in the power of the Institution to confer important benefits on our country and the world.

In presenting the different operations of the Institution, I shall adopt, as in my last report, the principal divisions of the programme:

1st. Publication of memoirs in quarto volumes, consisting of positive additions to knowledge.

2d. Institution of original researches, under the direction of competent persons.

3d. The publication of a series of reports, giving the present state and progress of different branches of knowledge.

4th. Formation of a library and museum of objects of nature and art.

5th. Lectures.

Publication of Memoirs.

Agreeably to the plan of the Institution, these memoirs are intended to embody the results of researches which could not otherwise be readily published, and are to be distributed to societies, public libraries, and other institutions. An account of the first memoir was given in the last report. It relates to the ancient monuments of the Mississippi valley, and occupies an entire volume. It has been presented, as far as opportunity would permit, to the principal literary and scientific societies of the world, to all the colleges and larger libraries of this country, and has everywhere

been received with much commendation. All the societies from which we have as yet heard, have declared their willingness to co-operate with the Institution, and to give us their publications in exchange, from which source our library has already been enriched with valuable additions.

It is to be regretted that our means would not permit us to distribute the first volume more liberally than we have done, and that the price put upon the copies offered for sale has placed them beyond the reach of many persons desirous of obtaining them. This arose from the fact, that in order to remunerate the authors for the expense and labor bestowed on the memoir, they were allowed to strike off from the types and plates of the Institution an edition to be sold for their own benefit. To avoid risk of loss, the edition was a small one, and the price put at ten dollars. An occurrence of this kind will not happen again; for although it would be desirable to pay authors for their contributions, yet it is now found that materials will be offered, free of all cost, more than sufficient to exhaust the portion of the income which can be devoted to publications.

In printing the future volumes it will be advisable to strike off an extra number of copies for sale on account of the Institution, and to dispose of those for little more than the mere cost of press-work and paper.

The second volume of Contributions is now in the press, and will consist of a number of memoirs which have been submitted to competent judges and found worthy of a place in the Smithsonian publications. In this volume we have adopted the plan of printing each memoir with a separate title and paging. The object of this is to enable us to distribute extra copies of each memoir separately, and also to furnish the author with a number of copies regularly paged for his own use. It will likewise enable us to classify the memoirs according to subjects.

The following is a brief account of the memoirs contained in the second volume, so far as they have been reported on by the commissioners to whom they have been submitted:

1. *A memoir on the planet Neptune, by Sears C. Walker.*—An abstract of this memoir has been published in the proceedings of the American Philosophical Society, and has received the approbation of the scientific world. It presents the several steps of the discovery of an orbit which has enabled Mr. Walker to compute the place of the new planet with as much precision as that of any of the planets which have been known from the earliest times.* Starting from the observations of the motion of the planet during a period of about four months, Mr. Walker calculated an empirical orbit, which enabled him to trace its path among the stars of the celestial vault through its whole revolution of 166 years. He was thus enabled to carry its position backward until it fell among a cluster of stars accurately mapped by Lalande towards the close of the last century; and, after a minute and critical investigation, he was led to conclude that one of the stars observed by Lalande on the night

* It is proper to state that a part of the researches given in this memoir was made during the author's connection with the National Observatory, under the direction of Lieutenant Maury. An account of these will probably soon be published in the next volume of the records of operations of this observatory.

of May 10, 1795, was the planet Neptune. This conclusion was rendered almost certainty by the observation, made on the first clear night, that all the stars in the cluster above mentioned were found in place, except the one previously fixed upon as the new planet. Some hesitation was created, however, by noting that the missing star in Lalande's maps was marked as doubtful. In order to settle this difficulty, the original manuscript of the astronomer deposited in the Observatory of Paris was referred to. It was then found that Lalande had twice observed the same star; and not finding the right ascension and declination each time the same, and not dreaming it was a planet, he selected one of the observations for publication, marking the position indicated doubtful. The planet had moved during the interval of observation, and thus produced the discrepancy. By allowing for the movement during the time elapsed, the two observations precisely agree. There could, therefore, be no longer any doubt that this star, observed and mapped fifty years ago as a fixed star, was in reality the planet Neptune. Mr. Walker, availing himself of this discovery, had now a series of observations embracing not a few months of the motion of the planet, but which carried it back fifty years. From these data he was enabled to deduce a pure elliptical orbit, or one which the body would describe were there no other planets in the system. This orbit has been investigated by another of our countrymen in a series of profound and beautiful researches, adding much to our knowledge both of Neptune and Uranus. I allude to the labors of Professor Peirce, of Cambridge.

It is well known that the planet Neptune was discovered by mathematical deductions from the perturbations observed in Uranus, and that Leverrier and Adams, the independent authors of this discovery, not only pointed out the direction in which the unseen planet was to be found, but also, from *a priori* considerations, gave the dimensions, form, and position of the orbit it describes around the sun. The direction indicated was the true one, but the elements of the orbit were widely different from those subsequently found to belong to the actual orbit of the planet. Professor Peirce submitted the data used by Leverrier and Adams to a new and critical examination, and succeeded in discovering the cause of their error, and of verifying the conclusions of Mr. Walker. He afterwards proceeded to consider the inverse problem, viz: that of deducing the perturbations which Neptune ought to produce in the planet Uranus. His final results gave a perfect explanation of all the anomalies in the motions of Uranus, and furnished the data, for the first time since its discovery in 1781, for correct tables for determining its position in the heavens. Professor Peirce also investigated the action of all the other planets on Neptune, and his results enabled Mr. Walker, by applying them to his elliptical orbit, to compare the actual with the calculated place of the planet. This led to a further correction of the elliptical orbit, and a more perfect table of calculated places. In this way, by a series of profound and beautiful investigations, alternately combining the data of observation with theoretical considerations, these two astronomers have perfected our knowledge of the motion of the most distant planets of our system, and furnished the means of giving their past and future position through all time. The details of Mr. Peirce's paper have not yet been prepared for the press.

They will probably be given in due time to the world as a part of the Smithsonian Contributions.

The investigations mentioned in the foregoing account have been attended with very laborious arithmetical calculations. A small appropriation has been made to defray, in part, the expense of these. Indeed, without the aid thus given, the discoveries we have related would scarcely have been made—at least at this time, and in our country.

2. The next memoir is *An account of the discovery of a Comet by Miss Maria Mitchell, of Nantucket*, with its approximate orbit, calculated by herself. The honor of this discovery has been duly awarded to the author. A medal has been presented to her by the King of Denmark, and the comet itself is now known to astronomers in every part of the world by her name. From the peculiarities of the case, the Executive Committee recommended that a small premium be presented to Miss Mitchell.

3. The third memoir is *On a new method of solving Cubic Equations, by Professor Strong, of New Brunswick, New Jersey;* a purely mathematical paper, which has been pronounced an interesting addition to that branch of science.

4. The fourth memoir is *A contribution to the Physical Geography of the United States.* It presents a section, from actual surveys, of the descent of the bed of the Ohio river from its source, in the State of New York, to its mouth, on the Mississippi. By a series of observations and elaborate calculations, the author exhibits the amount of water which passed down the river during a period of eleven years prior to 1849. This, compared with the amount of rain which fell during the same time on the surface drained by the river, gives a series of interesting results in reference to evaporation.

It also contains a proposition for improving the navigation of the Ohio, founded upon data given in the preceding part of the memoir. Whatever may be the result of the plan here proposed, this memoir has been recommended for publication as a valuable addition to the physical geography of the United States. The author is Charles Ellet, jr., the celebrated engineer of the wire bridges over the Niagara and Ohio rivers. Another memoir is promised by the same author, which will be a continuation of the same subject.

5. The fifth memoir is contributed by Dr. Robert Hare, of Philadelphia, and is intended to elucidate the remarkable phenomena exhibited at the great fire in the city of New York on the 19th of July, 1845, during which two hundred and thirty houses were destroyed, containing merchandise amounting in value to sixty-two millions of dollars. "A series of detonations, successively increasing in loudness, were followed by a final explosion, which tore in pieces the building in which it took place, threw down several houses in its vicinity, and forced in the fronts of the houses on the opposite side of the street." These effects were attributed to gunpowder, though the owner of the building in which the explosion occurred declared that none of this article was present, but that the house contained a large quantity of nitre, in connexion with merchandise of a combustible nature.

This memoir contains a series of investigations relative to the explosions which may be produced by heated nitre in connexion with carbon-

aceous matters. The author shows, by numerous experiments, that explosions of a violent kind can be produced by forcibly bringing into contact at a high temperature, nitre, and substances of an inflammable character. It also contains several new experiments on the combustion of gunpowder under different circumstances.

6. The sixth memoir is *On the Ancient Monuments of the State of New York, by E. G. Squier*, and may be regarded as a continuation of the memoir by Squier and Davis, on the ancient monuments of the Mississippi valley. The expense of the explorations which form the basis of this memoir was two hundred dollars, one half of which was defrayed by the members of the Historical Society of New York, and the remainder by this Institution.

7. Another memoir is by Professor Secchi, a young Italian of much ingenuity and learning, a member of Georgetown College. It consists of a new mathematical investigation of the reciprocal action of two galvanic currents on each other, and of the action of a current on the pole of a magnet. It begins with the assumption that the force between the elements of the currents and the magnet is inversely as the square of the distance, and directly as the sine of the inclination, and then presents the mathematical inferences which legitimately flow from these data. The deductions are of such a nature that the author has been able to verify them by means of well devised experiments, and the results accord as nearly with the deductions as the complex nature of the subject will admit. The investigations involve the mathematical theory of the galvanometer, and the experiments furnish much interesting and useful information, aside from the principal object of the memoir, particularly on the comparative value of different kinds of galvanic batteries.

8. The next paper is by Professor Louis Agassiz, of Harvard University, and is entitled *The Classification of Insects upon Embryological Data*. It gives an account of a series of new and interesting facts observed by the author relative to the metamorphosis of insects, which have an important bearing on general questions in zoology, and which will probably lead to the arrangement of these animals according to a new system of classification, founded upon more definite principles than those heretofore adopted.

9. The next is a memoir by Dr. R. W. Gibbes, on the *Mosasaurus* and some new allied genera of the gigantic lizards which formerly inhabited our planet, and of which the remains are now found in different parts of the United States, particularly in the marl beds of various parts of the country. This is an interesting addition to palæontology, and has received a favorable report from the commission to whom it was referred.

Researches.

The programme of organization contemplates the establishment of researches, under the direction of suitable persons, the expense to be borne in whole or in part by the Institution. In the last report it was mentioned that a telescope and other apparatus had been ordered for Lieutenant Gilliss in his astronomical expedition to Chili, and that, with-

out this assistance, the expedition would have been delayed a year. I am now, however, happy to state that the expense of these instruments has since been paid by an appropriation of Congress; and the Institution has thus been the means of promoting the objects of the expedition without any expenditure of its income. Certain improvements in astronomical instruments, however, have been made since the departure of Lieutenant Gilliss which would much facilitate his observations, and enable him to do much more with his small number of assistants; and it may be well for the Institution to furnish him with instruments of this kind.

Under the head of researches it may also be mentioned that, during the past year, we have caused to be computed, at the expense of the Institution, an ephemeris of Neptune, giving the position of the planet in the heavens from August 4, 1846, to February 4, 1848, and also in the last half years of 1848 and 1849. This ephemeris is based on the orbit of Neptune established by Mr. Walker and corrected by the perturbations of the planet Neptune by the action of Jupiter, Saturn, and Uranus, as deduced from the mathematical investigations of Professor Peirce, of Harvard University.

We have distributed copies of this ephemeris to all persons known to us who are interested in practical astronomy, not only in this country but in Europe. It has been received with high commendation, and is found to give the actual place of the planet in the heavens within the limits of a few tenths of a second of arc; indeed, the coincidence of the calculated and observed places is so marked, that, were the actual planet of the heavens and that of the ephemeris to be considered as a double star, they would have so close a proximity that no telescope yet constructed could separate them.

Occultations for 1850.

A set of tables in continuation of those mentioned in the last and preceding report for facilitating the calculation of the appearance of occultations of fixed stars by the moon during the year 1850 has been prepared by Mr. Downes, of Philadelphia, and published by the Institution. At the last session of Congress an appropriation was made for establishing a Nautical Almanac, which will furnish, among other aids to astronomical observation, sets of tables of the kind just mentioned. Lieutenant Davis, of the United States navy, to whom the superintendence of this national work has been entrusted, recommended that the expense of the preparation of the tables for 1850 should be defrayed from the appropriation for the Almanac; and this recommendation has been concurred in by the Secretary of the Navy. The Institution has, therefore, been called upon merely to pay for the printing and distribution of the tables, and thus again enabled, with a small outlay of its funds, to afford important facilities for the advance of science.

Meteorology.

Under the general head of researches we may also give an account of the progress made in establishing the system of meteorological ob-

servations proposed in the preceding reports. Circulars describing the plan of operation were distributed to the several parts of the Union through members of Congress at the last session, and the results fully equalled our anticipations. From localities widely separated from each other, and distributed over the greater portion of the United States, about one hundred and fifty monthly returns are now regularly received. To carry on this system efficiently, much labor is necessarily required in the way of correspondence; but it bids fair to furnish the Institution with a wide field of usefulness in bringing it into communication with individuals who, though secluded in position, are desirous of improving themselves, as well as of promoting general knowledge. The correspondence we have thus established, and which we hope to extend, through the aid of the members of the present Congress, will enable us to acquire definite information on a variety of subjects besides those which relate to meteorology. We have already accumulated in this way a mass of curious and instructive information, which we hope, in the progress of the development of the plan of the Institution, to digest and present to the public.

We would mention in this connexion that two of our meteorological correspondents have proposed the collection of statistics of diseases, including the rise, progress, and decline of epidemics. This is a subject we would commend to the American Medical Association. The Smithsonian Institution could assist in an enterprise of this kind by receiving the information which is attainable, and collating it, under the direction of a committee of gentlemen belonging to the medical profession.

It will be recollected that our plan of meteorological observations embraces three classes of observers—one to record the changes in the aspect of the sky, the direction of the wind, beginning and ending of rain, snow, &c.; another, in addition, to give an account of the changes of temperature indicated by the thermometer; and a third, furnished with a full set of instruments for recording the most important atmospheric changes. The importance of the information which may be derived from a careful record of the weather without instruments can scarcely be realized by persons who have given but little attention to the subject. The place of origin, direction, velocity of motion of a storm, as well as the direction and velocity of the wind which composes it, whether gyratory or inward and upward, may all be determined by a sufficient amount of data of the kind we have mentioned. Also, a careful record of the observations of meteors seen by individuals from different positions would furnish interesting data for determining the elevation and velocity of these mysterious visitors.

There are other data which can only be obtained by the use of accurate instruments; fortunately, however, a comparatively small number of observers are sufficient for determining these. The instruments should be of the best possible construction, placed in important situations, and observed at suitable times and with undeviating regularity by competent observers. Few persons are acquainted with the difficulty of procuring accurate meteorological instruments. The ordinary thermometers for sale in the shops frequently differ several degrees from each other, particularly at the higher and the lower temperatures, and even the same thermometer is liable, for a time after its construction, to undergo a

change in the size of the bulb, and thus to derange the accuracy of the scale. An accurate barometer is another instrument which cannot readily be obtained, unless at too great a price for the means of ordinary observers. The common weather-glasses, sold under the name of barometers, though they may be of use in indicating variations of atmospheric pressure, and thus assist in furnishing data for determining the progress of aerial waves, are inapplicable to the precise and accurate observations necessary to determine the minute changes of atmospheric pressure, or to ascertain the height of places above the level of the sea.

Considerable pains have been taken during the past year to ascertain the best form of a barometer, which could be procured at a reasonable cost; and, after considerable inquiry and comparison of different instruments, we have at length decided upon one, with an adjustable cistern and enclosed in a brass case, which may be transported to a distance, and will serve as well for a mountain barometer as for indicating meteorological changes. For the construction of these instruments, we have employed Mr. James Green, formerly of Baltimore, now of New York; and in order that the instruments furnished by him to ourselves, or sold to our observers, may be comparable with each other, we have procured a standard barometer from London, with which each instrument, previously numbered, is accurately compared, and the record carefully preserved. We have also decided upon the forms of rain and snow gauges and wind vanes, and have ordered a number of these to be constructed by Benjamin Pike & Son, Broadway, New York.

It is the policy of the Institution to do as much with its funds as possible, and to call in aid from every quarter whence it may be obtained. With reference to the system of meteorology, I am happy to inform the Board that we have received assistance from a number of sources from which it could scarcely have been expected at the commencement of the scheme. The last Congress appropriated two thousand dollars for meteorology, to be expended under the direction of the Navy Department. It was understood that Professor Espy was to be engaged in the investigations to be made in accordance with this appropriation, and, in order that his labors might co-operate with those of the Institution, the late Secretary of the Navy directed him to apply to me for instructions. During the past year he has been engaged in directing observations and making preparation for a series of experiments having an important bearing on the explanation of meteorological phenomena. It is understood that the remainder of this appropriation, after paying the salary of Mr. Espy, will be expended in defraying incidental expenses, such as printing, engraving, &c.

The Regents of the University of the State of New York, in 1825, organized a system of meteorology, which has continued ever since, and which has added many interesting facts to the stock of scientific knowledge. In order to extend the usefulness of this system, the Regents of the University have lately resolved to reorganize the whole and to supply the observers with accurate and well compared instruments. This work has been intrusted to Dr. T. Romeyn Beck and one of our Regents, Gideon Hawley, esq., both of Albany. They have adopted the same system and instruments as those of the Smithsonian Institution,

and have agreed to co-operate fully with us in the observation of the general and particular phenomena of meteorology. A similar movement has been made in the legislature of Massachusetts for the establishment of a system of observations; and it is hoped that the other States of the Union will follow these examples. We are also happy to state that the medical department of the army, under the direction of Surgeon General Lawson, has signified its willingness to unite with us in the same system, and to furnish the new military posts with instruments constructed on the same plan, and compared with the Smithsonian standard. We hope, therefore, within the coming year, that there will be established at least fifty stations in different parts of North America, furnished with accurate instruments of this kind.

During the past summer I visited Canada, principally for the purpose of examining the meteorological instruments and the method of using them employed at the Observatory of Toronto. Captain Lefroy, the director of this institution, offered me every facility for acquiring the desired information. He also furnished me with a list of military posts in Canada at which observations may be made, and gave assurance of the hearty co-operation in our labors of the officers attached to these posts. We have also a prospect of procuring permanent observations from Bermuda, some of the West India islands, and from Central America.

From all these statements, it will be seen we are in a fair way of establishing a general system of meteorology, extending over a great portion of North America, including many stations furnished with compared instruments referred to the same standard. When fully organized, it will constitute one of the most important systems ever instituted; but to bring it fully into operation will require a judicious expenditure of all the funds at our disposal for this purpose. At the last session of the Board one thousand dollars were appropriated for meteorological purposes, the greater portion of which has been expended for instruments, among which are those to serve as standards; an equal sum at least will be required for the next year.

In connexion with the regular meteorological system, 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 their wires for the transmission of meteorological intelligence. We propose to furnish the most important offices along the lines with sets of instruments, and to give the operators special instructions for the observation of particular phenomena. It is hoped by this means to obtain results not otherwise accessible. Instruments for this purpose are now in process of construction, and as soon as they are completed the transmission of observations will commence.

The establishment of the extended system of meteorology which we have just described is a work of time and labor, the correspondence alone being sufficient constantly to occupy the time of one person; and the adjustment of the several parts of the plan has required more time than my other engagements would permit me to devote to it.

Magnetic Observations.

A set of magnetic apparatus was ordered from London for the purpose of determining the lines of magnetic intensity, declination, and inclination. These are entrusted to Colonel Emory, of the Boundary Commission, and in his possession they will probably be made to do good service in the cause of science. As soon as the funds will admit of the appropriation, it would be advisable to purchase several sets of instruments of the same kind, to be placed in the hands of the scientific explorers of our new territories, and for determining the principal magnetic lines across the United States.

Physical Geography.

Another subject of much interest, connected with the physical geography of our country, is the collection of the statistics of all railway and canal explorations which have been made in various parts of the United States and Canada. This information, at present in the possession of individuals, is of little value, and, unless collected by some public institution, will soon be lost to the world. Surveys of this kind furnish the most exact data for the determination of what may be called the mountain bases or general water-sheds of the surface; and no portion of the world, of the same extent, has been so thoroughly traversed with these explorations as the United States. Connected with these, sketches should be made of the principal mountain ranges, barometrical measurements of the higher peaks, with geological sections of the strata through which the public works are carried. For the purpose of commencing this collection, we have addressed letters to all persons within our knowledge who possess information of this kind, requesting memoirs from them containing results of their own measurements and observations. By this means we hope to present a series of papers of the same character as that of Mr. Ellet, and thus furnish materials for a more accurate physical map of North America, as well as the means, in connexion with our operations in meteorology, for a more exact study of our climate.

During the past year Professor Guyot has made a barometrical exploration of the mountain system of New Hampshire, and he purposes to devote a portion of each year to investigations of this kind.

Natural History.

Our new possessions in Oregon, California, and Mexico offer interesting fields for scientific inquiry, particularly in the line of natural history; and Dr. Gray, of Cambridge, and Dr. Engleman, of St. Louis, aided by several scientific gentlemen interested in this branch of science, have sent a number of collectors to develop the resources of those regions, particularly so far as the botany is concerned.

Among these, Mr. Charles Wright has been engaged to make explorations during the past year in New Mexico, at the expense of a subscription by individuals and institutions. He has just returned laden with a valuable collection of plants, seeds, &c., which are to be di-

vided among those who defrayed the expense. In behalf of the Smithsonian Institution $150 was subscribed towards this enterprise, and for this we are entitled to a full set of all the objects collected. These are to be submitted to Dr. Gray, of Cambridge, to be described in a memoir by him, and to be published in the Smithsonian Contributions. Mr. Wright is expected to start on another expedition early in the spring, for the purpose of making explorations in natural history in the regions around El Paso; and it will be well for the Smithsonian Institution to further assist this laudable enterprise with another subscription of an equal amount.

We have also purchased, for the sum of $20, a set of the plants collected by Mr. Fendler, in the vicinity of Santa Fe, during the year 1847. This adventurous explorer, under the direction of the gentleman previously mentioned, is now engaged in investigating the botany of the great valley of the Salt Lake, and it is proposed further to assist him by the purchase of a set of the collections he may obtain. By cooperating in this way with individuals and institutions we are enabled, at a small expense, materially to advance the cause of science.

Ancient Monuments.

Another object, the prosecution of which falls particularly within the province of the Institution, is that of obtaining descriptions of the ancient monuments of North America. Circulars have been sent to gentlemen in various parts of the country, requesting them to furnish surveys and explorations of mounds and other ancient works which are reputed to exist in their vicinity. To facilitate these investigations, we have requested the authors of the first volume to draw up, from the results of their experience, a set of instructions for the proper examination and description of works of this kind. The same subject has also been placed before several historical societies, established in places where mounds are known to exist. In connexion with this subject, we cannot too highly commend the policy of the new Territory of Minnesota, which, among the first of its acts, has established a Historical Society, to gather up the record of events as they occur, and thus to preserve the unappreciated facts of the present—destined to become history in the future. An important and interesting part of the labors of such societies would be the survey and exploration of the ancient monuments which might be found in their vicinity. Brief accounts of these might be published in the proceedings of the societies, while detailed descriptions and drawings could be given to the world at the expense and through the transactions of the Smithsonian Institution.

The publication of our first volume has awakened a lively interest in this subject, and we have received accounts of various locations of mounds and other ancient works in different parts of the country which were previously unknown. A gentleman, well qualified for the task, is now engaged in preparing for us an ethnological chart indicating the relative positions, as far as they are known, of all the monuments of this kind. This chart may be improved from time to time, and will be the means of eliciting important additional information. Indeed, this

whole subject should be prosecuted by the Institution, until all accessible information has been collected. The Smithsonian Institution owes this to the world. The work should be done quickly; for the plough, as well as the elements, are every year rendering less visible the outlines and distinctive forms of these remnants of the arts and policy of the ancient inhabitants of this continent.

Bibliographia Americana.

In the last report an account is given of the preparation of a work on the bibliography of America, by Henry Stevens, of Vermont. This work, it will be recollected, is to contain a brief account of every book published in, or relating to, North America, prior to 1700, with references to the different libraries in this and other countries in which these works are to be found. The Institution agreed to publish this work at its own expense, provided, on examination by a commission of competent judges, it is found properly executed. Mr. Stevens is now engaged in the British Museum cataloguing all the works embraced in this plan, and informs me that he is making good progress in his enterprise.

Reports on the Progress of Knowledge.

Of the reports on the progress of knowledge, proposed in the plan of organization, none have as yet been published, though several of those mentioned in my report of last year have been completed, or are very nearly ready for the press. The appropriations, however, for the last year were not found sufficient for carrying out further this part of the plan.

The most important report now in progress is that on the forest-trees of North America, by Dr. Gray, Professor of Botany in Harvard University. It is intended in this work to give figures from original drawings of the flowers, leaves, fruit, &c., of each principal species in the United States proper, for the most part of the size of nature, and so executed as to furnish colored or uncolored copies—the first being intended to give an adequate idea of the species, and the second for greater cheapness and more general diffusion.

This work will be completed in three parts, in octavo, with an atlas of quarto plates—the first part to be published next spring. A portion of this will be occupied with an introductory dissertation giving the present state of our knowledge, divested as much as possible of all unnecessary technical terms—of the anatomy, morphology, and physiology of the tree—tracing its growth from the embryo to its full development and reproduction in the formation of fruit and seed. This will be illustrated by drawings from original dissections under the microscope, and sketches made, in every instance, from nature. As the work will be adapted to general comprehension, it will be of interest to the popular as well as the scientific reader.

Report on the history of the discovery of the planet Neptune.—The first part of a report on recent discoveries in astronomy has been completed, and is ready for the press. This is written by Dr. B. A. Gould, of

Cambridge, editor of the American Astronomical Journal. Copious references to authorities are given in foot-notes, which will render the work interesting to the professed astronomer as well as to the less advanced student.

A report has been prepared by Professor Guyot, late of the University of Neufchatel, on the construction and use of meteorological instruments, more particularly designed for distribution among our meteorological observers. This gentleman is now engaged, at the expense of the Regents of the University of the State of New York, in establishing a new system of meteorology, and in instructing the observers in the use of the instruments; for which service he is well adapted by his experience in a similar undertaking in Switzerland.

The report on the application of chemistry to agriculture is also nearly ready for the press. This is by Dr. Lewis C. Beck, of Rutgers College, New Jersey.

Collections.

Apparatus.—The plan of organization also contemplates the formation of a museum of physical instruments, which may be used for experimental illustration and original research, and may serve as models to workmen as well as to illustrate the general progress of inventions in this line.

The munificent donation of Dr. Hare has enabled us to commence this collection with very flattering prospects. It now contains, besides the articles of Dr. Hare, instruments for the illustration of the principles of light, heat, and sound, procured from Paris, and a full set of pneumatic instruments, of superior size and workmanship, constructed expressly for the Institution by Mr. Chamberlain, of Boston; also, a number of chemical articles purchased during the last year; a set of magnetical instruments, already noticed; a standard barometer and thermometers, and other meteorological instruments, procured from Europe. It is proper that I mention, in this place, that we are indebted to Professor Snell, of Amherst, for superintending the construction of a set of very ingenious instruments devised by himself for the illustration of wave motion. It is believed that the collection of instruments of research will, in due time, not only form a feature of great interest, but that it will surpass in extent similar collections in other countries.

It is intended to publish a descriptive catalogue of all the instruments for the use of visitors; and it may be advisable to illustrate this by wood-cuts, particularly as we have had presented to us all the wood engravings employed by Dr. Hare in describing his apparatus.

It is not in accordance with the plan of organization to confine the instruments of observation to the immediate use of the officers of the institution, but to suffer them to be employed, under certain restrictions, by others who are possessed of the requisite degree of skill. This practice may be attended in some cases with loss, and the breakage of instruments; but the expenditure which may be incurred on this account will probably be more than compensated by the advance to knowledge resulting from the adoption of the plan.

A small appropriation has been made for collections in natural history during the past year; and, under the direction of a distinguished young naturalist, upwards of ten thousand specimens of vertebrated animals, principally reptiles and fishes, have been obtained. Many of these are rare specimens from unexplored parts of our country, and a considerable number of them consists of undescribed species. They furnish the materials for an interesting series of memoirs on physiology, embryology, and comparative anatomy. The whole cost of making this collection did not exceed $140. We are convinced, from the important results obtained by this small expenditure, that a most valuable working collection of objects of the natural history of North America can be obtained at a very moderate outlay of funds.

Library.

During the past year the process of developing the plan of the library, as given in the programme, has been carried out by Professor Jewett as far as the funds which could be devoted to the purpose would allow.

Considerable progress has been made in the plan of forming a general catalogue of all the important libraries in the United States; and Professor Jewett has wisely commenced the preparation of a catalogue of all the books to be found in the different libraries in the city of Washington, including those of the several departments of the government; and in this way he will be enabled to exhibit the importance of catalogues of this kind.

He has also devoted much time to the continuation of his researches relative to the statistics of libraries in this country, and for an account in detail of his valuable labors in this line I must refer to his report herewith transmitted. I will also direct attention to some important suggestions in his report on the subject of the deposit of books for securing copyright, and the establishment of a bulletin.

Museum.

The formation of a museum of objects of nature and of art requires much caution. With a given income to be appropriated to the purpose, a time must come when the cost of keeping the objects will just equal the amount of the appropriation; after this no further increase can take place. Also, the tendency of an Institution of this kind, unless guarded against, will be to expend its funds on a heterogeneous collection of objects of mere curiosity; whereas the plan presented in the programme contemplates complete definite collections arranged for scientific purposes, rather than for popular display.

In this connexion there is one point which I beg to present to the consideration of the Board as one of much importance, and which, if possible, should be decided at this meeting, because on it will depend the arrangement of that part of the building devoted to natural history. I allude to the acceptance of the museum of the Exploring Expedition.

By the law 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."

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, cannot 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 is 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 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 co-operates 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.

Lectures.

At the last meeting of the Board an appropriation of five hundred dollars was made to defray the expense of lectures to be given before the Smithsonian Institution, a part of which only is expended. The first course, in accordance with this part of the plan of organization, was by Professor Koeppen, of Denmark, on Modern Athens. These lectures were illustrated by a number of large drawings, for the use of which the Institution is indebted to the Lowell Institute of Boston. A second course was delivered by Dr. Hitchcock, President of Amherst College, on geology, in the lecture-room of the east wing of the Smithsonian building; and both courses were attended by large and apparently interested audiences. The results of these lectures indicate that much good may be effected in Washington by this means of communicating knowledge. No city, perhaps, of the same number of inhabitants, contains so many intelligent and well educated persons desirous of obtaining information; and no point in our country is so favorably situated for the dissemination of opinions, by means of lectures, as the political centre of the American Union. Invitations have been given to a number of distinguished gentlemen in different parts of the United States to favor us with courses of lectures during the present session of Congress, and in almost every case the invitation has been accepted. It is intended to extend these invitations so as to call here in succession all who have distinguished themselves in literature or science. We shall not seek mere popular lecturers, whose chief recommendation is fluency of speech, or powers of rhetorical declamation, but chiefly those who are entitled, from their standing and acquirements, to speak with authority on the subjects of their discourse, and whose character will tend to give due importance to their communications. It is to be regretted that the amount of funds which can be devoted to this object is not as great as could be wished. It is hoped, however, that many persons will consider the opportunity of visiting Washington, and the compliment paid by the invitation, as in part a remuneration for the labor and time which their lectures may cost. But in all cases, sufficient should be allowed to defray all necessary expenses, and, as soon as the state of the funds will permit, to reward liberally, rather than otherwise, those who are called to assist the Institution in this way. I forbear to publish the names of those who have consented to lecture, lest they should be accidentally prevented from filling their engagement, and the public thus be disappointed.

To facilitate the approach to the building, at the time of these lectures, the walks were temporarily improved, at a considerable expense to the Institution. It is hoped that the authorities of the city of Washington will cause bridges to be erected across the canal, and walks to be constructed through the public grounds, to facilitate the approach to the building, and that the Institution will not be expected to provide accommodations of this kind.

Building.

The east wing of the building was taken possession of by the Secretary in April last, and has since been constantly occupied. The west wing is now finished, and it is contemplated to occupy it temporarily as a library until the portion of the main building intended for this purpose is completed.

The plan of the Smithsonian building was designed by the architect, and recommended to the Board by a committee of the Regents, before the programme of organization was adopted. It is not strange, therefore, when the building came to be occupied, that changes in the internal arrangement should be deemed advisable which would better adapt it to the wants of the Institution. Such changes, at my suggestion, have been made; and for the propriety of these I am responsible. They are principally, however, those of simplification, and in themselves add nothing to the cost of the edifice. An increased expense, however, will arise out of the furnishing of new rooms, which have been acquired by the alterations.

All of which is respectfully submitted.

JOSEPH HENRY,
Secretary of the Smithsonian Institution.

FOURTH ANNUAL REPORT

Of the Secretary of the Smithsonian Institution, for the year 1850.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: During the past year the several parts of the plan of organization have been prosecuted as efficiently as the portion of the income which could be devoted to them would permit. The financial affairs are in a prosperous condition, and though the funds are burthened with the erection of a costly building, and the expenditures trammelled by restrictions growing out of the requisitions of the charter of incorporation, yet the results thus far obtained are such as satisfactorily to prove that the Institution is doing good service in the way of promoting and diffusing knowledge.

Though the programme of organization has been given in two of the annual reports and extensively published in the newspapers, its character does not appear to be as widely known and as properly appreciated as could be desired. Indeed it will be necessary at intervals to republish the terms of the bequest, and also the general principles of the plan which has been adopted, in order that the public may not only be informed of what the Institution is accomplishing, but also reminded of what, ought reasonably to be expected from its operations. Moreover, there is a tendency in the management of public institutions to lose sight of the object for which they were established, and hence it becomes important frequently to advert to the principles by which they ought to be governed. I beg leave, therefore, as introductory to this report, briefly to recapitulate some of the propositions of the programme of organization, and to state some of the facts connected with its adoption.

SMITHSON left his property, in case of the death of his nephew, to whom it was first bequeathed, "to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men." These are the only words of the testator to serve as a guide to the adoption of a plan for the execution of his benevolent design. They are found, however, when attentively considered, to admit of legitimate deductions sufficiently definite and comprehensive.

1. The bequest is made to the United States, in trust for the good of *mankind*.

2. The objects of the Institution are two-fold: first, to increase; second, to diffuse knowledge; objects which, though often confounded with each other, are logically distinct and ought to be separately regarded. The first is the enlargement of the existing stock of knowledge by the discovery of new truths, and the second is the dissemination of these and other truths among men.

3. No particular kind of knowledge is designated; hence a liberal interpretation of the bequest will include no part of the great domain of

science and literature from the degree of attention its importance may demand.

4. Since mankind are to be benefited by the bequest, any unnecessary expenditure on merely local objects would not be in accordance with the proper administration of the trust.

5. Though the funds are generally considered large, and much is expected of them, they are really small in proportion to the demands made upon them. The annual income of the bequest is less than half the cost of the publication of a single yearly report of the Patent Office.

6. In order, therefore, that the limited income may effect the greatest amount of good, it should be expended in doing that which cannot be done as well by other means.

These views, which have commanded the assent of all unprejudiced and reflecting persons who have studied the subject, have been the guiding principles in all cases in which I have had any power of direction; and I am happy to say they are fully adopted by the present directors and officers of the Institution.

To carry out the design of the testator, various plans were proposed; but most of these were founded on an imperfect apprehension of the terms of the Will. The great majority of them contemplated merely the diffusion of popular information, and neglected the first and the most prominent requisition of the bequest, namely, the "increase of knowledge." The only plan in strict conformity with the terms of the Will, and which especially commended itself to men of science, a class to which Smithson himself belonged, was that of an active living organization, intended principally to promote the discovery and diffusion of new truths by instituting original researches, under the direction of suitable persons, in History, Antiquities, Ethnology, and the various branches of Physical Science, and by publishing and distributing among libraries and other public institutions, accounts of the results which might thus be obtained, as well as of those of the labors of men of talent which could not otherwise be given to the world.

This plan, which was probably in the mind of the donor when he gave expression to the few but comprehensive words which indicate the objects of the bequest, is found from our experience to be eminently practical. It requires no costly building or expensive permanent establishment. Its operations, limited only by the amount of the income, are such as to affect the condition of man wherever literature and science are cultivated, while it tends in this country to give an impulse to original thought, which, amidst the strife of politics, and the inordinate pursuit of wealth, is of all things most desirable.

It was with the hope of being able to assist in the practical development of this plan, that I was induced to accept the appointment of principal executive officer of the Institution. Many unforeseen obstacles, however, presented themselves to its full adoption; and its advocates soon found, in contending with opposing views and adverse interests, a wide difference between what, in their opinion, ought to be done and what they could actually accomplish.

The plan was novel, and by many considered entirely chimerical; indeed it could not be properly appreciated except by those who had been devoted o original research. Besides this, the law of Congress

incorporating the Institution, while it did not forbid the expenditure of a part of the income for other objects, authorized the formation of a Library, a Museum and a Gallery of Art, and the erection of a building, on a liberal scale, for their accommodation. It was, indeed, the opinion of many that the whole income ought to be expended on these objects. The Regents did not consider themselves at liberty to disregard the indications of Congress, and the opinion expressed in favor of collections; and after much discussion it was finally concluded to divide the income into two equal parts, and, after deducting the general expenses, to devote one half to the active operations set forth in the plan just described; and the other, to the formation of a Library, a Museum and a Gallery of Art.

It was evident, however, that the small income of the original bequest, though in itself sufficient to do much good in the way of active operation, was inadequate to carry out this more extended plan—to maintain the staff of attendants, and to defray other contingent expenses incidental to a large establishment of this kind. Besides the Secretary and an assistant to attend to the general operations, two principal assistants would be required, one to take charge of the Library and the other of the Museum of Natural History; and to these sufficient salaries must be given, to secure the services of men of the first reputation and talents in their respective lines. It, therefore, became absolutely necessary that the income should be increased; and in order to do this, it was proposed to save the greater part of the $242,000 of accrued interest which Congress had authorized to be expended in a building, by erecting, at a cost not to exceed $50,000, the nucleus of an edifice, which could be expanded as the wants of the Institution might require, and to add the remainder to the principal.

Unfortunately, however, for this proposition, Congress had presented to the Institution the great museum of the Exploring Expedition; and a majority of the Regents, supposing it necessary to make immediate provision for the accommodation of this gift, had taken preliminary steps, previous to my appointment, to construct a large building, and indeed a majority of the committee, to which the matter was referred, had determined to adopt the plan of the present edifice. Strenuous opposition was, however, made to this; and as a compromise, it was finally agreed to draw from the United States treasury $250,000 of accrued interest, and instead of expending this immediately in completing the plan of the proposed building, to invest it in treasury notes, then at par, and to finish the building in the course of five years, in part out of the interest of these notes, in part out of the sale of a portion of them, and also in part out of a portion of the annual interest accruing on the original bequest. It was estimated that in this way, at the end of five years, besides devoting $250,000 to the building, the annual income of the Institution would be increased from $30,000 to nearly $40,000, a sum sufficient to carry out all the provisions of the programme.

After the resolutions relative to the division of the income, between collections on the one hand and active operations on the other, had been adopted, and the plan of finance as to the building had been settled, I was requested to confer with persons of literary and scientific reputa-

tion, and to digest into the form of a general programme the several resolutions of the Board. In the programme which was thus produced and afterwards adopted, it is attempted to harmonize the different propositions of the Board, and to render them all, library, collections, &c., as far as possible, subservient to a living, active organization. Though a valuable library will in time be accumulated, by donation and the exchange of the publications of the Institution, the design at first is to purchase only such books as are immediately necessary in the other operations of the Institution, or which cannot be procured in this country; and the Librarian is required to perform other duties than those which pertain to the office of an ordinary collector and curator of books. He is directed to report on plans of libraries, and the best method of managing them; to collect the statistics of the libraries of the United States; to make a general catalogue as far as possible of all the books in this country, and to procure all the information necessary for rendering the Institution a centre of bibliographical knowledge. Instead of attempting to form a miscellaneous collection of objects of nature and art, it is proposed to collect only those which will yield a harvest of new results, and to preserve principally such as are not found in other collections, or will serve to illustrate and verify the Smithsonian publications.

The tendency of an Institution in which collections form a prominent object, is constantly towards a stationary condition; with a given income, the time must inevitably come when the expenditures necessary to accommodate the articles with house room and attendance will just equal the receipts. There is indeed no plan by which the funds of an institution may be more inefficiently expended, than that of filling a costly building with an indiscriminate collection of objects of curiosity, and giving these in charge to a set of inactive curators. Happily, the programme of organization and the system of expenditure which the Regents have adopted, if rigidly adhered to, will prevent this state of things, and happily the spirit of the present directors and officers who are to give the initial form to the character of the Institution, is in accordance with as active operations as the state of the funds and requisitions of Congress will allow.

It is to be regretted that Congress did not leave the entire choice of the plan of organization to those who were to be entrusted with the management of the bequest, and that, instead of the plan of a costly building, there had not been adopted the nucleus of a more simple edifice, which could have been modified to meet the wants which experience might indicate.

The original estimate for the building, furniture, and improvement of the grounds, was $250,000; and could the actual cost have been confined to this sum, all the results anticipated from the scheme of finance which had been adopted would have been realized at the end of five years. During the past year, however, it has been found necessary, for the better protection of the collections, to order the fire-proofing of the interior of the edifice, at an increased expense of $44,000. This additional draft on the funds can only be met by extending the time for the completion of the building; and even this will require the appropriation of a portion of the income which ought to be devoted to other

purposes. The active operations will suffer most by this draft on the income, since it will be made for the better accommodation of the library and the museum.

It must not be inferred, from the foregoing account, that the affairs of the Institution are in an unfavorable condition; on the contrary, though they are not in every respect what could be wished, still, under the circumstances I have mentioned, they are much better than could have been anticipated. The funds are in a very prosperous state, and all the obstacles in the way of the usefulness of the establishment may, by judicious management, in time be removed. The opposition which was made to the building, led to the adoption of the plan of finance to which I have heretofore adverted, and from this has been realized much more than could have been expected.

After all the expenditures which have been made on the building, grounds, publications, researches, purchase of books and apparatus, not only is the original bequest untouched, but there is now on hand upwards of $200,000 of accrued interest. This will be sufficient to finish the exterior of the building, including all the towers, the interior of the wings, ranges, and a part of the interior of the main edifice; which will afford sufficient accommodation for some years to come, and leave $150,000 to be added to the principal.

This result has been produced by a rigid adherence to the determination of increasing the annual income; and in accordance with this, and in obedience to the direction of the Board of Regents, a petition has been presented to Congress, asking that $150,000 may be taken from the Institution and placed in the treasury of the United States, on the same terms as those of the acceptance of the original bequest, never to be expended, and yielding a perpetual interest of six per cent.

If this petition be granted, all the funds will be permanently and safely invested, and the original income will be increased from $30,000 to nearly $40,000. Out of this, besides carrying on the more important object of the plan, it is proposed to appropriate yearly a small sum for the gradual completion of the interior of the building.

The great importance of a small addition to the income will be evident, when it is recollected that a definite sum is annually required to defray the necessary expenses of the establishment, and that after this has been provided every addition will tend to produce a greater proportional amount of useful effect. The proposed increase will be sufficient to pay all the salaries of the officers, and leave the original income in a great measure free to be applied to the objects contemplated in the plan.

At the last meeting of the Board, Professor Baird, of Dickinson College, Pennsylvania, a gentleman distinguished for his attainments in science, was appointed an Assistant Secretary in the department of natural history. His appointment was made at this time more particularly in order that his services might be secured to take charge of the publications, and that we might avail ourselves of the ample experience which he had gained in this line. He entered on his duties in July last, and besides being actively engaged in organizing the department of natural history, he has rendered important service in conducting our foreign exchanges and attending to the business of the press.

This addition to our force was absolutely necessary to a more efficient discharge of the duties which devolve on us. No person, except from actual experience, can form an idea of the amount of labor required for the transaction of the ordinary business. The correspondence alone is sufficient to occupy two persons continually during the usual office hours.

During the past year one-half of the whole income has been appropriated to the building; and after deducting the general expenses, the remainder has been equally divided between the two great classes of objects designated in the plan. The portion of the income after these divisions, which could be devoted to any one object, has been necessarily small; for example, all that could be expended for researches, publications, and lectures, and indeed for every thing of which the public at a distance could take immediate cognizance, has not exceeded $4,500, and yet out of this sum we have been expected to produce results for which the whole income would be entirely inadequate. I trust, however, that a proper consideration of the facts presented in the remainder of this report, will show that much has been done in proportion to the means at our command.

Publication of Original Memoirs.

The important aid which can be rendered to the promotion of knowledge by the publication, and in some cases by assistance in the preparation of important memoirs, is now beyond all question. Experience has thus far abundantly shown that much more matter of the most valuable character will be presented for publication, free of all charge, than the portion of the income devoted to this object will allow us to publish. Indeed, there is now on hand, or in preparation, more material of this kind than we shall be able, with our limited income, to give to the world in two or three years. In view of this fact, I cannot repress the expression of regret which I have always felt, that the restrictions arising from the requisitions of Congress do not permit a greater expenditure for this most important object. It is chiefly by the publications of the Institution that its fame is to be spread through the world, and the monument most befitting the name of Smithson erected to his memory.

Most of the distinguished foreign literary and scientific societies have placed the Institution on their list of exchange, and in many instances have presented not only the current volume of their Transactions, but also full sets of the preceding volumes. We have reason to believe that before the expiration of another year, we shall receive in exchange the Transactions of nearly all the learned societies of the world, and that the Institution will be recognised by them as an active co-operator in the promotion of knowledge. Professor Baird has furnished a list of the literary and scientific societies to which the quarto volumes have been presented.

The following Memoirs, an account of which was given in my last report, have been printed, or are now in press:

1. Researches relative to the planet Neptune; by S. C. Walker.

2. Contributions to the Physical Geography of the United States; by Charles Ellet, jr.

3. Memoir on the Explosiveness of Nitre; by Dr. Robert Hare.

4. On the Aboriginal Monuments of the State of New York; by E. G. Squier.

5. Memoir on the Reciprocal Action of two Galvanic Currents; by A. Secchi, of Georgetown College.

6. On the Classification of Insects, from Embryological Data; by Professor Louis Agassiz.

7. Monograph of Mosasaurus and the allied Genera; by Dr. R. W. Gibbes.

Besides these, several other papers not described in my last report have been printed, and are ready for separate distribution. The first of these I shall mention is by Professor Lieber, of the College of South Carolina, on the vocal sounds of Laura Bridgman, the blind and deaf mute, whose mind, apparently forever consigned to darkness, has been almost miraculously enlightened, by the sagacity, ingenuity, and perseverance of Dr. Howe.

There is, perhaps, at this time, no living human being who offers to the psychologist so attractive an object of study as this individual; and hence every observation relative to her peculiar habits is of great interest. Dr. Lieber has, from year to year, during his summer vacations, been in the habit of visiting Laura Bridgman, and on one occasion spent three months in her immediate neighborhood for the purpose of studying the sounds which she utters as indicative of ideas. These sounds consist principally of such as she voluntarily adopted to designate different individuals. The results of the observations given in this paper are accompanied by a series of philosophical deductions and suggestions which cannot fail to interest the psychologist and physiologist. This memoir is illustrated by an engraved *fac simile* of a letter from Laura Bridgman's own hand.

The next paper is by Professor Bailey of West Point. This gentleman has rendered himself favorably known to the world of science by his researches on minute animals and plants, which, though mostly unseen by the naked eye, are found as widely distributed, and as permanent and definite in character, as the largest organized objects in nature. This paper gives the results of a series of microscopic observations which the author made during his sojourn in the southern part of the United States, whither he was ordered last winter on account of his health. It designates numerous localities of microscopic animals and plants, and furnishes lists of the species found in each. It also contains a series of tables presenting a number of species with the different localities where each was found. The species so classed include those of the Desmidiæ, Diatomaceæ, Infusoriæ, and Algæ. Following these is a description of numerous other species, most of which are represented by lithographic figures.

Among the interesting facts arrived at by the author, are the discovery of an extensive stratum of fossil infusoriæ near Tampa Bay, Florida; the existence of infusoriæ in the rice fields of the south; and the demonstration of the cosmopolite character of many microscopic objects hitherto believed to exist only in Europe.

Another paper by the same author, but presented to the Institution by Professor Bache, Superintendent of the U. S. Coast Survey, has refer-

ence to a microscopic examination of soundings along the eastern coast of the United States; samples of all the materials brought up by the sounding apparatus of the Coast Survey having been carefully preserved by Professor Bache in bottles, and so arranged as to present, as it were, the surface geology of the bottom of the sea within a certain distance from the shore. Specimens of these were given to Professor Bailey for microscopic examination, and the results are presented in this paper. It exhibits the fact of a high development of minute organic forms, mainly of Polythalamia, in all deep soundings, varying from fifty-one to ninety fathoms, occurring in an abundance similar to that in which analogous fossil forms are found in the marls under the city of Charleston. It also shows that each locality has its predominant species, by means of which alone the region whence they were taken may be indicated. Many of the conclusions derived are of much interest to the mariner, the geologist, and the naturalist. The paper closes with a brief description of the genera and species referred to, embracing several that are new, the whole accompanied by numerous figures.

In connexion with the foregoing may be mentioned a paper by Mr. Charles Girard, entitled "A Monograph of the Fresh Water Cottoids of North America," which has been accepted, and will soon be published. The species of fish called *Cottus gobio* was supposed to be common to Europe and America, and thus to form an exception to a general rule in regard to the fresh water species of the two continents. It has been discovered by Mr. Girard and others, that the European species, as described by Linnæus, is really composed of several, and that while none of these are found in North America, we have actually a number of species peculiar to this country. The memoir contains elaborate descriptions of the known species as well as of several new ones, together with copious notes on their scientific history, their geographical distribution, affinities with each other and with foreign species, anatomical structure, &c.; the whole illustrated by appropriate figures. It is worthy of remark, that most of the hitherto undescribed species presented in this memoir were collected by Professor Baird, and now form a part of the Smithsonian collection.

Another memoir, now in course of preparation, is one which will of itself occupy a considerable portion of one of the quarto volumes of the Smithsonian Contributions. It affords an interesting illustration of the working of the plan of organization in the way of eliciting important scientific knowledge which would not otherwise be produced, or, if produced, could not be given to the world through any other channel.

This memoir consists of a description of the marine plants, or Algæ, which are found along the eastern and southern coasts of the United States, and which are deserving of attention, not only on account of their beauty, variety, and the illustrations they present of the growth and development of vegetable forms, but also on account of their economical value with reference to agriculture and the chemical arts. This volume is in the course of preparation by Professor Harvey, of the University of Dublin, Ireland, a gentleman who is recognised as the first authority in this branch of botany. He was induced to visit this country by an invitation to lecture on the Algæ before the Lowell Institute, and by the opportunity thus offered him of studying his favorite

branch of science in a new region. After completing his lectures he made a collection of the marine plants of our coast, and offered to furnish drawings of the genera and species, with detailed descriptions free of all cost, provided the Institution would bear the expense of publication.

Upon the warm recommendation of some of the principal botanists of the country, the liberal offer of Professor Harvey was accepted, and he is now engaged in making, with his own hand, the drawings on stone. The preparation of the work, besides the time expended in collecting the specimens, will occupy two or three years. This voluntary contribution to knowledge from a man of science may surprise those whose minds are not liberalized by philosophical pursuits, and who cannot conceive any object in labor unconnected with pecuniary gain.

To assist in defraying the heavy expense of the publication of this work, it is proposed to color the plates of a part of the edition, and to offer copies for sale. The work will also be issued in parts, so as to distribute the cost through several years.

In addition to the foregoing, an appendix, added to Mr. Squier's paper on the ancient monuments of New York, has been printed. Also, there has been such an urgent demand for copies of Mr. Ellet's paper on the physical geography of the Mississippi Valley, that it has been thought advisable to reprint it, and distribute the whole of the first edition among all persons to whom a knowledge of its contents would be of peculiar importance.

The several papers which have been described in this and the preceding Report, will, when collected together, form the contents of the second and part of the third volume.

The plan adopted of printing each memoir with a separate title and paging has been found to answer a good purpose. There is no delay in printing one paper on account of the engraving of the plates of another; and long before a volume can be completed a separate memoir may be widely circulated among those most interested in its perusal. As an example of this I may mention that one of the papers which forms part of the second volume of the Contributions has already been reprinted in the London and Edinburg Journal, with due credit given to the Institution.

Reports on the Progress of Knowledge.

The income of the Institution as yet has not been sufficient for fully reducing to practice this part of the plan of organization. The preparation of these reports can only be entrusted to those who are familiar with the subjects, and well skilled in the art of composition, and the services of such persons cannot be obtained without an adequate remuneration. Of the several reports mentioned at the last meeting of the Board but one has been published, viz: that on the discovery of the planet Neptune, by Dr. B. A. Gould, of Cambridge, editor of the Astronomical Journal. It has been stereotyped, and copies distributed amongst all our meteorological observers, and other persons in the country known to us as being actively engaged in promoting the science of astronomy.

The preparation of the report on the Forest Trees of North America, though delayed in consequence of the absence of the author, Dr. Gray, of Harvard University, on a visit to Europe, is still in progress. The illustrations are in the hands of the artists, and the first part will probably be published during the present year. The cost of this report, on account of the elaborate illustrations, will be greater than was at first anticipated; consequently, the publication of the entire work must necessarily be spread over a number of years. It is believed, however, that a considerable part of the expense will be repaid to the Institution by the sale of copies at a small advance on the original cost.

The other reports on the Progress of Knowledge mentioned in my last communication to the Regents are ready for the press, and will be published, in whole or in part, during the present year.

The report on the statistics of Libraries of the United States, prepared by Professor Jewett, has been ordered to be printed by Congress, as an appendix to the Regents' Report. A sufficient number of extra copies will be presented to the Institution, for distribution to all the libraries from which statistical information was received. It forms a volume of about two hundred and twenty-five pages, and will, I am sure, be considered an important contribution to bibliographical statistics.

Distribution of Publications.

We have found considerable difficulty in deciding upon the rules to be observed in the distribution of the Smithsonian publications. It is evident that, from the small portion of the income which can be devoted to this object, the distribution must be circumscribed. Fifteen hundred copies of each memoir have been printed; but this number, though all that the income could furnish, has not been found sufficient to meet a tenth part of the demand. It should be recollected that, though these memoirs consist of the results of new investigations of the highest importance to the well-being of man in extending the bounds of his knowledge of the universe of mind and matter, yet they are not generally of such a character as to be immediately appreciated by the popular mind, and, indeed, they are better adapted to instruct the teacher than to interest the general reader. They should, therefore, be distributed in such a way as most readily to meet the eye of those who will make the best use of them in diffusing a knowledge of their contents.

The following rules have been adopted for the distribution of the quarto volumes of collections of memoirs:

1. They are to be presented to all Learned Societies which publish transactions, and give copies of these in exchange to the Institution.

2. To all Foreign Libraries of the first class, provided they give in exchange their catalogues, or other publications, or an equivalent from their duplicate volumes.

3. To all Colleges in actual operation in this country, provided they furnish in return meteorological observations, catalogues of their libraries and of their students, and all other publications issued by them relative to their organization and history.

4. To all States and Territories; provided they give in return, copies of all documents published under their authority.

5. To all incorporated Public Libraries in this country, not included in either of the foregoing classes, containing more than seven thousand volumes; and to smaller Libraries, where a whole State or large district would be otherwise left unsupplied.

The author of each memoir receives, as his only compensation, a certain number of copies, to distribute among his friends, or to present to individuals who may be occupied in the same line of research. In this way single memoirs are distributed to individuals, and especially to those who are most actively engaged in promoting discoveries. Copies of the reports, and also in some cases of particular memoirs, are sent to our meteorological observers. Besides these, we have placed on the list the more prominent Academies and Lyceums, as recipients of the minor publications. It is also intended, in order to benefit the public more generally, to place on sale copies of memoirs and reports; though on account of the number required for the supply of Institutions, we have not, as yet, been able to carry this plan into effect.

No copyright has been taken for the Smithsonian publications; they are therefore free to be used by the compilers of books, and in this way they are beginning to reach the general reader and to produce a beneficial effect on the public mind.

Meteorology.

The system of meteorology under the direction of the Smithsonian Institution has, during the last year, made good progress. And though the whole number of stations has not been much increased, yet the character of the instruments adopted, and consequently the value of the observations, has been improved both in precision and variety.

This system is intended to embrace, as far as possible, the whole extent of North America, and to consist of three classes of observers. One class, without instruments, to record the changes in the aspect of the sky, the direction of the wind, the beginning and ending of rain, the appearance of the aurora, &c. Another, in addition to the foregoing, to give an account of the changes of temperature, as indicated by the thermometer. A third class, furnished with full sets of instruments, to record all changes deemed important in the study of meteorology.

To carry on this system, the Institution has received or expects to receive assistance from the following sources:

1. From the small appropriation made by Congress, to be expended under the direction of the Navy Department.

2. From the appropriations made by different States of the Union.

3. From the observations made under the direction of the Medical Department of the United States army.

4. From the officers of her Majesty's service in different parts of the British possessions in North America.

5. From observations made by institutions and individuals, in different parts of the continent, who report immediately to the Smithsonian Institution.

A small appropriation has been made by Congress for two years pas

to be expended under the direction of the Navy Department for meteorological purposes; and Professor Espy, engaged under the act making this appropriation, has been directed to co-operate with the Institution, in promotion of the common object. Besides the aid which we have received from Professor Espy's knowledge of this subject, the general system has been benefited in the use of instruments purchased by the surplus of the appropriation, after paying the salary of the director and other expenses.

During the last year, Professor Espy has been engaged in a series of interesting experiments on the variations of temperature produced by a sudden change in the density of atmospheric air. The results obtained are important additions to science, and directly applicable to meteorology. The experiments were made in one of the rooms of the Smithsonian Institution, and with articles of apparatus belonging to the collection which constituted the liberal donation of Dr. Hare. An account of these investigations will be given in a report to the Secretary of the Navy.

It was mentioned in the last report that the Regents of the University of the State of New York, in 1849, made a liberal appropriation of funds for the reorganization of the meteorological system of observations established in 1825; and that Dr. T. Romeyn Beck and the Hon. Gideon Hawley, to whom the enterprise was entrusted, had adopted the forms and the instruments prepared under the direction of the Smithsonian Institution. Another appropriation has been made, for 1850; and the system has been carried, during the past year, into successful operation by Professor Guyot, late of Neufchatel, in Switzerland. This gentleman, who has established a wide reputation as a meteorological observer by his labors in his own country, was recommended to Dr. Beck and Mr. Hawley by this Institution, and employed by them to superintend the fitting up of the instruments in their places, to instruct the observers in the minute details of their duty, and to determine the topographical character and elevation above the sea of each station.

The whole number of stations which have been established in the State of New York is thirty-eight, including those which have been furnished with instruments by the Smithsonian Institution, and the Adirondack station by the liberality of Archibald McIntyre, esq., of Albany. This number gives one station to twelve hundred and seventy square miles, or about one in each square of thirty-five and a half miles on a side. These stations are at very different heights above the level of the sea. They were selected in conference with Dr. Beck, Professor Guyot, and myself. The State is naturally divided into the following topographical regions, namely:

1. The southern or maritime region.

2. The eastern, or region of the Highlands and Catskill mountains, with the valleys of the Hudson and Mohawk rivers.

3. The northern, or region of the Adirondack mountains, isolated by the deep valleys of the Mohawk, Lake Champlain, the St. Lawrence, and Lake Ontario.

4. The western, or region of the western plateau, with the small lakes and sources of the rivers.

5. The region of the great lakes, Erie and Ontario.

I regret to state that no efficient steps have as yet been taken to organize the system of Massachusetts, for which an appropriation was made by the legislature, at its last session. I have lately written to Governor Briggs, urging immediate action, and offering, on the part of the Institution, to render any assistance in our power towards furthering so laudable an enterprise. No answer has yet been received.*

The observations made at the different military stations, under the direction of the Medical Department of the United States army, have been partially reorganized, and a number of new stations and several of the old ones furnished with improved Smithsonian instruments. The head of the Medical Department of the army, Dr. Lawson, has assigned the general direction of the system of observations to Dr. Mower of New York, to whom we are indebted for the valuable aid which this extended set of observations furnishes the general system. The immediate superintendence of the reduction of these observations is in charge of Dr. Wotherspoon, to whose zeal and scientific abilities the cause of meteorology bids fair to be much indebted.

The most important service the Smithsonian Institution has rendered to meteorology during the past year, has been the general introduction into the country of a more accurate set of instruments at a reasonable price. The set consists of a barometer, thermometer, hygrometer, wind vane, and snow and rain gauge.

The barometer is made by James Green, No. 422 Broadway, New York, under the direction of the Institution. It has a glass cistern with an adjustable bottom enclosed in a brass cylinder. The barometer tube is also enclosed in a brass cylinder, which carries the vernier. The whole is suspended freely, from a ring at the top, so as to adjust itself to the vertical position. The bulb of the attached thermometer is enclosed in a brass envelope communicating with the interior of the brass tube, so as to be in the same condition with the mercury, and to indicate truly its temperature. Each instrument made according to this pattern is numbered and accurately compared with a standard. In the comparisons made by Professor Guyot, a standard Fortin barometer, by Ernst, of Paris, was employed; also, a standard English barometer, by Newman, of London, belonging to this Institution. These instruments, for greater certainty, have been compared with the standard of the Cambridge Observatory, and of Columbia College, both by Newman; also with the standard of the Observatory of Toronto, Upper Canada.

The results of these examinations prove the barometers made by Mr. Green, according to the plan adopted by the Smithsonian Institution, to be trustworthy instruments.

The thermometers are by the same maker; and those intended for the State of New York were compared with a standard by Bunten, of Paris, and with another by Troughton & Simms, of London. Those found to differ more than a given quantity from the standards were rejected.

* A letter has since been received, and the system placed under the direction of this Institution.

The instruments for indicating the variation of the hygrometrical condition of the atmosphere, consist of two thermometers, of the same dimensions, accurately graduated. The bulb of one of these is enveloped in a covering of muslin moistened with water, and that of the other is naked.

The rain and snow gauges, and also the wind vanes, are made under the direction of the Institution, by Messrs. Pike & Son, 166 Broadway, New York. The rain gauge is an inverted cone of sheet zinc, of which the area of the base is exactly one hundred square inches. This cone or funnel terminates in a tube which carries the water into a receiving vessel. The water which has fallen is measured by pouring it from the gauge into a cylinder, so graduated as to indicate hundredths of inches. A smaller cylinder is also provided, which gives thousandths of inches, and may serve, in case of accident, as a substitute for the large cylinder. The rain gauge is placed in a cask sunk in the earth, with its mouth near the level of the ground.

The snow gauge is a cylinder of zinc of the same diameter as the mouth of the rain gauge. The measurement is made by pressing its mouth downward to the bottom of the snow, where it has fallen on a level surface, then carefully inverting it, retaining the snow, by passing under it a thin plate of metal. The snow is afterwards melted, and the water produced is measured in one of the graduated glass cylinders of the rain gauge.

The wind vane is a thin sheet of metal, (it might be of wood,) about three feet long, carefully balanced by a ball of lead, and attached to the top of a long wooden rod, which descends along the wall of the building to the sill of the observer's window. It terminates in the centre of a fixed dial-plate, and its movements indicate the direction of the wind by a pointer attached to the rod.

The observer is by this arrangement enabled to determine the course of the wind, by looking down on the dial-plate, through the glass of the window, without exposing himself to the storm.

Besides the full sets of instruments furnished by the State of New York, from the appropriation of the regents of the University, the Smithsonian Institution has furnished a number of sets to important stations; and, in order that they might be more widely disseminated, we have directed Mr. Green to dispose of sets to individuals, at a reduced price, on condition that they will give us copies of the results of their observations; the remainder of the cost being paid by this Institution. A number of persons have availed themselves of this privilege.

To accompany the instruments, and for the use of those who take part in the Smithsonian system of meteorological observations, a series of minute directions, prepared by Professor Guyot, has been printed by the Institution. It occupies forty octavo pages, with wood-cut representations of the instruments, and is accompanied by two lithographic engravings, to illustrate the different forms of clouds, and to facilitate their notation in the journals, in accordance with the nomenclature adopted by meteorologists. A set of tables has also been furnished for correcting the barometrical observations, on account of variation of temperature. A set of hygrometrical tables, to be used with the wet

and dry bulb thermometers, and a set for the calculation of heights by the barometer, will be prepared.

We may also mention, in connexion with this subject, that a series of preliminary experiments have been made, in the laboratory of this Institution, for the purpose of constructing, from direct observation, a scale of boiling temperatures, corresponding to different degrees of rarefaction of the air. With a thermometer, each degree of which occupies one inch in length of the scale, the variations of the boiling point corresponding to a slight change in altitude are found to be more perceptible than those in the length of the barometrical column.

A series of experiments has also been made for testing the performance of the aneroid barometer under extremes of atmospheric pressure. The instrument, as usually constructed, has not been found, from these experiments, very reliable, though it may be improved, and thus serve as an indicator of minute atmospheric changes. I think, however, it will not answer for the determination of changes of atmospheric pressure of considerable magnitude.

For the better comprehending the relative position of the several places of observation, now embraced in our system of meteorology, an outline map of North America has been constructed by Prof. Foreman. This map is intended also to be used for presenting the successive phases of the sky over the whole country, at different points of time, as far as reported; and we have been waiting for its completion, to commence a series of investigations, with the materials now on hand, relative to the progress of storms.

A valuable collection of returns relative to the aurora has been received, in accordance with the special instructions which we have issued for the observation of this interesting phenomenon. These are to be placed in the hands of Captain Lefroy, of the Toronto Observatory, and incorporated with observations of a similar kind which he has collected in the British possessions of North America. An account in full of the whole series will be presented by Captain Lefroy, to be published in the Smithsonian Contributions.

The meteorological correspondence is under the charge of Professor Foreman. This is found not only to involve considerable labor in the way of arranging the regular returns and sending the required blanks and directions, but also in the discussion of questions on almost every branch of science propounded by the meteorological observers, which we think it our duty in all cases to treat with respect, and to answer to the best of our knowledge.

Researches, &c.

Explorations.—The programme of organization contemplates the institution of researches in Natural History, Geology, &c.; and, though the state of the funds would permit of little being done in this line, yet we have made a beginning. Besides the assistance rendered to the exploration of the botany of New Mexico, by the purchase of sets of plants from Mr. Wright and Mr. Fendler, as mentioned in my last report, a small sum was appropriated to defray the cost of transportation of the articles which might be collected by Mr. Thaddeus Culbertson, in the

region of the Upper Missouri. This gentleman, a graduate of the institutions at Princeton, had purposed to visit the remote regions above mentioned for the benefit of his health, and was provided by Professor Baird with minute directions as to the preservation of specimens and the objects which should particularly engage his attention. His journey was undertaken, and executed, under particularly favorable circumstances for exploration. He was accompanied by his brother, Mr. Alexander Culbertson, for many years connected with the American Fur Company, who was familiar with the whole country, and had himself sent valuable specimens of fossil mammalians to the Philadelphia Academy of Natural Sciences.

Mr. Culbertson first visited an interesting locality called the *Mauvaises Terres*, or Bad Lands, where his brother had previously found the remains of the fossils sent to the Academy. He afterwards ascended the Missouri, to a point several hundred miles above Fort Union. He returned in August last in renewed health to gladden the hearts of his parents and friends, with the prospect of long life and usefulness; but though he had withstood the privations and exposures of the wilderness, he sank under an attack of a prevalent disease and died after a few weeks' illness.

He left a journal of all the important events of his tour, which is thought of sufficient importance to be appended to this report.

For a particular account of the interesting specimens which he procured, many of which are new and undescribed, I must refer to the appended report of Professor Baird. A part of the specimens, those of the fossil remains, have been referred to Dr. Leidy, of Philadelphia, who will present the result of his investigations relative to them, for publication in one of the volumes of the Smithsonian Contributions.

A small appropriation has also been made to defray in part the expense of exploration, relative to the erosions of the surface of the earth, especially by rivers, and for investigations relative to terraces and ancient sea-beaches, under the direction of President Hitchcock. An abstract of these investigations, as far as they have been made, has been received by the Institution; and a full account of the whole, it is expected, will soon be ready for publication.

An exploration for the increase of the Smithsonian collection, particularly in fishes and reptiles, of which our knowledge is most imperfect, was undertaken by Professor Baird, accompanied by a number of young gentlemen, his former pupils. The result of this expedition, which cost the Institution little more than the price of materials and transportation, was a large number of specimens, including numerous species before unknown to science.

Experiments.—A series of experiments has been made, during the past year, under the direction of Professor Jewett, to test the value of a new plan of stereotyping. If the result of these experiments be favorable, it is proposed to purchase the right to use the invention, for the purposes of the Institution. Should the invention be found to possess the character to which it appears entitled, it will not only be of much importance to the Institution, but to the world; and we shall have done good service to the cause of knowledge, by giving it our countenance and assistance. Professor Jewett has found it especially

applicable to his system of stereotyping catalogues of libraries, by separate titles; and in this way it will certainly be of great value, even should it fail in other respects to realize the sanguine expectations of its inventor.

The result of the experiments will be submitted to a commission of persons properly qualified to judge of its merits; and if their report be favorable, a small sum will be allowed for the use of it.

Besides the experiments mentioned under the head of meteorology, made by Mr. Espy, on the cold produced by the rarefaction of air, Dr. Hare, of Philadelphia, is employing articles of apparatus belonging to the Institution, in a series of researches on the phenomena exhibited in the air and in a vacuum by rubbing silicious minerals against each other. The results of these experiments, with the drawings of the apparatus employed, he intends to present to the Institution in the form of a memoir for the Smithsonian Contributions to Knowledge.

Computations.

Occultations for 1851.—For the purpose of facilitating the accurate determination of geographical points in the United States, a list of occultations and the co-ordinates of reductions for the years 1848, 1849, and 1850, was prepared and published at the expense of the Smithsonian Institution. Congress has since ordered the publication of an American Nautical Almanac; and as lists of occultations will form a part of this ephemeris, Mr. Preston, late Secretary of the Navy, directed that the expense of computing these tables for 1850 should be defrayed from the appropriation for the Almanac, provided the printing and distribution were at the expense of the Smithsonian Institution. The same course has been authorized by Mr. Graham, the present Secretary of the Navy.

Copies of these tables, computed by John Downes, of Philadelphia, have been sent to all persons known to the Institution, who would probably make use of them in the way of improving our knowledge of the geography of this country. They have been furnished particularly to officers of the United States army, and other persons engaged in exploring our new possessions and determining their boundaries. All persons to whom these tables were presented, have been requested to send the result of their observations, made in connexion with the use of them, to this Institution, or to publish them in some accessible journal.

Ephemeris of Neptune.—It was stated, in the last Report, that the orbit of the planet Neptune, established by the researches of Mr. Walker, and comprised in his memoir published by the Institution, gives the data for calculating an ephemeris or tables of the daily position of this planet, rivalling in precision the tables for any of the older planets. Sets of these tables were computed and published for 1848 and 1849, at the expense of the Smithsonian Institution; but those for 1850 and 1851 have been computed under the direction of Lieutenant Davis, superintendent of the Nautical Almanac, and at the expense of the appropriation under his charge, while the expense of printing the tables has been borne by this Institution.

These tables are corrected for the perturbing influence of the planets Jupiter, Saturn, and Uranus, by deductions from mathematical investigations of Professor Peirce, of Harvard University. They have been used in following the motion of Neptune, by all the principal astronomers of the world, and have everywhere received the highest commendation, reflecting honor on the Institution, and on the science of the country.

Museum.

The act of Congress authorizing the establishment of the Smithsonian Institution contemplates the formation of a Museum of Natural History. It would not, however, be in accordance with the spirit of the organization, to expend the income in the reproduction of collections of objects which are to be found in every museum of the country. Natural history can be much more effectually promoted by special collections of new objects; by appropriations for original explorations and researches; and, above all, by assistance in the preparation of the necessary drawings, and by presenting to the world, in a proper form, the labors of naturalists. In conformity with these views, it has been resolved to confine the collections, principally, to objects of a special character, or to such as may lead to the discovery of new truths, or which may serve to verify or disprove existing or proposed scientific generalizations. A number of special collections, important in this point of view, are mentioned by Professor Agassiz, in the Appendix to my last Report; and, for a more enlarged statement relating to the same subject, I would refer naturalists to the accompanying report by Professor Baird, to whom the charge of the collections of natural history has been confided.

A considerable number of specimens in mineralogy, geology, and botany, had been received previous to Professor Baird's connexion with the Institution; and since he has entered upon his duties, a large addition has been made to the stock, by the deposite of his own cabinet, and by donations from various sources.

The collection is principally rich in undescribed species of fishes and reptiles; and especial care will be taken by Professor Baird to enhance its value, by procuring, in all cases, as far as practicable, such specimens as may help to solve questions of scientific interest. The collection has been arranged in one of the rooms of the basement story, so as to be available to the student in this branch of science, and has already done service in this way, by furnishing the facts given in one of the memoirs of the Smithsonian Contributions. Though letters are constantly received requesting the Institution to purchase collections of plants, minerals, and other objects of natural history, yet we have declined, in all cases, to avail ourselves of opportunities of this kind to increase the cabinet. Experience has, thus far, shown that specimens of all kinds will accumulate, from donations and exchange, as rapidly as they can be accommodated with room, and properly arranged.

I have given, in my last report, the reasons why it is not thought advisable, on the part of the Institution, to accept the gift, proffered by Congress, of the great museum of the Exploring Expedition, and I have no reason to change my opinion on that point.

For a detailed account of the spcimens forming the Smithsonian collection, I refer to Professor Baird's report, herewith submitted.

American Antiquities.

During the past year we have received information of the locality of a number of mounds, and other remains of ancient art, in different parts of the United States. A gentleman is now engaged in the examination of the mounds of Western Virginia, with the intention of presenting the results of his labors for publication in the Smithsonian Contributions.

The survey of the mineral land in the vicinity of Lake Superior has disclosed the site of an ancient copper mine, whence, in all probability, the copper of the ornaments, instruments, &c., found in the mounds, was derived. The remains of the implements, and of the ore, as left by the ancient miners, are exhibited in place, and afford an interesting illustration of the state of arts among the mound-builders. The geological surveyors have promised to make accurate measurements and drawings of everything of interest connected with these works, and to present them, with suitable descriptions, to the Institution for publication.

Mr. E. G. Squier, during his sojourn in Central America, as chargé d'affaires of the United States, made some interesting explorations relative to the antiquities of that country, and has sent to this Institution five large stone idols and several smaller objects, as the beginning of an ethnological museum. For the cost of shipment and transportation of the three larger idols, by way of Cape Horn, the Institution is indebted to the liberality of B. Blanco, esq., of New York.

For some remarks relative to the importance of forming an ethnological museum, I beg to refer to a paper by Mr. Squier, given in the Appendix to this Report.

Apparatus and instruments of research.

It is a part of the plan of the Institution to appropriate a small portion of the funds to the purchase of sets of instruments for physical research, to be used by the officers of the Institution, and, under certain restrictions, by other persons. In accordance with this purpose, I was requested, by the Board of Regents, to procure an astronomical clock, with the electro-magnetic registering apparatus, to be lent to Lieutenant Gillis during the continuance of his astronomical labors in Chili. The clock has been imported from Germany, and is now in the hands of the instrument-maker to receive the registering attachments. The whole will be sent to Chili as soon as the apparatus is completed. I regret that the difficulty of procuring the services of suitable workmen has delayed so long the completion of these instruments.

A communication from Lieutenant Gilliss informs us that the Chilian government has resolved to establish a permanent national observatory at Santiago, and that it will purchase the instruments above mentioned. The institution will therefore again, as in the case, mentioned in a former Report, of the purchase of a telescope for the same expedition, be the means of promoting science without an expenditure of its income.

The apparatus for determining the elements of terrestrial magnetism, mentioned in my last Report as having been lent to Colonel Emory, has been delivered to Col. Graham, to be used on the Mexican Boundary Survey. To replace these, the Institution has received permission to order another set, from London, at the expense of the government; and thus, by an addition to the number of instruments of this kind, the means of promoting the science of terrestrial magnetism, in this country, will be increased.

The purchase of standard meteorological apparatus, and also the instruments which have been distributed to different important stations throughout the country, is a part of the same plan.

During the past year a considerable portion of the apparatus constituting the liberal donation of Dr. Hare, of Philadelphia, has been repaired and fitted up; and we hope, during the present season, to complete the repairs of the remainder, and to place the whole in a proper position for exhibition and use.

Library.

It has been stated, that the programme of organization is intended to harmonize the several requisitions of Congress, and the resolutions of the Board of Regents, with a system of active operations, the influence of which shall be as widely extended as practicable. Though almost every one will admit the value of libraries, and the importance of collecting in this country as great a variety of books as possible, yet it may well be doubted whether the accumulation of a large number of books which are to be found in almost every library of the country, is, in the present state of the funds, to be expected or aimed at. It is believed that a portion of the income devoted to the library may be more efficiently expended in the promotion of the desired ends by other means, and hence it was resolved to make special collections of books; particularly to procure such as are not in the country, and also, in order to render more available those which are now in our libraries, to prepare, as far as practicable, a general catalogue of all the books they contain.

In accordance with these views, Professor Jewett has devised a plan of facilitating the publication of catalogues of libraries, which bids fair to be of much importance to the literature of the country. This plan has been submitted for examination to a commission of gentlemen well acquainted with the subject, and we have received from them a very favorable report recommending its adoption.

The propositions submitted to the commission for examination, were as follows:

1. A plan for stereotyping catalogues of libraries by separate movable titles; and,

2. A set of general rules, to be recommended for adoption by the different libraries of the United States, in the preparation of their catalogues.

For a full account of Professor Jewett's plan, and of the advantages anticipated from it, I must refer to his report herewith submitted. I may, however, briefly allude to the leading principle of the plan, which

is to stereotype the titles of books on separate movable blocks. These blocks once prepared, and kept in a central depository, may be used for the printing of new editions of the catalogues for which they were originally made, allowing the interposition of additional titles in their proper order; as well as for the printing of all other catalogues containing the same titles. The collection of the stereotype blocks of the titles of the several libraries will thus form the stereotyped titles of a general catalogue of all the libraries. They will lend themselves to the construction of bibliographies of particular branches of knowledge, and will admit of being arranged alphabetically, chronologically, or in classes, in accordance with any required system.

These blocks are not to be made in advance of a demand for their use. They are to be gradually accumulated, by an arrangement, which, imposing only a temporary and light burden upon the funds of this Institution, will effect the great public object desired, at the same time that it diminishes to but a fraction of the present cost the expenses of publishing catalogues, and secures the construction of them upon a uniform and approved system.

The details of a plan so comprehensive may well be supposed to be difficult of adjustment, and not capable of being clearly described within the limits of a few paragraphs. These, however, have been fully considered by a competent tribunal; and the plan has received commendation and promises of co-operation from some of the principal institutions of the country.

During the last year, the library has continued to increase by donation, by receipts under the copyright law, by exchanges for the publications of the Institution, and by purchase. It now numbers, in all, nearly ten thousand separate articles, and bids fair, from the same sources, to become a very valuable collection.

Though one half of the annual interest is to be expended on the library and the museum, the portion of the income which can be devoted to the former will, in my opinion, never be sufficient, without extraneous aid, to collect and support a miscellaneous library of the first class. Indeed, all the income would scarcely suffice for this purpose. Still, by means of exchanges, donations, and purchases, a library of great value may be collected and sustained; and this, with the constantly increasing library of Congress, the libraries of the Departments, and that of Georgetown College, will furnish a collection of books not unworthy of the capital of this nation.

From the report of Professor Jewett, it will be seen that a Gallery of Art has been commenced, and that it is already in possession of a valuable collection of engravings.

In this connexion, I may mention that at the last annual meeting of the Board a letter was presented from the Hon. Abbott Lawrence, informing the Regents that a portrait of Smithson had been offered through him for sale to the Institution. This portrait, which was in the possession of the widow of John Fitall, a servant of Smithson, mentioned in his will, was purchased for thirty guineas, and is now in the Gallery of Art. It represents the founder of this Institution, in the costume of a student of Oxford, and was probably painted when he was not more than twenty years of age. There is, also, in the pos-

session of the Institution a medallion of Smithson, in copper, taken in after life. It is from this that the head on the title-page of the Smithsonian publications has been copied.

Lectures.

During the past session of Congress a series of popular lectures has been given to the citizens of this place and strangers, in the lecture-room of the Smithsonian building. These lectures were delivered by gentlemen distinguished for their standing, and for their attainments in literature and science, who were invited for this purpose. The interest in these lectures has been sustained to a wonderful degree. They have been attended from the first by large audiences; and the results thus far indicate that considerable good may be derived from the diffusion of knowledge in this way, in a central position like Washington, where persons from every part of the Union are found. Although the lectures appear to the public one of the most prominent objects of the Institution, and although they are attended with much trouble and considerable expense, they really form the least important feature of the plan adopted. So long, however, as there is a prospect of doing good by means of them, it is due to the city in which the Institution is located that they should be continued.

Much complaint has been made on account of the size of the lecture-room. It is certainly too small to accommodate all who have wished to attend. We have, however, endeavored, in several instances, to obviate this difficulty, by procuring a repetition of the lectures; but this plan is attended with additional expense, and cannot, in all cases, be adopted. Should large audiences continue, it may be well to provide a larger lecture-room in the main building, and, by removing the seats from the present lecture-room, convert it into a museum of apparatus. This change, if thought advisable, can be made at very little, if any, additional expense; since the present wood-work of the interior of the main building is to give place to a fire-proof structure, which will admit of being arranged as a lecture-room. Indeed, the original plan contemplated a room of this kind in the main building; but the arrangement of it was such as to seat scarcely more than the room at present used.

Many inquiries are made as to the publication of these lectures. In some cases, reports of them have been given in the newspapers, and it will be advisable to extend this practice to all; but the publication, in a separate form, of lectures, which in many cases are not written out, and not intended by their authors as additions to knowledge, would be attended with much expense and little useful effect. The Institution, in several instances, is doing better service, by publishing in full the original researches on which the lectures are based. The papers of Professor Agassiz, of Professor Harvey, and of Lieutenant Davis, are of this character, and will be given to the world through the Smithsonian Contributions.

The following is a list of the Titles of Lectures given before the Institution during the last session of Congress, with the names of the distinguished gentlemen by whom they were delivered:

A single lecture on Holland, by the Rev. Dr. George W. Bethune, of Brooklyn, New York.

A course of lectures on the Relations of Time and Space, the Vastness of the Visible Creation, and the Primordial Arrangement of Existing Systems; by Professor Stephen Alexander, of Princeton, New Jersey.

A course of lectures on Science applied to Agriculture, by Professor J. F. W. Johnston, of the University of Durham, England.

Two lectures, one on the Tendencies of Modern Science, and the other on the Spirit of the Age; by the Rt. Rev. Bishop Alonzo Potter, of Pennsylvania.

One lecture on the Ability of the Individual to Promote Knowledge; by the Rev. John Hall, of Trenton, New Jersey.

A course of lectures on the Unity of the plan of the Animal Creation; by Professor Louis Agassiz, of Cambridge, Massachusetts.

A course of lectures on the Tides of the Ocean and their Geological Relations; by Lieutenant Charles Henry Davis, of the United States navy.

A course of lectures on Marine Algæ or Sea Weeds, and also on the Morphology of the Vegetable Kingdom; by Professor William H. Harvey, of the University of Dublin, Ireland.

Two lectures, one on the Origin and Growth of the Union during the Colonial Period, and the other on some points of the History and Peculiarities of the English Language; by Professor Henry Reed, of the University of Pennsylvania.

A course of lectures on the Chemical Operations of Nature; by Professor Lewis C. Beck, of Rutgers College, New Jersey.

The first part of a general course, giving an exposition of the Dynamical Phenomena of Geology; by Professor Henry D. Rogers, of Boston.

Whatever may have been the effect of these lectures in the way of diffusing knowledge, it is evident, from the character of the men by whom they were delivered, that they presented truths intended to elevate and improve the moral and intellectual condition of the hearers.

All of which is respectfully submitted:

JOSEPH HENRY,
Secretary of the Smithsonian Institution.

FIFTH ANNUAL REPORT

Of the Secretary of the Smithsonian Institution, for the year 1851.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: Besides the care of all the property of the Institution, and the responsibility of the direction of its operations, under the control of the Regents, the Secretary is required to give an account, at their annual session, of the condition of the Institution, and of its transactions during the preceding year.

In the discharge of this duty on the present occasion, I am happy to inform the Regents, that the Institution under their care is still in a prosperous condition, and that since their last meeting it has continued, silently but effectually, to enlarge the sphere of its influence and usefulness, and to elicit from every part of the civilized world commendations not only of the plan of organization it has adopted, but also of the results it has produced.

In my last Report I gave a brief account of the means employed to increase the income, so that in addition to the requirements of Congress in regard to the formation of a library and a museum, and the erection of a building on a liberal scale, operations of a more active character could be incorporated into the plan of organization.

During the past year the same policy has been observed; and though the officers of the Institution have been subjected to the inconvenience of transacting business in an unfinished building, and in rooms not intended for the purpose, yet this has been considered of minor importance in comparison with the saving of the funds. Every dollar now expended on the building lessens the amount of accruing interest, and diminishes the means of producing results which are to affect the world at large; hence the importance of an adherence to the plan of finishing it by degrees. Since the last session of the Board, it has, therefore, not been thought advisable to urge the contractor to a rapid completion of his work, and all the expenditures on account of the building have been made from the accrued interest of the current year, and from a portion of that of the year preceding. There is, consequently, still on hand the two hundred thousand dollars of accumulated interest mentioned in the last and preceding reports. Of this, it will be recollected, $50,000 are to be applied towards finishing the building, and the remainder to be invested as part of the principal.

The importance of increasing the funds and of gradually developing the operations embraced in the programme, was set forth in the last report. The Institution, it is to be hoped, is not one of a day, but is to endure as long as our government shall last; it is therefore necessary, in the beginning, that we should constantly look to the future, and guard against the temptation, to which we are continually exposed, of expanding too rapidly.

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REPORT OF THE SECRETARY.

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By a resolution of the board, at their session in 1849, the Secretary was directed to petition Congress to take from the Institution $150,000, and such other sums, not exceeding in all $200,000, as may have been, or shall

be received in accruing interest or otherwise, upon the same terms as those on which the original bequest had been accepted. This petition was referred to a committee and favorably reported upon, but unfortunately the press of business prevented Congress from acting upon it at their last session. The petition will again be renewed, and it is believed that so reasonable a request will meet with a favorable reception. It is, however, thought important that the amount should be increased, and that the sum of $250,000 be inserted in the petition, instead of that named in the resolution.

In addition to the $150,000 which the regents thus seek to invest, there is still a portion of the original legacy remaining in England as the principal of an annuity settled upon Madame De la Batut, the mother of the nephew of Smithson, to whom his property was originally bequeathed. Besides this, I am informed, upon good authority, that the Institution is the contingent legatee of an estate of considerable magnitude, depending on the demise without issue of a single individual. We may also reasonably expect that if the affairs of the Institution are properly conducted, and its funds judiciously husbanded or properly expended on the legitimate objects of the bequest, other trusts will be committed to its care. It therefore becomes important that the limit should be at least $250,000, so that the whole sum, including the original bequest, shall amount to a little more than $750,000. There can surely be no just grounds of fear that the income of this sum will be devoted to improper uses, so long as it is an essential part of the plan to produce fruits, the value of which can be judged by all who are capable of appreciating the advance of knowledge. This request is also in accordance with the policy adopted by the Institution of asking nothing from Congress but the safe keeping of its funds, and the appointment to its board of regents of gentlemen of intelligence and high moral principles.

The government has thus far liberally fulfilled the obligations which it imposed upon itself in accepting the trust. Not only has the original sum been permanently invested in the treasury of the United States, but interest has been allowed from the time of receiving the funds. Congress has also made several donations to the Institution, which, though they will not prove as valuable to us as could be wished, indicate a liberal intention. The first gift was the great museum of the Exploring Expedition, for the accommodation of which the larger portion of the present building was originally intended; the second was a grant of nineteen acres of land surrounding the building of the Institution; the third, a copy of every book published in the United States for which a copyright might be granted; the fourth and last gift was that of all the plates, manuscripts, &c., of the Exploring Expedition, for the purpose of publishing a new edition for distribution.

These donations, though made with kindly feelings and in a spirit of liberality, have proved singularly unprofitable. The maintenance of the museum of the Exploring Expedition would subject the Institution to an annual expense which would materially interfere with more important operations. After expending several thousand dollars on the improvement of the grounds, it has been deemed best to return them to the charge of the general government. Were the copyright act fully complied with, perhaps some benefit might accrue from it to the Institution; but in the manner in which it is at present observed, the expense of postage and of

clerk hire in recording the titles and furnishing the certificates of deposit, has more than equalled the value to us of all the books received. Lastly, it has been estimated that the publication of a new edition of the expensive volumes of the results of the Exploring Expedition would cost at least fifty thousand dollars. Fortunately, it has not been considered obligatory on the Institution, except in the case of the copyright law, to accept these gifts.

Publication of memoirs.—Since the adoption of the plan of organization, nearly fifty original memoirs, purporting to be additions to the sum of human knowledge, have been presented to the Institution for publication. Though a number of these have been returned to their authors, principally on account of not falling within the restricted class of communications accepted for publication, yet they have generally been productions of much merit, and have evinced a surprising activity of mind, and manifest a growing attention in this country to original research. The probable success of this part of the plan of organization was not overrated; for, were the whole income of the institution devoted alone to publishing the results of the labors of men of literature and of science, which otherwise would never see the light, it could be profitably expended. In this respect, the Smithsonian bequest supplies the wants which in Europe are met by richly endowed academies and national societies.

It will be recollected that each memoir is printed separately, and with a separate title and paging, so that it can be distributed to persons most interested in its perusal as soon as it comes from the press, without waiting for the completion of the volume to which it belongs. In this way, the author is enabled to present a full account of his discoveries to the world with the least possible delay, while, by the rules of the Institution, he is allowed to publish an abstract of his paper in the proceedings of the American Association for the advancement of science, or in those of any other properly organized society.

The number of copies of the Smithsonian Contributions distributed is greater than that of the transactions of any scientific or literary society, and therefore the Institution offers the best medium to be found for diffusing a knowledge of scientific discoveries.

Every memoir published by the Institution is issued with the stamp of approval of a commission of competent judges, and in order to secure a cautious and candid opinion, the name of the author, and those of the examiners, are not made known to each other unless a favorable report is given, and, in this case, the names of the commission are printed, as vouchers for the character of the memoir, on the reverse of the title-page.

This plan secures an untrammelled expression of opinion, while it induces caution on account of the responsibility which it involves.

Besides deciding on the fitness of original memoirs for publication, the Institution is continually applied to for information relative to almost every department of literature and science. Respectful attention is always given to these applications, and when the desired answer does not fall within the line of study of any officer of the Institution, it is sought for from those in whose knowledge and judgment we have full confidence. No inconsiderable portion of time is occupied in giving the information involved in the answer to these inquiries; but I am happy to inform the board that in this service, as well as in that of examining memoirs, we have received the co-operation of a considerable number of the most distinguished individuals in our coun

try, and in scarcely a single case has application for assistance in this way been refused. By the operation of the plan adopted, the Institution can command the talents and learning of the world, and with a small corps of permanent officers, or a sufficient clerical force, can discharge the duty of an association to which subjects, relative to all branches of knowledge, can be referred.

There is one class of requests which, by a resolution of the Board of Regents, we are directed to refuse, viz: those for the examination and approval of the innumerable inventions by which the ingenious and enterprising seek to better their own condition and that of the public. Were it not for this resolution, originally proposed by Governor Cass, we would be overwhelmed with applications of this kind, and have forced upon us the business of the Patent Office. Besides this, the principal object of the organization is the discovery of new truths, rather than the application of known principles to useful purposes. Not that we would undervalue the labors of the inventor; but because practical knowledge has a marketable value which always insures its cultivation, provided the higher philosophical truths on which it is founded are sufficiently developed and made known.

The idea is still very generally entertained that Smithson bequeathed his property to this country for the diffusion of useful knowledge among the people, and that his intention would be best consulted by the expenditure of all the income in the publication and general distribution of tracts on practical subjects. The adoption of this plan would be to dissipate the funds without beneficial effect. A single report of the Patent Office costs, in some instances, more than three times the income of the Smithsonian fund, which itself would be insufficient for the general diffusion of a single octavo page of printed matter. The property, however, was not left to the inhabitants of the United States, but to the government, in trust for the good of man; and not merel for the dissemination or diffusion of knowledge, but, first of all, for creating, originating, increasing it. Furthermore, Smithson does not confine his bequest to the promotion of *useful* knowledge alone, in the lower sense of the term, but includes all knowledge in his liberal and philosophical design. The true, the beautiful, as well as the immediately practical, are all entitled to a share of attention. All knowledge is profitable; profitable in its ennobling effect on the character, in the pleasure it imparts in its acquisition, as well as in the power it gives over the operations of mind and of matter. All knowledge is useful; every part of this complex system of nature is connected with every other. Nothing is isolated. The discovery of to-day, which appears unconnected with any useful process, may, in the course of a few years, become the fruitful source of a thousand inventions.

That the encouragement of the discovery of new truths, the publication of original memoirs, and the establishment of new researches, are in conformity with the design of Smithson, is not only manifest from the terms of his will, but also from the fact, which has lately come to our knowledge, that he at first left his property to the Royal Society of London, for the very object embraced in this part of the plan. And what prouder monument could any man desire than the perpetual association of his name with a series of new truths! This building and all its contents may be destroyed, but the volumes of the Smithsonian Contributions, distributed as they are among a thousand libraries, are as wide-spread and lasting as civilization itself.

During the past year a number of memoirs have been accepted for publication, and are either in the press, or are waiting the drawings to illustrate them, now in the hands of the engraver. It is the duty of the secretary, in accordance with the original plan of the Institution, to give a popular account of these memoirs in his annual report.

The first is a memoir by Dr. Asa Gray, professor of botany in Harvard University, consisting of an account of a collection of plants made by Mr. Charles Wright, in an expedition from Texas to El Paso, in the summer and autumn of 1849.

It was stated in my report for that year, that one hundred and fifty dollars had been subscribed on the part of the Institution toward the outfit of Mr. Wright, and that the plants collected by him would be submitted to Dr. Gray for examination and description. The memoir now mentioned is the result of this arrangement, though it also contains notices of plants gathered by other collectors in adjacent regions, especially by Dr. Wislizenus in the valley of the Rio Grande and Chihuahua; and by the lamented Dr. Gregg in the same district, and in the northern part of Mexico. This memoir is a good exposition of the character of the vegetation, and consequently of the climate, of the regions traversed.

Specimens of all the plants obtained by Mr. Wright belong to this Institution; and these, with sets collected by Fendler and Lindheimer, form the nucleus of an important and authentic North American herbarium.

Another paper on botany is by Dr. John Torrey, of the college of New Jersey, Princeton. It gives illustrations of the botany of California, and describes a number of new and interesting plants discovered by Colonel Frémont in his different explorations in that country.

Some of the plants collected by this intrepid traveller have been described in the appendix to his first and second report; but many are still unpublished. Of the collections made during his third expedition, no descriptions have been given, except that two or three of the new plants were briefly characterized by Dr. Gray, in order to secure priority of discovery.

In the memoir presented to the Institution, Dr. Torrey has given descriptions of a number of genera of new and remarkable plants, all collected by Col. Frémont in the passes and on the sides of the Serra Nevada. With regard to this publication Dr. Torrey remarks, that he had hoped that arrangements would have been made by the government of the United States for the publication of a general account of the botany of California; but as there is no immediate prospect of such a work being undertaken, this memoir, on some of the more interesting genera discovered by Col. Frémont, has been prepared for the Smithsonian Institution.

The drawings to illustrate this paper have been made, at the expense of the institution, by Mr. Isaac Sprague, of Cambridge, who, in the opinion of Dr. Torrey, ranks among the best botanical draughtsmen of our day.

The next paper presents the results of a series of observations made in the years 1845–6–7, to determine the dip, inclination and intensity of the magnetic force in several parts of the United States, by John Locke, M. D., professor of chemistry in the medical college of Ohio. The results presented in this paper are a continuation of a series derived from observations begun in 1837, and prosecuted annually for ten years. The first parts of the series have been published in the transactions of the American Philosophical Society, and have been incorporated by Col. Sabine, in his contributions to Terrestrial Magnetism. A part of the observations given in this memoir

were made at the expense and under the direction of the United States Coast Survey. Another portion was made in accordance with the direction of the Hon. Robert J. Walker, late Secretary of the Treasury, as a part of the investigations instituted for the exploration of the mineral lands belonging to the general government. This paper has been examined by competent judges, and recommended for publication in the Smithsonian Contributions, as an important addition to knowledge.

A paper has also been presented for publication by the executors of the late Doctor Troost, of Nashville. It consists of descriptions and drawings of a very numerous family of extinct zoophytes, to which the organic remain called the stone lily belongs. The vicinity of Nashville appears to be a remarkable locality for these remains, and the paper of Professor Troost describes several hundred species, of which two only have living representatives.

The memoir, however, is not in a condition to be published without revision, and additions to bring it up to the state of knowledge at the present time. This labor has been gratuitously undertaken by Professor Agassiz, of Cambridge, and Professor James Hall, of Albany. The collection of specimens, from which the drawings were made, is now in the possession of these gentlemen, and the memoir will be published as soon as the corrections and additions are made.

The next memoir is on the winds of the northern hemisphere, by Professor James Coffin. The design of this communication, in the words of the author, is "to answer the following questions, viz:

"1. What is the average direction in which the lower strata of the air moves over different regions of the northern hemisphere?

"2. What is the rate of progress in the mean direction as compared with the total distance travelled by the wind?

"3. What modifications do the mean direction and rate of progress undergo in the different months of the year?

"4. What is the direction of the deflecting forces that cause these modifications?

"5. What is the average relative force and velocity of winds from several points of the compass?

"6. How will the introduction or omission of the latter element affect the answer of the preceding questions?"

The data used in answering these questions have been collected with great labor, and consist of observations made at no less than five hundred and seventy-six different stations on land, and a large number taken during numerous voyages at sea. The field of observation includes a zone which extends from the equator to nearly the parallel of 85° of north latitude, and occupies a period, taken in the aggregate, of 2,800 years.

Several of the foregoing questions have been answered approximately by other writers, but never, it is believed, from as extensive an induction as is presented in this memoir.

This paper is illustrated by a number of maps and diagrams, which render its publication very expensive. It was presented to the Institution more than a year ago, but the appropriation for printing was not sufficient to allow of its publication at that time.

The Institution has also commenced the publication of an extended memoir, consisting of a grammar and lexicon of the Dakota language, the results of the joint labors, during eighteen years, of the Dakota mission,

assisted by the most intelligent natives of this tribe of Indians. The whole has been arranged, and placed in its present form, by the Rev. S. R. Riggs, of the American Board.

This work was prepared under the auspices of the Historical Society of Minnesota, and recommended by this association to the favorable attention of the Smithsonian Institution. It is designed to meet the requirements of the missionary in his labor of diffusing the light of religion and civilization among one of the most numerous and important tribes of Indians in the country. It also forms an interesting addition to ethnology, which will be highly prized by all devoted to this branch of knowledge.

A language is not originally a thing of man's device, or the result of conventional art, but the spontaneous production of human instinct, modified by the mental character, the physical conditions, and other peculiarities of the people or tribe among which it had its origin, or by whom it is used. It is subject to definite laws of formation and developement, and is intimately connected with the history of the migrations and affiliations of the people by whom it is spoken, and hence becomes an object of interest to the student of the natural history of man.

In accordance with the policy of not expending the Smithsonian fund in doing with it what could be equally well done by other means, this memoir was first referred to the Bureau of Indian Affairs, with the hope that it might be adopted as a part of the materials of the volumes published under the direction of that bureau; but this was not found practicable, and the task was therefore undertaken by the Institution.

The memoir will occupy an entire volume, and would have been too much for our present income, had not about one-third of the whole cost of publication been promised by subscription from the members of the Historical Society of Minnesota and the American Board of Missions. The latter institution defrays the expenses of Mr. Riggs while he is engaged in superintending the passage of the work through the press. It is a pleasant circumstance that in this instance, as well as in many others, the organization of the Institution enables it to co-operate with other institutions, and to assist them in their labors of promoting knowledge.

This memoir, which is now in the press, was referred for critical examination to Professor Felton, of Cambridge, Massachusetts, and to Professor Turner, of New York. The latter has furnished us with a report on the importance of collecting information relative to the different dialects now in use among the Indians.

Dr. Joseph Leidy, of Philadelphia, has prepared a memoir for the Institution, accompanied by numerous illustrations, entitled "A Flora and Fauna of Animals." It is an elaborate history of a most remarkable series of plants, in many cases accompanied by parisitic animals, found growing, as an ordinary or natural condition, within the interior of the bodies of living animals. In some of the latter, it is stated, growing plants are never absent; and in a species of insects, viz: *Papulus Cornutus*, a forest of vegetation is always found covering the inner surface of the *ventriculus* or second stomach.

The plants of course are Cryptogamic, and are algoid in their character. Some are as long as half an inch, but usually they are very much smaller. They grow attached to the mucous membrane of the cavities in which they are found, and occasionally from the exterior covering of worms infesting the same cavities. Several genera and species of these plants are charac-

terized under the names of *Euterobryus Elegans*, *E. attenuatus*, *Arthromitus cristatus*, *Cladophytum comatum* and *Corynocladus radiatus*.

The mode of growth and reproduction of several of the species has been carefully traced and fully illustrated by figures.

The researches are prefaced by some observations on the laws of parasitic life in general, which are presented in a highly philosophical manner, and entirely free from hypothesis—the whole forming one of the most remarkable papers on physiology which has ever been produced by our countrymen.

Lieutenant Charles Henry Davis, United States Navy, Superintendent of the American Nautical Almanac, has presented a memoir on the dynamic effects of the tides.

This memoir is a continuation of one presented by the author to the American Academy a few years ago, and is of much interest, not only in a scientific point of view, as connected with important geological changes, but also on account of the practical bearings upon the transformations which are constantly going on at the entrance of rivers, channels, and in the formation of headlands and promontories. Were our globe a perfect spheroid of revolution, surrounded by water of uniform depth, the tides of the ocean would consist of nearly perpendicular undulations of the particles of the liquid, and a mere translation of form, without a transference of matter. But, in the case of a globe of irregular surface, covered with water of varying depth, the oscillations of the ocean must constantly produce currents in definite directions which tend continually to change the position of the movable materials which are found at the bottom of the sea, particularly as we approach land. A part of the force of the particles of water forming the sinking swell of the wave, in the case of an obstruction to their free descent by a diminished depth, is expended in producing a current along the inclined plane of the surface leading to the shore.

Lieutenant Davis has entered with much ardor upon the new field of research, and after an examination of various parts of the shore of the United States, through a series of years, in which he was engaged on the coast survey, has succeeded in developing the laws of action which give rise to the changes before mentioned.

He finds that the tendency of the flood-tide is to transport the matter from the bottom of the ocean and deposit it on land. He is enabled to explain the character of the alluvial formations, to account for their peculiar shape, their comparative sizes, their accumulation, and to predict the results of certain combinations of circumstances on their future changes. The particular object of this memoir is to inquire into the mechanical operations of the tides, and the uses they may have served in the general economy of the globe in directing the loose materials of the earth's crust.

Smithsonian reports and other publications.—Since the last meeting of the Board of Regents, the report of Professor Jewett on the public libraries of the United States has been published and widely distributed. It is impossible to collect at once full and reliable accounts of all the libraries of the country, and this report is intended merely as a beginning, to be followed by others on the same subject. It has been sent to all the libraries of the United States, with the request that its deficiencies may be pointed out and additional materials furnished to render it more perfect. The great interest which is felt in this work is manifested by the amount of sta-

tistical information which has already been received in return for this volume.

A report has also been published on the recent improvements in the chemical arts. It is compiled from articles which have appeared during the last ten years in the various journals of science and the arts in the English, French and German languages. Though this report is chiefly intended to benefit the practical man, yet it will be found interesting to the general reader, as exhibiting the cotemporaneous advance of science and art, and the dependence of the latter on the former for the improvement of its most important processes.

The accounts given in the report alluded to do not consist of descriptions of methods which have been merely proposed and published without practical verification. On the contrary, care has been taken to select such as have been actually tried, or such as offer great probability of success from the well-established principles on which they are based.

The preparation of this report was entrusted to Professor James C. Booth, assayer of the United States mint at Philadelphia, who associated with himself Mr. Campbell Morfit, of Baltimore. The work has been executed in a manner highly creditable to the authors, and will, I doubt not, prove very acceptable to the public. Notes will be made of the new inventions of the same class, as they appear in the journals, so that in the course of a few years another report of a similar kind, or one which may be considered a continuation of this, can be published.

Copies, at the mere cost of printing, paper and commission, are offered for sale. The matter has been stereotyped, in order to supply all the demand, and to reproduce this member of the series, should the subject be continued.

The progress of the elaborate report on the forest trees of North America, mentioned in the last two reports, was for some time arrested by the absence of the author, Dr. Gray, in Europe. He has now, however, returned, and will resume the preparation of the drawings, as soon as the funds of the Institution will admit of the expenditure. This work has proved a more expensive undertaking than was at first anticipated, and can only be finished on the original plan, by extending the time of its publication over several years. It will form a valuable contribution to the botany and economical and ornamental arts of our country.

Dr. F. G. Melsheimer, of Dover, Pennsylvania, has presented to the Institution a catalogue of the Coleopterous insects of North America, with references to the principal places of description. This has been put to press, but progresses slowly on account of the great care necessary in correcting the proofs. When printed, it will be of great service to the cause of American entomology.

Besides the reports, other works are in progress, among which may be mentioned a small volume by Professor Baird, consisting of practical directions for the collection and preservation of specimens of Natural History. This will be illustrated with numerous figures, and issued as soon as the engravings can be procured. A part of the letter-press has been finished. It is especially designed for the use of travellers and officers of the Army and Navy who may be inclined to make collections for the Smithsonian Institution, but will be of general interest to the cultivators of Natural History.

A volume of tables of use in Meteorology and other branches of scientific observations, has been prepared, under the direction and at the expense of the

Institution, by Professor Arnold Guyot. The following are the contents of this volume, viz:

1. Thermometrical tables for the conversion of the scales of different thermometers into each other.

2. Hygrometrical tables giving the elastic force of vapor, the relative humidity &c.

3. Barometrical tables for the comparisons of different scales, reduction of observations to the freezing point, and correction for capillary action.

4. Hypsometrical tables for calculating altitudes by the barometer, and by the difference of the boiling point.

5. Tables of the corrections to be applied to the monthly means to obtain the true mean.

6. A set of miscellaneous tables frequently required in physical investigations.

These tables supply a desideratum in the English language, and will doubtless be highly prized by all engaged in physical research. It is proposed to extend their number so as to include a wider range of objects, and to publish them in parts to suit different purposes. Copies will be distributed with the quarto volumes of our publications, and sent to meteorological observers. The tables have been stereotyped and may therefore be offered for sale at a low rate.

Since the date of the last report, a number of separate memoirs have been bound together so as to form the second volume of the series of Smithsonian Contributions. The memoirs, an account of which has just been given, will be ready for distribution during 1852.

The second volume has been forwarded to all the colleges and other institutions specified in the rules adopted for the distribution of the Smithsonian publications in this country, and to all the first class libraries and principal literary and scientific societies abroad. Through the liberality of the members of the Senate of the United States and its officers, we have been enabled to send to our foreign correspondents, in addition to our own publications, copies of reports to Congress, and other works published at the expense of government. In return, the Institution has received a series of flattering acknowledgements and valuable presents, not only of the current numbers of transactions, but in several instances, of entire sets of all the volumes.

The promotion of knowledge is much retarded by the difficulties experienced in the way of a free intercourse between scientific and literary societies in different parts of the world. In carrying on the exchange of the Smithsonian volumes, it was necessary to appoint a number of agents. Some of these are American consuls, and other respectable individuals, who have undertaken in most cases to transact the business free of all charge, and in others for but little more than the actual expense incurred. These agencies being established, other exchanges could be carried on through them, and our means of conveyance, at the slight additional expense owing to the small increase of weight; and we have accordingly offered the privilege of sending and receiving small packages through our agency to institutions of learning, and in some cases to individuals who choose to avail themselves of it. The offer has been accepted by a number of institutions, and the result can not fail to prove highly beneficial, by promoting a more ready communion between the literature and science of this country and the world abroad.

As a part of the same system, application was made through Sir Henry Bulwer, the British minister at Washington, for a remission of duties on packages intended for Great Britain, and we are informed that a permanent arrangement will probably be made, through the agency of the Royal Society, for the free passage through the English custom-house, of all packages from this Institution.

The Smithsonian exchanges are under the special charge of Professor Baird, who has been unwearied in his exertions to collect proper materials, and to reduce the whole to such order as will combine security with rapidity of transmission.

The system of exchange here described has no connection with that established between national governments by Mr. Vattemare. It is merely an extension of one which has been in operation on a small scale for nearly half a century between the American Philosophical Society and the American Academy on this side of the Atlantic, and the several scientific societies on the other.

Ancient Monuments.—The success of the first memoir published by the Smithsonian Institution has awakened much attention to American antiquities, and a number of communications have been submitted on this subject. Among these is one by Mr. William Pidgeon, of Virginia, who has spent a number of years in the exploration of mounds, and other ancient remains, on the upper branches of the Mississippi.

The results of his labors are of a very interesting character, though the facts contained in his memoir are too much mingled with the traditions received by him from the Indians, and with his own hypotheses, to be accepted as a part of the Smithsonian Contributions. After repeated conversations with Mr. Pidgeon, I was clearly of opinion that his researches ought to be given to the public in some way, in order that his statements might receive due attention, and be corroborated or disproved by other explorers; and I am pleased to be able to state that a gentleman of Washington has undertaken to arrange and edit these researches, and that they will be published in a seperate volume for the benefit of the authors.

We have also received communications relative to mounds from Mr. Charles Whittlesey of Ohio, from Mr. Titian R. Peale of Washington, and Mr. William E. Guest of Ogdensburg, New York. The first of these may be considered as supplementary to the memoir of Messrs. Squier and Davis, describing works omitted in their survey. The second gives a plan and description of the mounds which formerly existed on the present site of St. Louis, Missouri, made during the visit of Major Long's party in 1849 to that country, on their way to the Rocky mountains. This sketch is now interesting on account of the fact that, in the rapid progress of improvement, these mounds have been nearly obliterated, and that they can only be preserved to science, as they existed more than thirty years ago, by this publication.

The third is an account, with drawings, of ancient works at Prescot, in Canada west. The great size of the remains of trees which occupy the ground, evince the long time which must have elapsed since these works were constructed, and the entire absence of stone pipes and arrow heads has induced the belief that they are of a higher antiquity than those in the Ohio valley.

The last two contributions will form a single memoir, the plates for which are partially completed.

But the most interesting circumstance connected with the study of the ancient remains of this country is a recent action of the American Antiquarian Society of Worcester, Massachusetts. This institution was founded in 1812 by the zeal and liberality of Isaiah Thomas, for the purpose of collecting and preserving such manuscripts, pamphlets and other articles as relate to the history of this country, and for the exploration and publication of its antiquities. It was at the expense of this society that the original researches of Mr. Atwater, on the mounds of the Ohio valley, were first published, and during the last two years the condition of its funds has again enabled it to take the field, and to direct its attention to the remarkable antiquities in the State of Wisconsin.

These antiquities, it is well known, consist of representations, on a gigantic scale, of birds, beasts and fishes, and though many of them have been surveyed, and accounts of them given in the memoir of Messrs. Squier and Davis, comparatively few of those which are said to exist have been explored or delineated. For this reason, the council of the society have engaged Mr. I. A. Lapham, an experienced engineer, to make explorations and surveys, and drawings of these mounds. He has been engaged in these operations for two seasons, and is now employed in making up an account of his labors.

To insure harmony of action in the cultivation of the wide field of research offered in the investigations of the ancient monuments of this country, the Antiquarian Society has agreed to present to the Smithsonian Institution the results of the explorations of Mr. Lapham for publication, and to reserve its limited funds for further explorations. The memoirs will be examined and revised by the society, and will be published under its auspices in the Smithsonian Contributions.

This arrangement is another pleasing evidence of the feeling with which the efforts of this Institution are regarded, and the willingness with which other institutions co-operate with it in the important work of promoting original knowledge.

Explorations, Researches, &c.—During the last year several minor explorations have been made in the line of natural history, partly at the expense of the Institution. The sum of fifty dollars was appropriated to Professor C. B. Adams, of Amherst College, to pay in part his expenses while making collections in the West Indies and Panama. For the sum advanced, an ample return has been made in new and rare specimens. Professor Baird and Mr. Charles Girard have also made explorations which have added to the collections of the Institution at a cost little beyond that of the expense of transportation.

In this connexion I may mention that Professor Baird has contributed the report on the vertebrate animals collected by Captain Stansbury in his expedition to the Salt Lake region, and facilities have been given at the Institution to a number of persons in making scientific reports to Congress.

A series of experiments also have been made in our laboratory by a commission appointed by government to examine the stone proposed for the extension of the Capitol. It is believed that the Institution may, in the aid it affords the government in scientific operations, more than repay all the obligation imposed by the acceptance of the Smithsonian trust.

It was mentioned in the last report, that the specimens which were procured by Mr. Culbertson from the Upper Missouri, had been referred to Dr. Joseph Leidy, of Philadelphia, for examination. He has since made a report (see Appendix) giving a brief statement of the results of his inves-

tigation. From this report it appears that the specimens are of much scientific interest, showing as they do, for the first time, the existence in this country of an eocene deposite, rivaling in the number of its species of extinct animals the celebrated basin of Paris.

Occultations.—It has been mentioned in the preceding reports, that lists of occultations, and tables of reductions, have been published, from 1848 to 1851, inclusive. The cost of the computation of these tables, as well as that of their publication for the past two years, was borne by the Institution, but since then Congress has ordered the establishment of an American Nautical Almanac; and as these tables will form a part of this ephemeris, Mr. Preston, the late Secretary of the Navy, directed that the expense of the computation should be defrayed from the appropriation for the Almanac, the printing and distribution to be at the charge of the Institution. A similar order has been given by the Hon. Wm. A. Graham, the present Secretary of the Navy, relative to the tables for 1851 and 1852.

The tables for 1852, are much extended by the introduction of occultations visible in every part of the earth. The form is also somewhat altered in order better to adapt it to the arrangement to be adopted by the Nautical Almanac.

The primary object of these tables is to facilitate the accurate determination of the longitude of places within the territory of the United States, and in this respect they have done good service, especially in the hands of the officers of the coast survey, and the explorers and surveyors of our new possessions on the coast of the Pacific. Their extension will render them useful to geographers in every part of the world. They have been computed, for the present and the last two years, under the direction of Lieut. Davis, the accomplished superintendent of the American Nautical Almanac. As soon as this work, which will be an honor to the country, is ready to be issued, the publication will be relinquished by the Smithsonian Institution.

We observe again, in this case, the policy of not expending the funds of the Institution, in doing what other means can accomplish.

It will recollected that Mr. Sears C. Walker, astronomical assistant of the United States coast survey, prepared for the Smithsonian Transactions a memoir containing a determination of the true orbit of the planet Neptune, and that from this orbit, and the mathematical investigations of Professor Pierce, an ephemeris of Neptune was compiled. The ephemeris was prepared for the years 1848 and 1849, under the direction and at the expense of this Institution, but for the years 1850–'51–'52, it was computed under the superintendence of Lieutenant Davis, and at the expense of the appropriation for the Nautical Almanac, while the cost of printing and of the distribution has been defrayed by the Institution.

The ephemeris has been generally adopted by the principal astronomers of the world, and Professor Airy, the astronomer royal of Great Britain, has undertaken the labor, in his last volume of Greenwich Observations, of critically comparing his observations on the planet in the heavens with the predictions of the Smithsonian ephemeris. From these comparisons it is found that the ephemeris gives the position of the planet with a degree of precision not inferior to that with which the places of the planets longest known are calculated. The labors, therefore, of Mr. Walker on the elements, and Professor Pierce on the theory of the planet Neptune, have been crowned with complete success. It is proposed hereafter to collect all the

observations which may have been made on the planet, and compare them with the ephemeris, in order, if necessary, still further to correct the orbit.

Meteorology.—The general system of meteorology now in operation in this country, and described in the last report, has during the past year been continued and gradually extended. The instruments constructed under the direction of the Institution, with the aid of Professor Guyot, have been further improved, and some slight changes, indicated by experience, have been made to render them more convenient to the practical observer and they may now be considered not only equal in accuracy to the instruments of the best construction from abroad, but in some respects superior. They are furnished with the means of read adjustment to the standard instruments, and being in every instance accurately compared before they are used, and the error corrected, the labor of inserting a correction in the journal is avoided. New efforts have also been made to obtain a still more accurate comparison between the standard barometer of this country and those of the more important European observatories. For this purpose a second standard barometer by Newman, compared with the standard of the Royal Society, and a barometer by Ernst, compared with the standard of the Paris observatory, were ordered at the expense of the Institution. By a long series of comparisons between these two instruments and others at Cambridge, (Massachusetts,) Toronto, (Canada West,) and Washington city, the object sought has, it is believed, been obtained. The thermometers also, constructed by Mr. Green, of New York, for the Institution, have been compared with European standards, and an important step has thus been made towards obtaining reliable results as to the absolute meteorological elements of the different parts of this continent.

It was stated in the last report that the regents of the university of New York had made an appropriation for supplying thirty-three academies in that State with instruments, and had given the establishment of the whole system in charge to this Institution. The State of Massachusetts has also made a similar appropriation and arrangement. During the past year the instruments for this State have been constructed, and a part of the stations established under the care of Professor Guyot.

At the last meeting of the American association, a report was made, and a series of resolutions adopted, (see appendix) for extending the system of observations with the same instruments to other parts of this continent. These resolutions directed the committee to memorialize Congress for aid in extending the system under the direction of this Institution; to request the Secretary of the Treasury to provide for making observations at the several light-houses to be established on the coast of California; to ask the surgeon-general to establish new stations at important points; to memorialize the other States of the Union to follow the example of New York and Massachusetts, and also the Canadian government to cooperate in the same enterprise.

What may be the result of the labors of the members of the committee to which this duty is entrusted, it is impossible to say. They can scarcely fail, however, to awaken a more general interest in the enterprise, and to receive a favorable response to some of the requests.

Since the date of the last report, the system particularly intended to investigate the nature of American storms, immediately under the care of this Institution, has been continued and improved, both in the number of the stations, and, in some degree, in the character of the instruments. An

appropriation was made to furnish a larger number of stations than previously with barometers and thermometers, by distributing these instruments in some cases entirely at the expense of the Institution, and in others by selling them to the observers at half their original cost; but the demand was so great, and the loss by breakage in transmitting the instruments so frequent, that the appropriations were soon exhausted, and until we can afford to devote a large sum to the object, and employ a special agent to transport the articles to their destination, it will be inadvisable to attempt anything more in this way.

Though the instruments employed by these observers in some cases can not be relied on for giving absolute results, yet they serve a good purpose in determining changes of pressure and temperature, and the returns give all the varying phases of the sky.

Thus far, the returns which have been received from this system have been arranged in folio volumes, and a beginning has been made in the way of deducing general conclusions from them, which may test the value of the observations and lead to their improvement by suggesting other objects of inquiry. The results already obtained give promise of interesting and valuable additions to our knowledge of the nature of the storms which traverse this continent during the winter seasons, and will probably serve to settle definitely several theoretical questions of much interest to the meteorologist.

The meteorological correspondence of the Institution is principally attended to by Professor Foreman, and the labor which this involves is sufficient to occupy the greater portion of his time. The letters received from this class of coöperators are not confined to the subject of meteorology, but include the whole domain of physical science. We consider it, as before observed, a duty in all such cases to give the information required; and if this is not in the possession of the officers connected with the Institution, it is procured from other sources.

For the details as to the management of the meteorological affairs of the Institution, see Professor Foreman's report on this subject.

Library and Collections.—It will be recollected that the income of the Institution was, by a compromise alluded to in a former report, to be divided into two equal parts, one part to be devoted to the formation of a museum, a library and a gallery of art, and the other to publications, researches and other active operations. The terms of this compromise have been rigidly adhered to, as will be seen by a reference to the general statement of accounts given in the last report. Up to the date of the appointment of Professor Baird, in July, 1850, the part of the income devoted to the collections was expended on the library, or on objects pertaining to it. Since that time, a portion has been devoted to the museum.

It is proper to remark that this compromise was founded upon another, namely, that the cost of the building and furniture should be limited to two hundred and fifty thousand dollars. But in order to the better security of the collections, the regents have since found it necessary to add, in round numbers, fifty thousand dollars to this sum, which must of course diminish the income which would otherwise have been devoted to the active operations.

It is evident that one spirit, if possible, should pervade the whole organization, and that the same policy should be adopted with reference to all parts of the plan. Among the maxims which have been acted upon, that

of occupying ground untenanted by other institutions, and of doing nothing with the funds which can be equally well accomplished by other means, has commended itself to the intelligent and reflecting portion of the public; and it has always appeared to me that this is as applicable to the formation of collections of books and specimens, as to the publications and other operations of the Institution.

With reference to the library, the idea ought never be entertained that the portion of the limited income of the Smithsonian fund which can be devoted to the purchase of books, will ever be sufficient to meet the wants of the American scholar. On the contrary, it is the duty of this Institution to increase those wants by pointing out new fields for exploration, and by stimulating other researches than those which are now cultivated. It is a part of that duty to make the value of libraries more generally known, and their want in this country more generally felt; to show in what branches of knowledge our libraries are most deficient; to point out the means by which those deficiencies can be supplied; to instruct the public in the best methods of procuring, arranging, cataloguing and preserving books; to give information as to the best form and construction of library buildings; in short, to do all which was originally intended in the plan of rendering the Institution a centre of bibliographical knowledge, to which the American scholar can refer for all information relative to books in general, and particularly to those in our own country. The libraries of the country must be supplied by the country itself; by the general government; by the State governments; by cities, towns and villages; and by wealthy and liberal individuals. It is to be hoped that in the restoration of the library of Congress, a foundation will be laid for a collection of books worthy of a government whose perpetuity principally depends on the intelligence of the people.

The proper management of books, and general instruction as to their use, are matters perhaps of more importance than their accumulation in any one place. It is estimated that about twenty thousand volumes, including pamphlets, purporting to be additions to the sum of human knowledge, are published annually; and unless this mass be properly arranged, and the means furnished by which its contents may be ascertained, literature and science will be overwhelmed by their own unwieldy bulk. The pile will begin to totter under its own weight, and all the additions we may heap upon it will tend to add to the extension of the base, without increasing the elevation and dignity of the edifice.

One of the most important means of facilitating the use of libraries, particularly with reference to science, is well digested indexes of subjects, not merely referring to volumes or books, but to memoirs, papers, and parts of scientific transactions and systematic works. As an example of this, I would refer to the admirably arranged and valuable index to natural philosophy and the mechanical arts by Dr. Young. "If my library were on fire," said a celebrated author, "and I could save but one scientific book, it would be Dr. Young's index." This work comes down to 1807; and I know of no richer gift which could be bestowed upon the science of our own day than the continuation of this index to the present time. Every one who is desirous of enlarging the bounds of human knowledge should, in justice to himself, as well as to the public, be acquainted with what has previously been done in the same line, and this he will only be enabled to accomplish by the use of indexes of the kind above mentioned.

The most important operation during the past year relative to the library,

is the progress made by Professor Jewett in completing his plan of stereotyping catalogues with separate titles, described in the last report.

To reduce this plan to practice a series of original experiments were required, involving the expenditure of much time and labor. For this purpose, in preference to the usual method of stereotyping, a new one, invented by Mr. Josiah Warren, of Indiana, has been adopted on the recommendation of a committee to whom it was referred for examination. It is a fact well known to inventors, that however simple the theoretical plan of effecting a desired object may appear, a series of unforeseen difficuties must be encountered in the details, before the idea can be realized in actual results. These difficulties, in the present case, it is believed have been overcome, and the plan is now ready to be applied to the formation of a general and uniform catalogue of the libraries of the country. The course proposed is first to proceed with the catalogues of the library of the institution in accordance with the rules recommended by the commission appointed to report on this subject. This, stereotyped by the new process, may be distributed as a model for the other libraries which may adopt the plan. After all parts of the plan have thus been thoroughly tried, it will be desirable to commence on some large collection. The late accident which has happened to the library of Congress will induce the necessity of a new catalogue, and it is hoped that a liberal and enlightened policy will lead to the adoption of the Smithsonian plan. This will not only enable the government to issue, at a trifling expense, a new catalogue every year, with all the additions in their proper place, but also to assist in giving to the country an improved system of cataloguing, and facilitate the production of a general catalogue of all the libraries of the country.

Since the publication of the account of Mr. Jewett's plan of forming general catalogues, the invention has been claimed separately by two individuals in Europe. It is true, the want of such a plan has long been felt, and a general idea may have been conceived as to how it might be accomplished, but no attempts have been made to reduce it to practice, and indeed had they been made, they could not have succeeded, and would have done injury to the cause. The conditions necessary to success never before existed, and a premature attempt always tends to lessen public confidence in an enterprise, when the proper time for its actual accomplishment arrives. Besides this, there is a wide difference between the mere suggesting the possibility of a plan, and actually overcoming the difficulties which arise at every step in reducing it to practice.

With reference to the copyright law, something ought to be done to put the whole matter on a better footing. I repeat the assertion before made, that this law, as it now exists, imposes a tax on the Institution, without an adequate return. The great majority of the books received are such as are found in almost every public and private library; but very few of them would ever be purchased by the Institution, and are consequently dear at any price, even that of shelf-room and attendance, not to mention cost of transportation and of furnishing the certificates.

Granting the proposition that it is important a copy of every book originally published in this country should be somewhere preserved, it does not follow that the Smithsonian fund ought to be burdened with the expense of this charge.

If they should be preserved, it becomes the duty of Congress to provide for their care, as much as it does for that of the models of the Patent Office,

and no good reason can be assigned why the one should not be imposed upon the Institution as well as the other. Indeed, models are a species of books intended to convey ideas which printing cannot impart.

The objection to the present arrangement may be obviated by adopting the suggestion of Professor Jewett, that but one copy, instead of three, of each book, be sent to Washington for deposite, and that in place of the other two copies, a small fee be paid to the Institution, sufficient to defray all expenses; the maxim again being applied of not expending the funds in doing that which can and ought to be done by other means.

By reference to the report of the Librarian, it will be seen that the collection of books has continued to be increased by purchase, by copyright and by exchange. From the last mentioned source the Institution is obtaining a most valuable series of books of the highest interest to the scientific student, consisting principally of the transactions and proceedings of learned societies. In a few years, it is believed, as complete a collection of these will be gathered as it is possible to obtain.

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 cannot 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.

Furthermore, a promiscuous collection, embracing full sets of the objects above specified, is unnecessary in carrying out the plan of organization of the Institution.

For example, the organic remains brought from the upper Missouri by Culbertson, have been examined and reported on by Dr. Leidy, of Philadelphia, in that city; and the plants from California and Mexico have been referred to Dr. Torrey at Princeton, and to Dr. Gray at Cambridge. In this way, not only has the learning of these gentlemen been brought into requisition, but also their special cabinets rendered subservient to our use. The coöperation of the learning and talent, as well as the use of the libraries and collections of the whole country, is an essential feature of the plan and ought not to be lost sight of.

I would, however, distinctly disavow the intention of underrating the importance of collections in themselves. On the contrary, it ought to be the duty of the Smithsonian Institution to point out the means by which they may be made, and to aid in the work, to the extent of its ability, by

embracing all opportunities which may offer for procuring specimens for distribution, and by facilitating exchange and assisting explorations.

Though the formation of a general collection is neither within the means nor the 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. The navy, the army, and the whole corps of commercial and diplomatic agents in foreign countries, all consider it their duty to send to the seat of government of their own nation, every object which may serve to improve or to interest the people. Indeed the government of the United States 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 mental direction of an establishment of this kind, give plans for its organization and arrangement, provided it be requested to do so, and the means for effecting the object be liberally supplied.

I make these remarks with reference to the collections, because I am fully impressed with the fact that the tendency of the Institution will be to a statical condition, in which the income will be absorbed in the support and accommodation of objects of a doubtful or contingent value. There is even danger in receiving donations from individuals. The articles may be valuable in part, but may consist also of much which the institution cannot well afford to keep. Besides this, it is extremely difficult to discharge, acceptably, the duty of the curator of property thus acquired. Since the house-room and the income of the Institution for the accommodation and support of collections are limited, great care must be exercised in the choice of the articles, and preference given to those which are of importance in determining problems of interest, and which give promise of the ready production of new and interesting results.

For a detailed account of the additions to the museum during the past year, and the present state of the collections, I must refer to Professor Baird's report herewith presented.

In an appendix to this will be found a list of the donations, with the names of the donors alphabetically arranged. These consist principally of specimens not generally found in other collections, and though they may not be very attractive to ordinary visitors, the student of natural history will find in them much of interest.

The circular prepared by Professor Baird, describing the method of collecting and preparing specimens, and indicating objects especially desirable, has proved effective in procuring important contributions.

Among the objects which should be collected and preserved with care, are the remains of the specimens of the arts of the aboriginal inhabitants of this country, the contents of mounds, and the stone implements found on the surface of the earth. The implements and industrial products of the present tribes of Indians should also be gathered as the materials for the advance of the new and interesting science of ethnology. Of the contents of mounds, but a limited amount of specimens exist, and as these are not, like the spontaneous productions of nature, constantly in the process of reproduction, every article should be diligently sought for, and carefully preserved. Some additions have been made to the collections in this line.

The museum of natural history, besides plants and minerals, numbers eighteen hundred and fifty jars, containing specimens in spirits, of mammalia, reptiles, fishes, articulata, mollusca and radiata, amounting in all to twenty-five hundred species. Besides these, there are about nine hundred specimens of skulls and skeletons, and three thousand of skins of European and American birds.

Lectures.—In accordance with the suggestion contained in the act of incorporation of the Institution, courses of lectures have been given during the past year in the lecture-room of the Smithsonian building, and the reports of these lectures are generally copied in the public papers throughout the Union. Though the plan of diffusing knowledge by means of lectures is too restricted in its influence to meet fully the liberal views of the Smithsonian bequest, yet there is no place in the United States where such means will have a tendency to affect more minds and do more good than in the city of Washington, where persons from all parts of the country assemble during the sessions of Congress. It was supposed, at first, that the interest in these lectures would soon die away; but the experience of three years has indicated no tendency of this kind. This is in part owing to the constant influx of strangers and change of inhabitants. Besides this, there is in this city, in proportion to the whole number of inhabitants, a large number of intelligent persons with moderate salaries, who gladly avail themselves of the means of improvement offered by the gratuitous lectures of the Institution.

As an evidence of the high appreciation of the advantages which these lectures afford the citizens of Washington, I may mention that the corporation of the city has ordered, since the last meeting of the board, a bridge to be constructed over the canal at Tenth street, for the special accommodation of those who attend the evening instruction given at the Institution. This bridge, with a well-drained and well-lighted path across the public grounds, will afford a direct and comfortable approach to the building from a central point on Pennsylvania avenue.

In my last report I mentioned the fact that much complaint had been made through the public papers on account of the size of the lecture-room. It was the original intention of the Regents to construct a lecture-room in the main building, though, according to the plan proposed, the number of persons it would hold would scarcely have been greater than that now accommodated. This plan, however, was thought to be unsafe, because it was at first not proposed to fire-proof the interior; but since, an opposite course has been resolved upon, a large lecture-room may with safety be constructed in the main building, and the present lecture-room, having temporarily served the purpose, may be applied to other uses.

The proper construction of a lecture-room is, however, a problem of great difficulty, which in the present instance will be much enhanced by the form and peculiarities of the building. It must be well-adapted to sight, to sound, to ventilation and warming. A room might be constructed which would seat five thousand persons; but we know of none such, in every part of which an ordinary speaker can be distinctly heard. Too much must therefore not be expected with reference to the new lecture-room, though every endeavor will be made to render it as perfect as the conditions to which it is unavoidably subjected will allow.

The selection of the lecturers, and the arrangement of the courses, have been found, in some cases, an unpleasant and perplexing duty. The gen-

tlemen invited, as a general rule, have been men of high standing, and have been chosen on account of their reputation and moral worth, rather than with reference to their proficiency in the art of rhetoric. It is not the aim of the Institution in these lectures merely to please the ear, but to impart important truths which may be valued for their own sake.

Many applications have been made for the use of the lecture-room of the Institution for pay lectures and exhibitions of a private character, but these have in all cases been refused. The use of the room has, however, on several occasions been given to the faculty of Columbia College, and also for the meetings of the Teacher's Association of the District of Columbia. The organization of this association took place in the Smithsonian building in 1850, and its meetings have been regularly held in the lecture-room from that time to the present. It is believed that the spirit of the will of Smithson is properly consulted, in giving encouragement and rendering facilities to these meetings. The association has been kept up with much spirit, and I am sure that much good has resulted from the organization. It has served to cherish a feeling of harmony among the teachers, and to awaken a spirit of improvement relative to education and general knowledge.

The following is a list of the titles of lectures given before the Institution during the last session of Congress, with the names of the gentlemen by whom they were delivered:

A course of six lectures on History as a science, and a single one on Poetry, by Dr. Samuel H. Cox, of Brooklyn, New York.

Two lectures on Induction and Association, by Dr. John Ludlow, Provost of the University of Pennsylvania.

A course of five lectures on Entomology, and one on the Alps, by Rev. Dr. John G. Morris, of Baltimore, Maryland.

Two lectures on the History and the Forms of the English Language, by Professor W. C. Fowler, of Amherst, Massachusetts.

One lecture on the Architecture of the Middle Ages, by Dr. A. H. Vinton, of Boston.

Two lectures by Professor S. S. Haldeman, of Columbia, Pennsylvania, on the Mechanism of Speech, and its bearing upon the natural history of the human race.

Two lectures on Geology, by Dr. Benjamin Silliman, Sr., of Yale College, New Haven.

SIXTH ANNUAL REPORT

Of the Secretary of the Smithsonian Institution, for the year 1852.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: The object of the Annual Report of the Secretary is not only to present to the Regents an account of the transactions of the period which elapses between their successive sessions, but also to make such suggestions as may be important to the future management of the affairs of the Institution, and to state such facts in reference to it as may be interesting to the public, or which may furnish a connected history of its transactions.

Since the beginning of the Institution no change has taken place in the policy originally adopted with reference to the system of active operations. The details of this plan were well considered, and its importance as the only means of properly carrying out the intention of the donor was fully understood at the first. The theory of the plan was expressed in a few propositions, which have been constantly kept in view, and acted upon as far as the law of Congress and other restrictions would permit.

This plan, although prosecuted under very unfavorable circumstances, has produced results such as to render the name of the Institution favorably known wherever science and literature are cultivated, and to connect it indissolubly with the history of the progress of knowledge in our times. As proof of this we need only state the following facts:

The Institution has promoted astronomy, by the aid furnished the researches which led to the discovery of the true orbit of the new planet Neptune, and the determination of the perturbations of this planet and the other bodies of the solar system, on account of their mutual attraction. It has also aided the same branch of science by furnishing instruments and other facilities to the Chilian expedition, under Lieut. Gilliss; and by preparing and publishing an ephemeris of Neptune, which has been adopted by all the astronomers of the world.

It has advanced geography, by providing the scientific traveller with annual lists of the occultations of the principal stars; by the moon, for the determination of longitude; by the preparation of tables for ascertaining heights with the barometer; and by the collection and publication of important facts relative to the topography of different parts of the country, particularly of the valley of the Mississippi.

It has established an extended system of meteorological investigation, consisting of several hundred intelligent observers, who are daily noting the phases of the weather in every part of the continent of North America. It has imported standard instruments, constructed hundreds of compared thermometers, barometers, and psychrometers, and has furnished improved tables and directions for observing with these instruments the various changes of the atmosphere, as to temperature, pressure, moisture, &c. It has collected, and is collecting, from its

observers, an extended series of facts, which are yielding deductions of great interest in regard to the climate of this country and the meteorology of the globe.

The Institution has advanced the science of geology, by its researches and original publications. It has made a preliminary exploration of the remarkable region on the upper Missouri river called the "Bad Lands," and is now printing a descriptive memoir on the extraordinary fossil remains which abound in that locality. It has assisted in explorations relative to the distribution in this country of the remains of microscopic animals found in immense quantities in different parts of the United States.

It has made important contributions to botany, by means of the published results of explorations in Texas, New Mexico, and California, and by the preparation and publication of an extended memoir, illustrated with colored engravings, on the sea-plants of the coast of North America.

It has published several important original papers on physiology, comparative anatomy, zoology, and different branches of descriptive natural history; and has prepared and printed, for distribution to travellers, a series of Directions for collecting and preserving specimens.

It has advanced the science of terrestrial magnetism, by furnishing instruments for determining the elements of the magnetic force, to various exploring expeditions; and by publishing the results of observations made under its direction, at the expense of the government.

It has collected and published the statistics of the libraries of the United States, and perfected a plan of stereotyping catalogues, which will render effective, as a combined whole, all the scattered libraries of the country.

The Institution has been instrumental in directing attention to American antiquities, and has awakened such an interest in the subject as will tend to the collection and study of all the facts which can be gathered relative to the ancient inhabitants of this continent. It has also rendered available for the purposes of the ethnologist and philanthropist the labors of our missionaries among the Dakotas, by publishing a volume on the language of this tribe of Indians; and has done good service to comparative philology by the distribution of directions for collecting Indian vocabularies.

It has established an extended system of literary and scientific exchanges, both foreign and domestic, and annually transmits between the most distant societies and individuals, hundreds of packages of valuable works. It has presented its own publications, free of expense, to all the first-class libraries of the world, and thus rendered them accessible, as far as possible, to all persons who are interested in their study. No restriction of copyright has been placed on their republication; and the truths which they contain are daily finding their way to the general public, through the labors of popular writers and teachers. The distribution of its publications and its system of exchanges have served not only to advance and diffuse knowledge, but also to increase the reputation, and, consequently, the influence of our country; to promote a kindly and sympathetic feeling between the New World and Old—alike grateful to the philosopher and the philanthropist.

These are the fruits of what is called the system of active operations of the Institution, and its power to produce other and continuous results is only limited by the amount of the income which can be appropriated to it, since each succeeding year has presented new and important fields for its cultivation. All the anticipations indulged with regard to it have been fully realized; and, after an experience of six years, there can now be no doubt of the true policy of the Regents in regard to it.

I am well aware, however, that the idea is entertained by some that the system of active operations, though at present in a flourishing condition, cannot continue to be the prominent object of attention; and that under another set of directors, other counsels will prevail and other measures be adopted, and that what has been done in establishing this system will ultimately be undone. It is true, there is cause of fear that the policy in this respect may be changed; for the system we are here considering requires constant exertion, and is little suited to the tastes and habits of those who seek place and position from mere personal considerations. There is cause to fear, also, from the experience of the past, that the general expenses of a large building, the support of the establishment necessarily connected with it, and the cost of collecting, preserving, and exhibiting specimens of nature and art, will so increase as to paralyze the spirit of activity. Furthermore, the proposition is frequently urged upon the Regents, by persons who have not duly considered the will of Smithson, or who fail to appreciate the importance of the present plan, that a large portion of the income should be devoted to the diffusion of a knowledge of some popular branch of practical art; and there may be some fear that a timid policy on the part of the friends of the Institution will lead them to favor such a plan.

To obviate these tendencies, it is the duty of the present Regents, if they are convinced that the policy of active operations is the true one, to endeavor to correct, as far as possible, the errors which may have been committed in the beginning, and to give the Institution such an impulse in the proper direction, that it cannot deviate from it without immediately arresting the attention of the enlightened public, both at home and abroad, who will not fail to demand, authoritatively, a sufficient reason for the change.

A promise has been made to all persons in this country, engaged in original researches, and who are capable of furnishing additions to the sum of human knowledge, that the result of their labors shall continue to be presented to the world through the Smithsonian publications. The honor of the Institution is also pledged to the scientific and literary societies from which it has received exchanges, in this and other countries, that it will continue to send to them at least an annual volume of Contributions, of a character similar to those with which they have already been presented. It is on this condition that the library has been so richly favored, not only with the current volumes of Transactions, but also, in many cases from the oldest societies, with full sets of all the previous volumes of their series of publications. Besides this, the libraries of all the colleges and literary and philosophical societies of this country are supplied with full sets of the Smithsonian Transactions;

and in this way a foretaste has been given of the fruit of the operations which will tend, in some degree, to insure their continuance.

But if, notwithstanding all this, the Institution is destined to a change of policy, what has been well done in the line we are advocating can never be undone. The new truths developed by the researches originated by the Institution, and recorded in its publications; the effect of its exchanges with foreign countries; and the results of the cataloguing system, can never be obliterated; they will endure through all coming time. Should the government of the United States be dissolved, and the Smithsonian fund dissipated to the winds, the "Smithsonian Contributions to Knowledge" will still be found in the principal libraries of the world, a perpetual monument of the wisdom and liberality of the founder of the Institution, and of the faithfulness of those who first directed its affairs.

Whatever, therefore, may be the future condition of the Institution, the true policy, for the present, is to devote its energies to the system of active operations. All other objects should be subordinate to this, and be in no wise suffered to diminish the good which it is capable of producing. It should be prosecuted with discretion, but with vigor; the results will be its vindication.

It was stated in the last Report that the Institution had been the contingent legatee of a considerable amount of property. During the past year the facts with reference to this bequest have been investigated, and it appears that Mr. Wynn, of Brooklyn, N. Y., deceased, left a legacy to his wife, and the greater part of his property, valued at $75,000, to his daughter, a child six years old, with the condition that at the death of this daughter without issue, the property should come to the Smithsonian Institution. In making this bequest Mr. Wynn says, in his will: "I know no benevolent institution more useful and appropriate than the Smithsonian Institution at Washington."

This circumstance is highly gratifying to the friends of the Institution, not because it offers a remote possibility of an increase of the funds, but on account of the evidence it affords of the liberal views of the deceased, and of his confidence in the proper management and importance of the Smithsonian bequest. The will of Mr. Wynn induces us to believe that the right administration of the Smithsonian fund will cause similar examples of liberality on the part of wealthy individuals of our country; and in this point of view the responsibility which rests on those who have the direction of the affairs of this Institution is greater than that with reference to the good which the income itself may immediately accomplish.

Though it is scarcely to be expected that many unconditional bequests will be made, yet the example of Smithson may induce the founding of other institutions which may serve to perpetuate other names, and increase the blessings which may flow from such judicious liberality. Man is a sympathetic being; and it is not impossible that Smithson himself may have caught the first idea of his benevolent design from the example of our countryman, Count Rumford, the principal founder of the Royal Institution of London.

Bequests for special purposes, bearing the names of the testators, are not incongruous with the plan of this Institution. Lectureships on

particular subjects, annual reports on special branches of knowledge, provision for certain lines of research, and libraries for general use or special reference, may be founded under the name of those who bestow the funds, and be placed under the direction of, and incorporated with, the Smithsonian Institution. The charge, however, of such bequests ought not to be accepted unless they are sufficient in themselves to meet the expenses of the object contemplated by them, and would not incumber or impede the legitimate operations of the Institution. For example: were a library of a hundred thousand volumes offered, it would be unwise to accept it were it not accompanied by the funds necessary to the erection of a building and to the proper support of the collection.

In July, 1850, a new system of accounts was introduced, which has been continued to the present time. According to this system, every payment is made by an order of the Secretary on the Treasurer, who, in turn, gives his check on Messrs. Corcoran & Riggs, with whom the semi-annual interest and the other income of the Institution are deposited. As often as once a quarter all the bills are examined and referred to their appropriate classes, in presence of all the officers of the Institution. After the accounts are posted, they are referred to the Executive Committee for final examination.

By a reference to the report of the Executive Committee, it will be seen that the funds are in a good condition, and that, although during the past year $14,047 has been paid on the building, there is still on hand, after all the expenditures for publications and other purposes, besides the original bequest, upwards of $200,000 of accrued interest. It is to be regretted that Congress has not yet acted on the petition requesting the perpetual funding of $150,000 of the last-mentioned sum. It is highly important that this money should be permanently invested as a part of the principal, so that it can neither be lost nor expended. There are no other means of effectually accomplishing this result, except by funding it in the Treasury of the United States. The proposition should be pressed upon Congress, though there may be, at present, no very certain prospect of success; for, if the petition be refused, and the money be afterwards lost by improper investment or injudicious expenditure, the responsibility would, in part, rest with the government.

The charge of this fund, and of all the disbursements, is attended with much solicitude. It involves a degree of responsibility which, to a person unaccustomed to large financial transactions, is very onerous. I beg leave, however, in this place to mention the obligation which the Institution is under to W. W. Corcoran, esq., for the aid which he has, in all cases, afforded in the management of the funds, and the judicious advice which he has always given relative to their investment.

From the report of the Building Committee it appears that the contract for finishing the interior of the wings and ranges, and the rooms of the towers, has been completed. The whole interior of the main building, comprising a rectangular space of two hundred feet long, fifty wide, and about sixty high, remains to be finished with fire-proof materials. It is proposed to divide this space into two stories and a

basement; these stories to be devoted to the library, the museum, and a large and convenient lecture-room.

The business of the Institution would be much facilitated were this part of the building completed. Since Congress has authorized the establishment of a library and museum, it will be well to place all the objects of interest to the public in the main building, and make this exclusively the show part of the establishment, devoting the wings and ranges, and rooms of the towers, to the business operations and other purposes of the Institution. In the present condition of affairs there is no part of the edifice to which the public has not access, and, consequently, business has to be transacted amidst constant interruptions. The loss of time and effective life to which all are exposed who occupy a position of notoriety in the city of Washington, is truly lamentable; and where this is increased by facility of access to gratify mere curiosity, the evil becomes scarcely endurable. Progress in business, under such circumstances, can only be made by an encroachment on the hours usually allotted to rest, and that, too, at the expense of wasted energies and shortened days.

Publications.

During the past year the following memoirs, described in the previous Reports, have been collected into volumes and distributed to public institutions in this country and abroad:

1. Observations on Terrestrial Magnetism.
2. Researches on Electrical Rheometry.
3. Contributions to the Natural History of the Fresh-water Fishes of North America.
4. First part of the Marine Algæ of the coast of the United States.
5. Plantæ Wrightianæ Texano-Neo-Mexicanæ, Part I.
6. Law of Deposite of the Flood Tide, its dynamical action and office.
7. Description of Ancient Works in Ohio.
8. Occultations visible in the United States during the year 1852.
9. A Grammar and Dictionary of the Dakota language.

The memoir last mentioned occupies an entire volume, the fourth of the Smithsonian series of Contributions. The other memoirs are contained in the third volume of the same series.

The remaining memoirs, described in the last Report, are still in the press, the printing of them having been delayed by the exhaustion of the appropriation for the year, and by several necessary corrections. A sufficient number of papers will, however, be printed in the course of a few months, with the new appropriation, to complete the fifth volume of Contributions; and if the means prove sufficient, we can readily issue the sixth volume during the present year.

The result of the plan of publication has fully realized the anticipations which were entertained of its usefulness. It supplies the food it feeds upon. The appearance in the Contributions of a memoir on any subject immediately directs attention to that subject, and induces other laborers to engage in the same field of exploration. This is particularly manifest in the interest awakened with regard to the antiqui-

ties of our country, and to the language of the Indian tribes, by the publications of the Institution on these subjects.

The following is an account of the memoirs received since the date of the last Report:

1. Contributions to the History of the Marine Algæ of North America: By Dr. W. H. Harvey: Part II.

In the Report for 1850, an account was given of the acceptance for publication of an extended and expensive memoir of the Marine Algæ of the eastern and southern coasts of the United States, by Professor Harvey, of the University of Dublin. The first part of this memoir was published last spring, and has found much favor with the botanical world, as well as with the inhabitants and visitors of our sea-board. The second part of the same memoir is now printed, and will be ready for distribution in the course of a few weeks. It is illustrated by twenty-four plates, and comprises 240 pages of printed matter.

The common name of the class of plants which forms the subject of this memoir, viz: sea-weeds, has subjected the Institution to the charge of expending its funds on trifling and unworthy objects; and as the same objection may be made to many of the papers forming the series of Smithsonian Contributions, a few words in vindication of researches of this character may not be inappropriate.

Nothing in the whole system of nature is isolated or unimportant. The fall of a leaf and the motion of a planet are governed by the same laws. The structure of a lichen and the formation of an oak are equally the result of definite plans. It is in the study of objects, considered trivial and unworthy of notice by the casual observer, that genius finds the most important and interesting phenomena. It was in the investigation of the varying colors of the soap-bubble that Newton detected the remarkable fact of the fits of easy reflection and easy refraction presented by a ray of light in its passage through space, and upon which he established the fundamental principle of the present generalization of the undulatory theory of light. Smithson himself, the founder of this Institution, considered the analysis of a tear as nowise unworthy of his peculiar chemical skill; and well might he so consider it; for the knowledge of the composition of every secretion of the body is of importance, in a physiological point of view, as well as in the preservation of health and the cure of disease. The study of the cause of the spasmodic muscular contraction of a frog, when brought into contact with two pieces of metal, revealed to Galvani the first facts of the branch of science which now bears his name. The microscopic organization of animals and plants is replete with the highest instruction; and, surely, in the language of one of the fathers of modern physical science, "nothing can be unworthy of being investigated by man which was thought worthy of being created by GOD."

These remarks are particularly applicable to the study of the lower classes of the organic creation. Nature everywhere exhibits economy of means in attaining the most complex and diversified ends. Every result is produced in the simplest manner when viewed in relation to the whole design. All parts of organized beings, whether plants or animals, are formed of a few elementary structures, variously trans-

formed and combined. To obtain a knowledge of the plan and process of organization, we must begin with the most simple combinations, precisely as we would do in the study of mathematical analyses, in which the student commences with the least complicated formulæ, and gradually proceeds to those of a more involved character. It is for this reason that the study of the algæ, or sea-weeds, is of special interest to the physiologist. The framework of every vegetable is built up of cells or little membranous sacks. All vegetable structures, whether wood, bark, or leaves, are formed of aggregations of these cells, differently moulded and united. As we pass along the series of organized forms, we may descend from those of a higher to those of a lower complexity, until, in the class of algæ, we arrive at plants of which the whole body is composed of a few cells strung together; and finally at others, the simplest of organized bodies, whose entire framework is a single cell. Now, it is only by a critical study of these rudimentary forms, and by tracing them into their complex combinations, that man can ever hope to arrive at a knowledge of the laws of organization. We might speak of the importance of a knowledge of the algæ in their application to agriculture and the chemical arts; but what we have here stated will be a sufficient reason for their study, independent of all minor considerations.

2. The next memoir consists of an account of a series of researches in the comparative anatomy of the frog, by Dr. Jeffries Wyman, of Cambridge, Massachusetts.

The whole animal kingdom may in one sense be considered as the different development of four separate plans of organization, giving rise to four different classes of animals, viz: the Radiata, the Articulata, Mollusca, and Vertebrata. Whatever discovery is made with regard to the organization of any of the species belonging to any one of these classes, tends to throw light on the organization of the whole class; and it is only by the careful study of all the different animals of a class, and a comparison of their analogous parts, that we can arrive at a knowledge of the general laws which control the development of the whole. Thus the study of human anatomy is the basis of the investigation of the anatomy of all animals with a back-bone; and conversely, the anatomy of any animal of this class tends to throw light on that of man.

Dr. Wyman's paper gives an account of a series of elaborate investigations of the nervous system of a very common, but, in a physiological point of view, highly interesting animal.

The following are the several points of the memoir:

(1.) An anatomical description of the more important parts of the nervous system.

(2.) Comparisons between them and the corresponding organs of other animals, both higher and lower in the scale.

(3.) The metamorphoses which they undergo, especially the spinal chord and some of the cranial nerves, showing the existence of a more complete analogy between the immature condition of Batrachian reptiles and the class of fishes, than has hitherto been noticed.

(4.) An application of the facts observed in connexion with the cranial nerves to the philosophical anatomy of the nervous system, showing

what is believed to be the true nature of the special sense nerves, as contrasted with other cranial or the true spinal nerves, and the conformity of the other cranial nerves to the common spinal type.

3. The next communication has the following title: "Plantæ Wrightianæ Texano-Neo-Mexicanæ, Part II: By Dr. Asa Gray, Professor of Botany in Harvard University."

It has been stated in two of the preceding reports that a small appropriation was made for botanical explorations in Texas and New Mexico, and that the results had been placed in the hands of Dr. Gray for scientific investigation. The first memoir on this subject was described in the last report. It has been printed, and copies distributed to all the working botanists in this country and Europe. It also forms a part of the third volume of the "Smithsonian Contributions."

The object of the present memoir is to give a scientific account of the collections made by Mr. Wright, under the direction of Col. J. D. Graham, U. S. Topographical Engineers, and Major W. H. Emory, of the Boundary Commission, in New Mexico and in Eastern Texas, during the summer and autum of 1851, and the spring and early part of the summer of 1852.

The description of the plants from this region was previously carried as far as the order *Compositæ*. In the present paper Dr. Gray gives a similar account of the recent collections up to the same point, and reserves the other portions of these collections made by Mr. Wright, with the remainder of the undescribed plants of Fendler and Lindheimer, to be described in a general memoir. One portion of the collection was made from July to November, from El Paso to the Copper Mines of Santa Rita del Cobre, in the southwestern part of New Mexico; and thence into the northern part of the Mexican State of Sonora, as far as Santa Cruz, returning to the Copper Mines by way of Guadalupe Pass, and thence back to El Paso. The plants obtained during this tour are of exceeding interest, and comprise a larger portion of new species than any other collection that has fallen into Dr. Gray's hands. Another portion was obtained in the vicinity of El Paso and the rancho of Frontera, and down the Rio Grande for sixty or seventy miles; also, up the valley of the river as far as Camp Fillmore, and thence into the Organ mountains, which bound the valley on the east. Another collection was made in a hasty excursion to Lake St. Marie and Lake Guztman, in Chihuahua. These several collections afford many novelties, no botanist having previously explored this region at the same season of the year.

It is expected that a full account of the topography and productions of this country will be given in the reports of Colonel Graham and Major Emory.

The interest which attaches to the results of explorations of this kind is not confined to the botanist, but extends to the physical geographer and the political economist. An accurate description of the botany of a region is a sure guide to a knowledge of its power of producing and sustaining vegetable and animal life, and consequently of its value in a commercial and political point of view.

4. Dr. Leidy, of Philadelphia, has presented a memoir on the extinct species of the ox of America. In this paper he indicates the former

existence of four species of the ox, which were probably contemporaneous with the *Mastodon* and the *Megalonyx*. Fossil remains of these animals have been frequently found in the United States, and descriptions of them are scattered through various works; but no approach has before been made to a correct view of the number and character of the species. The present existing species of ox are found indigenous in every part of the world except South America and Australia; and this is the more remarkable, because the domestic ox introduced into the former country by Europeans exists in immense herds on the pampas in a wild state. There is a similar fact with regard to the horse. America, at the period of its discovery, possessed no indigenous quadruped of this kind, though the climate is highly favorable to its existence, and the remains of two extinct species are frequently found. Two of the species of ox described by Dr. Leidy belong to the genus Bison, and one of these is of gigantic size. The other two species belong to a new genus called *Bootherium*.

5. Another memoir presented by the same author forms an interesting addition to our knowledge of the extinct gigantic sloth tribe of North America. It comprises a description of remains of the *Megalonyx*, *Mylodon*, *Megatherium*, and of a new genus called *Eriptodon*.

The scientific world is indebted for the first account of the remains of a large extinct quadruped of the sloth tribe to President Jefferson. Fragments of the bones of this animal were found in a saltpetre cave in Greenbrier county, Virginia. They were regarded with little or no interest by the persons who first observed them, and, as they encumbered the saltpetre bed, would probably have been thrown out and suffered to decay, had not the news of their existence reached the ears of the distinguished individual before mentioned. Though devoted to politics, he was too much of a philosopher not to see in these mouldering fragments of a skeleton objects of high interest connected with the past history of our globe. He described them in a memoir published in the Transactions of the American Philosophical Society at Philadelphia in 1797, and gave to the animal to which they belong the name of *Megalonyx*, or the great claw. The materials in his possession, however, were too scanty to allow of his determining the true character of the quadruped. Dr. Wistar, of Philadelphia, suspected the animal to have been a gigantic sloth; and this opinion was confirmed by Cuvier, from the ample materials for comparison at his command. The original bones described by Jefferson are preserved in the collection of the Philosophical Society; but, besides these, Dr. Leidy had access to specimens of the remains of the same animal, found in different parts of the United States. From the study of these he has been enabled to throw much additional light upon the characters of the *Megalonyx*. He considers that the only remains of this animal yet known are those found in the United States, and satisfactorily proves that the lower jaw of an extinct quadruped discovered by Dr. Darwin in South America, and referred by naturalists to the *Megalonyx* of Jefferson, does not belong to an animal of the same genus.

The remains of the *Mylodon*, or gigantic sloth, were first discovered by Darwin in his researches in the southern part of South America. Remains of another species found in North America were described

by Dr. Harlan, but were erroneously referred to the *Megalonyx*. Dr. Leidy, in his memoir, describes the collection of the remains of this animal belonging to the New York Lyceum.

The *Megatherium*, which is the largest of all the extinct sloth tribe, when full grown, was more than fourteen feet long, including the tail, and eight feet high. It was first discovered in South America, but has since been found in Georgia; and it was from this locality, the only one in the United States yet known, that the remains described by Dr. Leidy were obtained.

The fourth and new genus of American sloths, called the *Eriptodon* by the author, is established upon a peculiar form of teeth which belonged to an animal of about the size of the *Megalonyx*, the bones of which were also found in Georgia.

Dr. Hays, one of the commission to which this memoir was submitted, remarks in his report, that "the author has not only made valuable additions to our knowledge of an interesting tribe of animals, but has also collected and arranged the facts previously known so as to throw new light on the subject, and to render his memoir an important starting point for future investigators."

Grammar of the Choctaw language.

The publication of the volume on the Dakota language described in the last Report, has called forth another important memoir on comparative philology, namely, a Grammar of the Choctaw language, by the Rev. Harvey Byington, for thirty years a missionary among the Indians.

It was referred for examination to Professor Felton, of Cambridge, and to Professor Gibbs, of Yale College, both of whom pronounced it an important addition to ethnology, and warmly recommended its publication. The work was afterwards placed in the hands of Professor W. W. Turner, formerly professor of Hebrew in the New York Theological Seminary, now librarian of the United States Patent Office. Previous to sending it to the press, the author, after numerous interviews with Professor Turner, concluded that this memoir was susceptible of so much improvement by a further study of the language, that he asked leave to withdraw it for a time. This request was of course granted, and Mr. Byington has returned to his missionary labors, and will again present the work after it has received the desired improvements.

Reports and other minor publications.

Since the date of the last Report to the Regents, the following articles have been printed and partially distributed:

1. Directions for making Collections in Natural History. This is a pamphlet of twenty-four pages, by Professor Baird, and is much called for by the correspondents of the Institution.

2. A work by Professor Jewett, containing an exposition of the system adopted by the Smithsonian Institution for constructing catalogues of libraries, by means of separate stereotype titles, with rules for the

guidance of librarians, and examples for illustration. This work is comprised in seventy-eight pages, and though not large, it has been produced at the expense of much time and labor.

3. A second emission of the Report on the Recent Improvements in the Chemical Arts has been printed and in part distributed. This work is stereotyped, and therefore copies can be supplied at any time, at a comparatively small cost.

4. A description of the Portraits of the North American Indians in the gallery of the Smithsonian Institution, by the painter of the portraits, J. M. Stanley, esq. This is a pamphlet of seventy-six pages, and contains brief sketches of the characters and incidents in the history of forty-three different tribes of Indians.

5. The first part of the collection of tables to facilitate meteorological and other calculations, by Professor Guyot: this was mentioned in the last Report, and has been stereotyped and distributed. It is a very acceptable present to the meteorological observers of the Institution, and other persons engaged in scientific investigations.

Several reports on different subjects are in progress of preparation; but the appropriation for this part of the programme of operations is at present so small, that the completion of them has not been urged upon the authors. The first part of the report on forest trees, by Dr. Gray, of Cambridge, will be ready for the press the latter part of the present or beginning of the next year.

Distribution of publications and exchanges.

Copies of the Smithsonian Contributions to Knowledge are sent to all the first-class libraries and literary and scientific societies of the world, and in return the Institution receives an equivalent in Transactions and other publications. After the printing of the first volume of Contributions was completed, a copy of it and of the programme of organization were sent to the principal foreign literary and scientific institutions, with the request that they would exchange publications, on the condition that a volume of equal importance should be presented to them annually. At first the number of responses to this proposition was small; but since the character of the Institution has become known and appreciated, the works received in exchange have rapidly increased in number and importance. The whole number of articles received during 1852 is four thousand seven hundred and forty-four, which is more than three times that of all the previous years. The publications received in many cases consist of entire sets of Transactions, the earlier volumes of which are out of print, and cannot be purchased. They are of use in carrying on the various investigations of the Institution, and of value to the country as works of reference. They ought not to be considered as donations to the library, but as the products of the active operations, which the Institution is at liberty to dispose of in the manner best suited to further its designs. The principal object, however, of the distribution of the Smithsonian volumes, is not to procure a large library in exchange, but to diffuse among men a knowledge of the new truths discovered by the agency of the Smithsonian fund. The worth and importance of the Institution is not to be estimated by what it accu-

mulates within the walls of its building, but by what it sends forth to the world. Its great mission is to facilitate the use of all the implements of research, and to diffuse the knowledge which this use may develop. The Smithsonian publications are sent to some institutions abroad, and to the great majority of those at home, without any return except, in some cases, that of co-operation in meteorological and other observations. Applications for these publications have now become so numerous, that the edition printed will supply but a part of the demand, and it becomes a difficult matter to select the places which will best subserve the purpose of rendering them accessible to the greatest number of persons who would be benefited by their perusal.

In connexion with the distribution of its own publications, the Institution has adopted an arrangement to establish and promote a more general exchange of literary and scientific productions between this and other countries. For this purpose it receives packages from societies and individuals in the different parts of the United States, and transmits them to England or the continent, and through its agents distributes them to the parties for whom they are intended. It also receives the articles sent in return, and forwards them to those to whom they are addressed. To facilitate this operation, the packages to the Institution are addressed to the collector of customs in New York, and by him, on the certificate of the secretary, admitted free of duty, and without the delay of an examination.

In carrying out this plan, the Institution is much indebted to the liberal course adopted by the government of Great Britain, and to the ready co-operation of the Royal Society of London. All packages intended for Great Britain, for some parts of the continent, and the East Indies, are directed to the care of the Royal Society, and on the certificate of its president, are, by a special order of the government, admitted duty free, and without the delay and risk of inspection. The packages are afterwards distributed by the agent of the Institution, or by those of the Society.

This system of exchange does not stop here. The Royal Society has adopted the same plan with reference to Great Britain and all other parts of the world; and the Smithsonian Institution, in turn, becomes an agent in receiving and distributing all packages which the Society desires to send to this country. A general system of international communication, first started by this Institution for the distribution of its own publications, has thus been established, which will tend to render the results of the labors of each country in the line of literature and science common to all, and to produce a community of interest and of relations of the highest importance to the advancement of knowledge, and of kindly feeling "among men."

The results of the operations of the system of foreign exchanges during the year 1852 are exceedingly gratifying. The whole number of packages sent out, including the Smithsonian publications, is 572, containing 9,195 articles, and weighing 9,855 pounds. There have been received, in addition to the 4,745 articles for this Institution, 637 packages, containing an unknown number of volumes, for other institutions in this country. The details of the business of the exchanges are entrusted to Professor Baird; and I would refer, for a particular

statement of all the facts connected with it, to his report, herewith submitted.

The planet Neptune.

It has been mentioned in the last annual reports that Mr. S. C. Walker, of the U. S. Coast Survey, prepared, at the expense of the Smithsonian Institution, a memoir containing an exposition of the elements of the true orbit of the planet Neptune, and that from this orbit, and the mathematical investigation of Professor Pierce, of Cambridge, an ephemeris of Neptune had been deduced, which has been accepted by all the astronomers of the world as the only certain guide to the position of the planet. This ephemeris was prepared for 1848 and 1849, at the expense of the Institution; but since the last-mentioned date it has been calculated at the expense of the appropriation for the Nautical Almanac, while the cost of printing and distribution has been defrayed by the Institution. The same arrangement will continue for the ephemeris of 1853 and 1854, after which the whole will be transferred to the Nautical Almanac.

Occultations.

The moon, in her passage eastward around the earth, continually passes between us and the fixed stars or planets which lie in her path, and obscures them from our view. The instant of the disappearance of a star behind the moon, or the occultation of a star, as the phenomenon is called, can be noted by observers widely separated from each other, and hence this phenomenon becomes a ready means of determining the difference of longitude between two places. The employment of occultations for fixing geographical positions is easy, and leads to accuracy in the results. The telescope may be of moderate size, and requires no accurate adjustment; the position assigned it may be such as to suit the convenience of the observer. The frequent occurrence of occultations renders the use of them of great importance to the travelling observer; and the publication of lists of these, and of tables for their reduction, is essential to the improvement of geography. They are of particular value in this country, on account of the frequent exploring and surveying expeditions now carried on by our government and our people, and to be continued for an indefinite time in the extensive territory of the West, and the newly-acquired possessions of the Southwest. Tables of occultations for 1849 and 1850 were prepared and published at the expense of this Institution; but for subsequent years the expense of their preparation has been defrayed by the appropriation for the Nautical Almanac, under the direction of Lieutenant Davis, while the composition and press-work are still at the expense of the Institution. As soon as the Nautical Almanac is fully commenced, the publication of these tables will be entirely relinquished to this enterprise of the government.

Up to 1850 the tables published were of occultations visible in the United States. Since, however, the preparation of the tables has been in charge of the director of the Nautical Almanac, the list has been so

extended as to make it useful to geographers in general as well as to those of the United States. This extension was rendered important on account of the surveys undertaken by our government in other parts of the globe. Also, a table has been added, giving the correction of the latitude due to the oblate spheroidal figure of the earth.

When we consider the character and condition of the vast continent of North America, which it belongs to us chiefly to reduce to a habitable and civilized state, we shall perceive that the practical scientific explorer has no higher duty than to settle the geography, the magnetism, the natural history, and the climate, of these regions.

Researches.

At the session of the Regents in 1849, an appropriation was made to supply Lieutenant Gilliss with a telescope for his expedition to Chili, to aid him in his observations for a new determination of the distance of the inferior planets, and, consequently, of the actual distances of the several members of the solar system. A subsequent appropriation was made for the purchase of an astronomical clock for the same purpose. The first appropriation was repaid to the Institution by a grant from Congress to cover the expenses of the expedition, and the second will also be reimbursed by the purchase of the clock and all the other instruments by the Chilian government, for the permanent establishment of an observatory in that country.

By these operations, the Institution has been the means of rendering essential aid to science, without in the end diminishing the amount of its income. Lieutenant Gilliss, after voluntarily exiling himself from his family and his country for four years, has returned with a rich harvest of materials in astronomy, meteorology, magnetism, and natural history, in the reduction, generalization, and description of which the Institution may also furnish important aid.

The sum of one hundred and fifty dollars has been advanced to Professor C. B. Adams, of Amherst College, to defray in part the expense of an exploration of the molluscs of the West Indies. This subject is intimately connected with the geological changes which have taken place on the surface of our globe; and it was with particular reference to this point that Professor Adams undertook these researches. This is his second expedition to the same regions; and in both instances the Smithsonian Institution has seconded his proposition, and warmly recommended it to the favorable consideration of the trustees of Amherst College. A small sum appropriated in this way, though not enough in itself to produce much effect, is still sufficient to complete the amount to be raised, and thus serve to determine the commencement of the enterprise.

Meteorology.

The general system of observations relative to the meteorology of the continent of North America, described in the previous Reports, has been continued and extended. It consists at present of the following classes, viz:

1. The Smithsonian system proper, made up of voluntary observers in different parts of the United States, who report immediately to the Institution.

2. The system of observations of the University of the State of New York, re-established under the direction of this Institution, and supported by the State of New York.

3. The system of observations established under the direction of this Institution, by the State of Massachusetts.

4. The extended system of observations made at the several military posts of the United States, under the direction of the Surgeon General of the army.

5. Separate series of observations by exploring and surveying parties, in some cases directed, and in part furnished with instruments, by this Institution.

6. Meteorological records from British America, consisting of observations made at the various posts of the Hudson's Bay Company, and at the residence of private individuals in Canada.

In the first three of these classes there are about two hundred observers distributed over the entire continent. In the older States they are very thickly distributed, and they are entirely wanting in none. Texas, Arkansas, the Indian Territory, Missouri, Iowa, and Minnesota, have each competent and reliable observers reporting directly to the Smithsonian Institution, in addition to those at the military posts which are in the same regions.

Further westward, and more widely separated, the observers at the military posts, and those of surveying and exploring parties, continue the connexion of the system to the Pacific coast, where the number of military posts is greater, and private observers are again found.

The New York system embraces twenty-five academies as stations, all furnished with new and reliable instruments at the expense of the State.

In Massachusetts twelve stations are furnished in like manner, of which eight have reported.

In 1852 ninety-seven military posts reported meteorological observations, and for 1853 the number will be greater rather than less.

The whole number of stations and observers available in making the deductions for 1852 was three hundred and fifty; and this number, either reporting directly to the Institution or furnishing their observations for its use, may be relied upon for the current year.

Besides the observations derived from this general system, a large collection has been procured from individuals in different parts of the country, who have kept records of the weather, in some cases for many years. This collection was obtained by issuing a circular from the Institution, requesting copies of any records which might have been kept relative to the climate of this country. The amount of information received in answer to this circular was far greater than was expected, and much more valuable matter was thus called forth than was previously known to exist.

In order that the materials procured from the aforementioned sources may be rendered available for scientific or practical purposes, it is necessary that they should be reduced, discussed, and arranged for

publication. This work was commenced at the close of 1851, and has been prosecuted with considerable vigor during the past year. It was given by me in charge to Mr. Lorin Blodget, of Western New York, who has engaged in the work with much ardor, has devoted to it his whole time and attention, and has evinced an unusual degree of talent for investigations of this character.

The results which have thus far been obtained are of interest to the science of meteorology, and valuable to the practical arts of life. The following is a descriptive list of the deductions presented in a tabular form:

Temperature Tables.

1. Tables of general mean temperature for a series of years, embracing a summary of the annual means for the years 1849, 1850, 1851, and 1852, with a general summary of reliable observations of mean temperature on the North American continent.
2. Tables of mean temperature for each month, season, and year, for 1849, 1850, 1851, and 1852, embracing 273 stations in 1849; 284 in 1850; 300 in 1851; and 396 in 1852.
3. Tables of mean temperature at each observed hour for the same periods and the same stations.
4. Tables of the monthly extremes of temperature, with the range above and below the monthly mean, for the same periods and the same stations.
5. Collection of tables of temperature at different stations, observed for a series of years.
6. Miscellaneous tables of temperature, not conforming entirely to either of the above divisions.

The first class of tables embraces six hundred and seventy stations, distributed over the entire continent, from the West Indies and Mexico to the Polar seas.

The second class has a more limited range, and is generally confined to the United States and its territories, as observed by the military system, and that of the Smithsonian Institution, with a few stations in Canada and the British possessions on this continent.

The third class of tables is nearly the same in extent with the preceding, and for three complete years, viz: 1850, 1851, and 1852.

The fourth class is of the same extent and time.

The fifth is a climatic arrangement of tables from various stations extending in continuous series over periods varying from five to sixty years.

Tables of Precipitation.

1. Tables of distribution of precipitation in rain and melted snow for each month, season, and year, for 1849, 1850, 1851, and 1852.
2. General tables of precipitation for a series of years, containing the results of the preceding tables, with a general summary of all reliable and accessible observation of fall of rain on the North American continent. These tables give results from about four hundred stations, principally in the United States, its Territories, and the West Indies.

3. Irregular tables and single series, extending over long periods, and where reliable observations have been made.

A series of charts has been constructed to exhibit the distribution of temperature on the North American continent, by isothermal lines; and also another series, illustrative of the distribution of precipitation for each month, season, and year of 1850, 1851, and 1852, and for the periods given in the general tables. It is proposed to present these results to Congress as a part of the Annual Report of the Regents, and as the first fruit of the labors of the Smithsonian Institution on the subject of meteorology.

Catalogue of Libraries.

In addition to the preparation of the work previously mentioned, Professor Jewett has continued his experiments on the new process of stereotyping, to be used in his system of cataloguing. Much difficulty and delay have been experienced in the prosecution of these experiments, on account of the want of workmen to construct the peculiar apparatus required. The services of an ingenious and skilful artisan have, however, been secured; and the process is now brought to such a state that it can be applied with certainty, and abridgment of labor, to produce the best specimens of typography.

The system of catalogues described in previous Reports, though future experience may suggest other improvements, is now apparently perfect in all its details. A stereotyping office has been established in the basement of the west wing of the Smithsonian building, and the Institution is ready to commence the formation of a general catalogue of the principal libraries of the United States. The commission to which the catalogue system was referred, recommended that measures be taken to procure the preparation and printing of the catalogue of the Library of Congress. The cost of the first collection of stereotype titles can be best borne by this library, and it will be the first to reap the benefit of this invention. The stereotype blocks of the titles can be preserved in the Institution, and a new catalogue annually furnished at a small expense, with all the additions inserted in their proper places. The same titles will be employed in printing the catalogues of other libraries, and the new titles which may be prepared for these will, in turn, be used for the Library of Congress.

I beg leave to commend this subject to the immediate consideration of the Board of Regents. The whole plan is in perfect harmony with the active operations, and has always received my cordial commendation. The Institution has incurred the expense of reducing it to practice, so far as it depends on mechanical arrangements; and it now only requires to be applied, to realize all the benefits which have been anticipated in regard to it, to do honor to the Institution and to confer deserved reputation on its author.*

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*Note.—Since this report was presented to the Board of Regents, Congress has appropriated three thousand dollars to commence the catalogue of its library on the stereotype plan, under the direction of the Smithsonian Institution.

Library.

During the last year the library has received important additions from the books presented in exchange for the volumes of the Smithsonian Cóntributions and other publications. The whole value of the works thus received during the year, according to the estimate of Professor Baird, is not less than from four to five thousand dollars. From this source alone a highly interesting and valuable collection of books, pertaining to all branches of positive knowledge, will, in time, be obtained. The reputation which the publications of the Institution have given it abroad, has induced individuals to present a number of valuable works to the library. For an account of the whole, I must refer to the report of Professor Jewett, herewith submitted. The library has also been increased by the purchase of such books as were required in the operations of the Institution, and with a series of scientific and other periodicals.

The copyright law is still in existence, and the library has received, during the past year, the usual number of articles from this source. The remark, however, may again be made with truth, that the action of this law, as it now exists, imposes a burden on the Institution from which it should be relieved.

According to the report of Professor Jewett, the whole number of articles now in the library is twenty-one thousand seven hundred.

Museum of Natural History.

The additions to the collection in natural history, under the persevering efforts of Professor Baird, have increased in a compound ratio over those of previous years. Large additions will also be made by the exploring expeditions which are about to leave for the different parts of this continent and distant seas; but the expense of preparing and transporting these, it is hoped, will be defrayed by the general government. For a detailed account of the number and variety of the specimens collected, I must refer to Professor Baird's report accompanying this communication.

Gallery of Art.

Besides a library, a museum, and lectures, the act of Congress establishing the Smithsonian Institution directed the formation of a gallery of art. The only articles belonging to the Institution which have been yet collected in accordance with the last-mentioned regulation of Congress, are the valuable series of engravings by the old masters, described in a previous report. One of the original propositions of the programme is that of encouraging art, by providing a suitable room for the exhibition of pictures free of expense to the artist. In accordance with this, the large room in the west wing will be devoted to this purpose. It now contains a very interesting series of portraits, mostly full-size, of one hundred and fifty-two North American Indians, with sketches of the scenery of the country they inhabit, deposited by the artist who painted them, Mr. J. M. Stanley. These portraits were all

taken from life, and are accurate representations of the peculiar features of prominent individuals of forty-three different tribes, inhabiting the southwestern prairies, New Mexico, California, and Oregon. The faithfulness of the likenesses has been attested by a number of intelligent persons who have visited the gallery, and have immediately recognised among the portraits those of the individuals with whom they have been personally acquainted. The artist expended in the work of obtaining these pictures ten years of his life, and perseveringly devoted himself to his task in the face of difficulties and dangers which enthusiasm in the pursuit could alone enable him to encounter. The Institution has published a descriptive catalogue of these portraits, which are of interest to the ethnologist as representatives of the peculiar physiognomy, as well as of many of the customs, of the natives of this continent.

Lectures of the Institution.

Public lectures have become one of the characteristics of the day, and next to the press perhaps tend, more than any other means of diffusing knowledge, to impress the public mind. The liberal price paid by the Lowell Institute, and some of the associations in our large cities, induces men of reputation to devote themselves to the preparation of popular lectures. In some parts of the country a number of adjacent cities or villages enter into an arrangement by which the same lecture may be repeated, in succession, at each place; and in this way the amount paid becomes sufficient to call forth the best talent. A plan of this kind has been adopted by the Athenæum of Richmond, Virginia, with reference to the lectures before the Smithsonian Institution, the effect of which has been mutually beneficial. Popular lectures appear better adapted to present literary and historical facts, and to give information relative to subjects of art and of morals, than to impart a knowledge of scientific principles. These require more attention and continuous thought than can be generally expected from a promiscuous audience. Hence the scientific lecturer frequently aims at a brilliant display of experiments, rather than to impress the mind with general principles.

Local lectures are too limited in their influence to meet a proper interpretation of the will of Smithson; yet they were ordered by Congress, and are calculated to do more good in this city than in any other part of the Union.

In selecting lecturers, the consideration of mere popular effect has not been regarded. The persons chosen have been such as to give weight to the lecture, and to reflect credit on the Institution. The object has been to give instruction rather than amusement—to improve the public taste rather than to elicit popular applause. The Institution, to be respected, must maintain a dignified character, and seek rather to direct public opinion than to obtain popularity by an opposite course.

The moral effect which the lectures have on the city of Washington cannot be otherwise than beneficial. When the weather is favorable, the room is every evening crowded before the hour of commencement with an intelligent audience. The lecturers have generally been per-

sons from a distance, who have expressed surprise to find such a large and respectful attendance in a city which is commonly thought to be exclusively devoted to politics and amusement. The plan of inviting gentlemen of reputation and influence from a distance renders the Smithsonian operations familiar to those best qualified to appreciate their value, and best able to give a correct account of the character of the Institution in their own districts of country, as well as to vindicate its claims to the confidence and friendly regard of the public. The results of this course, and the distribution of the volumes of Contributions to colleges and other institutions, it is hoped, will so establish the Institution in the good opinion of the intelligent and influential part of the community, that it may bid defiance to the assaults of those who are ignorant of its true character, or are disappointed in not sharing its honors without the talents or the industry to win them.

The following is a list of the titles of lectures given during the last session of Congress, with the names of the gentlemen by whom they were delivered:

A course of three lectures by Dr. E. K. Kane, U. S. N., on Arctic Exploration.

A course of three lectures by President Mark Hopkins, of Williams College, on Method applied to Investigation.

A course of four lectures by Prof. W. B. Rogers, of the University of Virginia, on the Phases of the Atmosphere.

A course of twelve lectures by Dr. Benjamin Silliman, sen., of Yale College, on Geology.

A course of two lectures by Prof. C. C. Felton, of Harvard University, on Greek Literature.

One lecture, by Job R. Tyson, esq., of Philadelphia: Queen Elizabeth and Oliver Cromwell, their characters and times, contrasted and compared.

A course of six lectures by Dr. B. A. Gould, jr., of Cambridge, on the Recent Progress of Astronomy.

A course of six lectures by Prof. Louis Agassiz, of Cambridge, on the Foundation of Symmetry in the Animal Kingdom.

A course of six lectures by Prof. B. Silliman, jr., on the four ancient elements—Earth, Air, Fire, and Water.

Omitted from previous report: A course of twelve lectures by Dr. Henry Goadby, on the Structure and Functions of Insects.

In the last Report to the Regents some general remarks were made relative to the library and museum, and nothing has since occurred to change the opinions then expressed. On the contrary, the experience of another year has tended to confirm these opinions, and to clearly exhibit the fact that it will be impossible to continue with the present income some of the most important operations, and rigidly adhere to the resolution of the Regents of 1847, to devote one half of the whole income to the library and museum, besides all the expenditures still required on the building for the accommodation of these objects. By a reference to the annual reports of the Executive Committee, it will be seen that the general incidental expenses have continually increased

from year to year; and it is evident that they must continue to increase in a geometrical ratio, on account of the greater repairs which, in time, will be required on the building. After deducting from the income the cost of repairs, lighting, and heating; of messenger, attendants, and watchmen; of stationary, transportation, and postage; after dividing the remainder by two, and deducting from the quotient the expense of the public lectures, the final sum to be devoted to the most important, and, indeed, the only legitimate object of the bequest, is exceedingly small.

The attempt has, however, been made in good faith to carry out the resolution of February, 1847; and if items which may properly be charged to the library and collections were added to this side of the account, the balance up to the present date would be in favor of the active operations. But the plan has not been found to work well in practice. The income is too small properly to support more than one system of operations, and therefore the attempt to establish and sustain three departments, with separate ends and separate interests, must lead to inharmonious action, and consequently to diminished usefulness.

However proper such a division of the income might have been in the beginning, in order to harmonize conflicting opinions, and to submit with proper caution the several proposed schemes to a judicious trial, the same considerations do not now exist for its continuance; changes have since occurred which materially alter the conditions on which the resolution was founded. The plan of active operations was not at first fully understood even by the literary men of the country. It was considered chimerical, and incapable of being continued for any length of time; and hence it was thought important to provide for the means of falling back upon a library and collections. The experience of six years has, however, established its practicability and importance, and it is now considered by the great majority of intelligent persons who have studied the subject, the only direct means of realizing the intention of the donor. Again: the building was to have been finished in five years, and the income after this was to be increased by the interest on the remaining surplus fund; but the Regents have found it necessary, for the better security of the library and museum, to add fifty thousand dollars to the cost of the edifice; and ten years will have elapsed from the beginning, instead of five, before any income from the surplus fund will be available. This additional expense is not incurred for the active operations, and the question may be asked whether they ought to bear any part of this additional burden. Furthermore, at the time the division was made, it was thought obligatory on the part of the Institution to support the great museum of the Exploring Expedition; but the Regents have since concluded that it is not advisable to take charge of this collection; and Congress, by its appropriation for the enlargement of the Patent Office, concurred in the opinion expressed in the Senate by the Hon. Jefferson Davis, that it was a gift which ought not to be pressed upon the Institution. The inquiry may also, in this case, be made, whether it is advisable in the present state of the funds, and the wants of the active operations, to expend any considerable portion of the income in the production of a collection of objects of nature and art. Again: the active operations are procur-

ing annually, for the library, by exchange, a large number of valuable books, which, in time, of themselves will form a rare and valuable collection; and even if the division of the income is to be continued, a sum equal in amount to the price of these books ought to be charged to the library, and an equal amount credited to the active operations.

Though a large library connected with the Institution would be valuable in itself, and convenient to those who are in the immediate vicinity of the Smithsonian building, yet, as has been said before, it is not essential to the active operations. It would be of comparatively little importance to the greater number of the co-laborers of the Institution, who are found in every part of the United States, and are not confined even within these limits. The author of the great work on the American Algæ, now publishing in the Smithsonian Contributions, is a resident member of Trinity College, Dublin; and very few of the authors of the Smithsonian memoirs reside in Washington. The libraries, therefore, of the whole country, and in some cases of other countries, are at the service of the Institution and employed for its purposes.

Similar remarks apply to the museum. It is not the intention of the Institution to attempt to examine and describe within the walls of its own building all the objects which may be referred to it. To accomplish this, a corps of naturalists, each learned in his own branch, would be required, at an expense which the whole income would be inadequate to meet. In the present state of knowledge, that profound attainment necessary to advance science can be made by an individual, however gifted, only in one or two narrow lines; and hence several members are required to complete a single class in any of the learned academies of Europe: therefore the plan which was once proposed, of establishing on the Smithsonian fund an academy of associated members, was entirely incompatible with the limited income of the Institution. The more feasible and far less expensive organization was adopted, of referring, for investigation, all scientific questions of importance, as well as objects of natural history, to persons of reputation and learning in different parts of the United States, and perhaps, in some cases, in foreign countries. By the operation of this plan, which has been found eminently practicable, the collections, as well as the libraries of the whole country, are rendered subservient to the use of the Institution.

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. It is, therefore, unwise to hamper the more important objects of this Institution, by attempting to anticipate results which will be eventually produced without the expenditure of its means.

The prominent idea embraced in the Smithsonian organization, is that of co-operation and concerted action with all institutions and individuals engaged in the promotion of knowledge. Its design is not to monopolize any part of the wide fields of nature or of art, but to invite all to partake in the pleasure and honor of their cultivation. It seeks not to encroach upon ground occupied by other institutions, but to ex-

pend the funds in doing that which cannot be as well done by other means. It gives to the words of Smithson their most liberal interpretation, and "*increases and diffuses knowledge among men*" by promoting the discovery of new truths, and by disseminating these in every part of the civilized world.

Respectfully submitted:

JOSEPH HENRY,
Secretary Smithsonian Institution.

REPORT OF THE SECRETARY.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: Nothing of especial interest has occurred during the past year to mark an epoch in the history of the institution over which you preside. The several objects set forth in the plan of organization have been prosecuted as far as the funds which could be devoted to them would allow. A knowledge of the true character of the institution has been gradually extended, and it is a subject of gratification that the plan of operations is more highly appreciated the better it is understood. Every succeeding year which is added to the age of the institution will render it more stable, so long as it pursues undeviatingly the same course. All establishments, however, which are supported by bequests, intended to promote the public good, are necessarily subjected to the scrutiny of all who consider themselves personally interested in the trust. The managers are overwhelmed with suggestions, and subjected to illiberal criticisms, and unless they are firmly convinced of the propriety of their course, and have sufficient moral courage to pursue it notwithstanding opposition, there is danger of vacillation, and of an attempt to gain popularity by adopting measures not calculated to promote the desired end. It should, however, be recollected that opinions ought to be weighed rather than counted, and that nothing of importance can be accomplished, either by an individual or an institution, except by constant and laborious exertion in one direction. In the beginning of this institution the plans best calculated to realize the liberal intentions of the donor were adopted after due deliberation, and have been constantly adhered to and developed as far as the requisitions of Congress and the limited income would allow. From the character of James Smithson and his pursuits there can be no reasonable doubt as to his intention in regard to the bequest. He was a man familiar with the precise language of exact science, and no other construction ought to be put upon the words of his will than that which a strict interpretation will allow. He leaves his property to found an establishment which shall bear his own name, and have for its object "the increase and diffusion of knowledge among men." It would evidently be incompatible with an enlarged and just interpretation of this will to confine its benefits exclusively to one people, and especially would it be unworthy the character of a great nation to accept the administration of a bequest intended for the good of mankind, and to apply it exclusively to its own use.

Nothing apparently can be further from the truth than the idea which

was first prevalent in this country that Smithson left his money merely to diffuse practical knowledge among the people of the United States. On the contrary he intended this institution as a monument to his name which should be known of all men, and prized by the student of every branch of literature and science, which should not be restricted to merely spreading abroad the knowledge which already exists, but, above all, should be the means of enlarging the bounds of human thought. He was also too much of a philosopher to confine his bequest to the promotion of any one branch of literature or science, and therefore left the trust free to be applied to all.

His will recognises a well established and very important distinction with regard to knowledge, viz: its increase and its diffusion. These, though frequently confounded, are very different processes, and each may exist independent of the other. While we rejoice that in our country, above all others, so much attention is paid to the diffusion of knowledge, truth compels us to say that comparatively little encouragement is given to its increase.

There is another division with regard to knowledge which Smithson does not embrace in his design, viz: the application of knowledge to useful purposes in the arts; and it was not necessary he should found an institution for this purpose. There are already in every civilized country establishments and patent laws for the encouragement of this department of mental industry. As soon as any branch of science can be brought to bear on the necessities, conveniences, or luxuries of life, it meets with encouragement and reward. Not so with the discovery of the incipient principles of science. The investigations which lead to these receive no fostering care from government, and are considered by the superficial observer as trifles unworthy the attention of those who place the supreme good in that which immediately administers to the physical necessities or luxuries of life.

If physical well being were alone the object of existence, every avenue of enjoyment should be explored to its utmost extent. But he who loves truth for its own sake, feels that its highest claims are lowered and its moral influence marred by being continually summoned to the bar of immediate and palpable utility. Smithson himself had no such narrow views. The prominent design of his bequest is the promotion of abstract science. It leaves to the teacher and the teeming press to diffuse popular knowledge, and to the Patent Office and the manufacturer to facilitate and reward the application of science to the useful arts. In this respect the institution holds an otherwise unoccupied place in this country, and adopts two fundamental maxims in its policy: first, to do nothing with its funds which can be equally well done by other means; and, second, to produce results which, as far as possible, will benefit mankind in general. Any deviations from these maxims which the history of the institution may exhibit, must be referred to the original requirements of the law of Congress authorizing its establishment, and not to the plan of active operations at first proposed in the programme, and which has constantly been kept in view from the beginning until the present time.

A miscellaneous and general library, museum, and gallery of art, though important in themselves, have from the first been considered by

those who have critically examined the will of Smithson, to be too restricted in their operations and too local in their influence, to meet the comprehensive intentions of the testator; and the hope has been cherished that other means may ultimately be provided for the support of those objects, and that the whole income of the Smithsonian fund may be devoted to the more legitimate objects of the noble bequest.

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, cannot be too highly estimated. But the support of such a collection ought not to be a burthen upon the Smithsonian fund.

It was stated in the last report that the plan of an equal division of the income between the library and museum on the one hand, and the lectures, the publications, and researches on the other, was found not to work well in practice. It leads to inharmonious action, and to a system of expenditure by no means compatible with proper economy or the limited income of the Smithsonian fund. The subject has, however, been referred to a special committee of the Regents, which I trust will give it due consideration, and report their views during the present session of the Board.

Publications.—During the past year no diminution has taken place in the objects of interest which have presented themselves for the assistance and patronage of the institution. The amount of publications has only been limited by the appropriation which could be devoted to this purpose.

1. The first memoir published during the past year is one by Dr. Joseph Leidy, Professor of Anatomy in the University of Pennsylvania, entitled "The Ancient Fauna of Nebraska."

A considerable portion of the country between the Mississippi and the Rocky mountains consists of the more recent geological deposits, and particularly on the upper Missouri there exists a tract of country known by the name of the Mauvaises Terres, or the Bad Lands; this at one time was probably the bottom of an immense lake, in which perished thousands of animals having no representatives at this time on the surface of the earth. It appears that the waters of this lake were removed by some convulsion of nature, that the sediment at its bottom became indurated, and that afterwards the whole country was traversed by an immense wave of water, which carried away the softer parts of the strata, and left standing the harder parts in a series of irregular prismatic and columnar masses, frequently capped with

irregular pyramids, and extending upwards to a heighth of from one to two hundred feet. "Viewed in the distance, these rocky piles in their endless succession assume the appearance of massive architectural structures, with all the accessories of buttresses, turrets, and tapering spires." The portion of the surface thus excavated forms a valley of ninety miles in length and thirty in breadth, which in its most depressed portion is about three hundred feet below the surface of the surrounding country. So thickly are the natural towers studded over the surface of this extraordinary region, that the traveller threads his way through deep confined passages, which resemble the narrow irregular streets and lanes of some of the old towns of the continent of Europe. At the foot of these columns, the remains of the ancient animals, which lived and breathed long before the advent of man upon the face of the earth, are found in such abundance as to form of this tract an extensive cemetery of vertebrated animals, rivaling, in the variety of its extinct species, the celebrated beds of the Paris basin.

This region having been brought to notice by a few fossil remains procured through the agents of the American Fur Company, an appropriation of about $200 for its exploration was made by the Smithsonian Institution to Mr. Thaddeus Culbertson, who was about to visit, on account of his health, the sources of the Missouri. The specimens of fossil remains which were thus procured, together with a collection subsequently presented to the institution by Capt. Stewart Van Vliet, of the U. S. army, and several specimens kindly lent by Dr. Prout, of Missouri, were referred to Dr. Leidy for examination. In addition to these he had the use of a collection lent by Prof. O'Loghland, of Missouri, specimens belonging to the Academy of Natural Sciences, Philadelphia, and a collection made by Dr. Evans, at the instigation of Dr. D. Dale Owen, the whole embracing all the specimens which have yet been brought to the east from the Bad Lands. The bones are completely petrified, and their cavities filled with silicious matter. They are preserved in various degrees of integrity, some being beautifully perfect and others broken and imperfect, the latter having been evidently subjected to violence while imbedded in a soft mud. The animals belong to the classes mammalia and chelonia, or turtles. With a single exception, all the species of mammalia belong to the great order of ungulata or hoofed animals, of which there are seven species of four genera, which belong to the ruminantia, or cud-chewing animals; two species of one genus belonging to the paradigitata ordinaria, or even-toed animals; one species of the solipedia, or solid-hoofed animals; and four species of three genera belonging to the imparidigitata ordinaria, or uneven-toed animals.

The first specimen described belonged to a peculiar genus of ruminants which, among recent animals, is more nearly allied to the musk, and was probably hornless. The next is of a remarkable genus of ungulata, representing a type which occupies a position in the wide physiological interval existing between recent ruminants and the anomalous fossil animal called the anoplotherium. Another genus is called oreodon, and constitutes one of the links necessary to fill up the very wide gap between existing ruminants and an exceedingly aberrant form of the same family now extinct. Another organic relic is that of an

animal which combined the ruminant and carnivorous characteristics, of which there are several species. There are also two remarkable species of rhinoceros, differing from any remains of this animal found in other parts of the globe. The existing species of the rhinoceros are met with in Africa, Asia, and the islands of Java and Sumatra. Remains of extinct species have been found in Great Britain, the continent of Europe, Siberia, and the Himalayas; but no trace of this genus had previously been discovered in America. Another fossil remain belongs to the feline family, about a fifth smaller than the American panther, and is probably the most ancient known genus of this animal. Hundreds of fossil turtles are found in the "Bad Lands;" they belong to the genus testudo, of which five species are described in this paper.

The memoir occupies one hundred and twenty-six pages, and is illustrated by twenty-four plates, one of which is a folio. It has already been printed and copies distributed among working geologists. No copy-right is secured on the publications of the Institution; and it may be mentioned here, as an illustration of the manner in which the knowlege contained in the Smithsonian memoirs reaches the public generally in a popular form, that one of the figures of this paper has already been copied, and some of its materials given in a recent work on geology.

2. Another paper, the printing of which is nearly complete, is on the "Winds of the Northern Hemisphere," by Prof. James H. Coffin, of Lafayette college, Easton, Pennsylvania. It is the same which was mentioned in the Report for 1851. Its publication has been delayed in consequence of the difficulty experienced in finishing the maps and printing the tabular matter, and also on account of additions made to it by the author. It is a very elaborate memoir, of two hundred pages, consisting principally of tabular matter, and illustrated by thirteen maps. The most important results arrived at in this paper are as follows: There exists in the northern hemisphere three great zones of wind extending entirely around the earth, modified and, in some cases, partially interrupted by the configuration and character of the surface. The first of these is the trade-wind, near the equator, blowing, when uninterrupted, from northeast to southwest. This belt is interrupted, however, in the Atlantic ocean, near the coast of Africa, upon the Mediterranean sea, and also in Barbary, by the action of the Great Desert. The second is a belt of westerly wind, nearly two thousand miles in breadth, between latitude 35° and 60° north, and encircling the earth, the westerly direction being clearly defined in the middle of the belt, but gradually disappearing as we approach the limits on either side. North of this, there is another system of winds flowing southwardly from high north latitudes, and gradually inclining towards the west, as it moves into a latitude of greater easterly velocity.

Subsequent investigations have led Prof. Coffin to conclude that the lines which separate these systems are not parallels of latitude, but circles, having a common pole in about latitude 84° north, and longitude 105° west from Greenwich, and that the winds of high northern latitudes diverge or radiate from this point.

The principal cause of these phenomena is the greater heat of the

sun between the tropics, which rarifies the air, and causes it to ascend into the higher regions; producing below a current from the pole towards the equator, and above a current in the opposite direction. The resulting motions to and from the equator are not in a north and south direction along the meridians, but are modified by the rotation of the earth; at the surface they deviate towards the west, and in the return current above towards the east. If the point mentioned by Prof. Coffin as the centre of the winds of the polar zone really exists, it is probably that of maximum cold; the air at this point would be condensed, and flow from it in radial lines in every direction along the surface of the earth. The paper is an important addition to meteorology, and has cost the author years of labor. The publication of it has also been very expensive, particularly on account of the maps and tables.

3. Another memoir accepted for publication is, "An Account of a Tornado that passed near New Harmony, Indiana, April 30, 1852, by John Chappelsmith."

The eastern portion of the North American continent is almost every year visited at different points by one or more tornadoes of frightful energy, but of exceedingly circumscribed limits; and it is almost an opprobrium to the science of this country that more reliable data have not been collected towards settling definitely the conditions of these remarkable phenomena, and for ascertaining their cause. For this purpose, however, mere verbal descriptions of the effects are alone insufficient; there must be added to these accurate instrumental surveys, and, if possible, the indications of the barometer, thermometer, and hygrometer. The first accurate report of this kind was that by Professor A. D. Bache, relative to a tornado which passed over the city of New Brunswick, in New Jersey, in 1834. A similar survey was made by Professor Eustis, of Harvard University, of the tornado of August 21, 1851, which passed near Cambridge.

We consider the present memoir as an exceedingly valuable addition to the stock of our knowledge on this subject. It gives not only all the collateral phenomena as far as they could be obtained, but presents a map of one square mile of the track on which are elaborately plotted the relative position and bearings of the prostrated trees. Some idea may be obtained of the enormous energy of this tornado from the statement of the author, that "on a single square mile of the track thousands of trees, many of them having a stem fifteen feet in circumference, were prostrated by a force acting simultaneously in opposite directions, and moving onward at the rate of a mile in a minute."

The author critically analyses the force at work, and arrives at the conclusion that the proximate cause of the phenomenon is an inward, upward, and onward moving column of air. Besides the map, the memoir is accompanied by diagrams and sketches to illustrate the character and effects of the tornado.

4. Another memoir is entitled "The Antiquities of Wisconsin," examined and surveyed by I. A. Lapham.

In the Report for 1851, it was mentioned that Mr. Lapham, an experienced engineer, had undertaken, under the direction of the American Antiquarian Society of Worcester, Massachusetts, to make explorations,

surveys, and drawings of the aboriginal antiquities of Wisconsin; and, to insure harmony of action in the cultivation of the wide field of research offered by the ancient monuments of this country, that the Antiquarian Society had agreed to present to the Smithsonian Institution the results of the labors of Mr. Lapham for publication, and to reserve its own funds for further explorations. Mr. Lapham's memoir has been completed; and, after having been examined and reported upon by a committee of the Antiquarian Society, has been presented to the Institution for publication. It consists of several hundred pages of manuscript, illustrated by sixty-three large drawings or plates adapted to the size of the Smithsonian contributions, a map of the country, and ninety-seven figures or smaller designs, intended to be engraved on wood and interspersed with the text.

Elaborate works of defence, and such as are apparently designed for religious or sacrificial ceremonies, so numerous in other sections of the country, are seldom found in Wisconsin. In place of these, less elevated structures, though often on a scale of considerable horizontal extent, representing a variety of fanciful forms, abound along the sides of the streams and borders of the lakes. The figures are principally those of lizards, turtles, birds, bears, foxes, and men, and they appear to be confined within a limited territory, between the Mississippi and Lake Michigan. It is very remarkable, says the committee, that none of the earlier travellers appear to have noticed the animal shape of the embankments; but this is accounted for by the extent and flatness of the works, and the difficulty of recognising them while covered with trees or a dense growth of other vegetation. Indeed, the surveyors who first attempted to plot them, were sometimes surprised at the figures developed under their hands, and which could not have been perceived on the ground, unless from an elevated point of view.

The memoir of Mr. Lapham, with a few unimportant exceptions, includes an account of every known work or assemblages of works in this region, and the whole were carefully surveyed by himself or by competent individuals under his direction. On the map are laid down the relative position of the earth-works; and from this it appears that they lie chiefly along the course of streams and the borders of the interior lakes. Nearly the same forms are repeated in different localities, but with dissimilar arrangement, and often with slight, yet evidently intentional, variation in figure. The works are enumerated as follows:

a. Tumuli of a conical shape and slight elevation.

b. Oblong mounds not more than three or four feet high, of regular width, extending in a straight line from twenty feet to several hundred, and even a thousand.

c. Embankments in crescent and serpentine forms.

d. Embankments tapering uniformly in width from one extremity to the other, and terminating in a point.

e. Similar tapering embankments, with two projections on one side, near the larger end, which are called lizards, and are very numerous.

f. The same general form, with projections on both sides at the larger end, and with a similar tapering tail, sometimes of exceedingly dis-

proportionate length. These frequently present a striking resemblance to a turtle, and are known by the name of that animal.

g. Oblong embankments, with arms or wings extended on either side. These vary from simple crosses to figures of birds and men, the head being usually omitted.

h. Representations of animals of more definite outlines and better proportions: among these are bears, foxes, otters, &c., and upon the Wisconsin river, buffaloes. It is proved by numerous excavations that the works which resemble animals are destitute of relics; they are mere relievos or embossments on the surface of the earth, seldom exceeding four feet in height, and in some cases but a few inches. Mr. Lapham disclaims all intention of indulging a disposition to theorize or speculate on the origin or design of these remains, and declares his object to be merely the faithful performance of the office of surveyor, to study the facts, and to report them in as much detail as may be necessary, leaving to others the deductions which, in connexion with other information, may be drawn from them. In the opinion of the commission appointed by the society to examine the memoir, "Mr. Lapham has accomplished his task with great thoroughness and artistic skill; he seems to have explored the entire field, to have industriously delineated every object of interest, and to have omitted no detail of drawing or description which could conduce to a clear understanding of the matter of which he treats." The publication of this memoir, which will be alike creditable to the author, the Antiquarian Society, and this Institution, will furnish an interesting addition to the antiquities of this country, which cannot fail to be hailed with pleasure by the ethnologist.

5. Two botanical papers, furnished by Dr. John Torrey, of the New York Medical College, have been published during the past year. The first describes a new plant, to which the author has given the name of *Darlingtonia Californica.* It is a new pitcher-plant, which was first detected by Mr. W. D. Brackenridge, assistant botanist in the United States Exploring Expedition under Captain Wilkes. It has hitherto been found only near the Shasta mountain, on the Upper Sacramento. The specimens brought home by Mr. Brackenridge were without flowers or seed-vessels, so that the genus of the plant could not be determined, but it was taken for a new Sarracencia. After many years, the flowers were discovered by Dr. G. W. Hulse, and brought to Dr. Torrey, who has shown that the plant is an entirely new genus of the same small but very interesting natural order to which the Sarracencia belongs. He has bestowed upon it the name of Darlingtonia, in honor of Dr. William Darlington, of West Chester, Pennsylvania, author of several valuable botanical works. The genus formerly dedicated to this veteran botanist by De Candolle having been reduced to an older one, Dr. Torrey embraced the opportunity of restoring the name, and connecting it with one of the most remarkable plants of North America.

6. The second memoir by Dr. Torrey is an account of a new maritime shrubby plant, called "Batis Maritima," which grows on the shores of Key West, Jamaica, Cuba, and the neighboring parts of the continent. It has been known to botanists for more than one hundred and fifty years, yet, strange to say, it has not till now been correctly described, nor its place in the natural system determined with any cer-

tainty. Dr. Torrey considers it as the type of a distinct order; nearly allied to the empetraceæ, or crowberries.

Both memoirs are illustrated with plates, from beautiful drawings made by Sprague, at the expense of the institution.

7. The next memoir is a "Synopsis of the Marine Invertebrata of the Grand Manan, or the region about the Bay of Fundy, New Brunswick," by William Stimpson.

The island of Grand Manan, a part of the natural history of which this paper is intended to illustrate, lies at the mouth of the Bay of Fundy, and is surrounded by deep water, the bottom of which abounds in a variety of marine animals.

The memoir consists of a compend of observations made on the marine fauna of this region during a residence of three months in the summer of 1852, and also of a catalogue of the marine invertebrata found on the shores and in the adjacent waters.

Minute surveys of the marine animals of a given district are highly interesting; it is only by a comparison of the results of such examinations made at a series of points along a coast, that an accurate knowledge can be obtained of their distribution, and of the effects of external circumstances on their growth, habits, and economy. By such surveys we can ascertain whether a species may inhabit two distant localities without occurring in the intermediate space, a fact which has an important bearing on several interesting questions relative to geological changes. The author is a pupil of Professor Agassiz, and has been appointed one of the naturalists in the North Pacific Exploring Expedition, under Captain Ringgold.

The paper occupies sixty-six pages, and is illustrated by thirty-seven lithographic figures.

8. A memoir has also been presented, and is now in the press, "On some new American species and localities of Microscopic Organisms," by Prof. J. W. Bailey, of West Point, New York.

Nearly two centuries have passed away since Leeuwenhoek, an eminent physician of Holland, discovered by means of the microscope a department of organized nature, consisting of bodies imperceptible to the unaided vision, and displaying active forms, so strange and varied in their appearance, that they excited a general curiosity. The discovery, in some of them, of organs of motion, convinced him of their animal character, and he gave to them the name of *animalcules*. They were afterwards called infusoria. Many opinions were entertained with regard to their character. Linnæus considered them as lifeless, oily particles, and their movements as altogether passive. We owe, however, to Prof. Ehrenberg, of Berlin, an extended series of observations on this subject, the results of which are, that the infusoria are organized bodies; the greater part, if not all, are animals; they exist in all quarters of the globe, as well on land as at the bottom of the sea, and their silicious and calcareous remains form, in this country, wide-spread fossil strata. At Andover, Massachusetts, there is a bed of these remains of fifteen feet in thickness, and underlying the city of Richmond, Virginia, one of twenty-eight feet. Professor Bailey has distinguished himself by researches in the same line, and has published on this subject a series of papers in Silliman's Journal, and in two

memoirs in the Smithsonian Contributions. In the present memoir he has described new species of diatomaceæ, limnias, auliscus, peridinium, cothurnia, and monactinus; he has given the American localities of Amphitetras antediluviana, and tetragramma, and gives an account of the organic forms found in the Croton water, New York.

One of the species described forms a material resembling white clay, which occurs in a large deposit at Suisun bay, about thirty miles above San Francisco; and should, says Prof. Bailey, this fact meet the eye of any scientific traveller in California, it may induce him to furnish further information concerning the geological relations of this interesting deposit, and to collect a good supply of specimens for a more complete study.

It has been known to the New York microscopists, but not to the public generally, that the Croton water abounds in beautiful microscopic organisms, and particularly in diatomaceæ and desmidieæ. The author found in the sediment collected by means of a filter at the Astor House, more than fifty different species of these organisms. Of these the gallionella crotonensis is in the greatest abundance, and thousands of its fragments must be daily swallowed by those who use the unfiltered water. It is so abundant that Prof. Bailey suggests that it may yet prove of importance as a means of detecting the fraudulent dilution of various substances by this water.

This memoir is illustrated by a number of wood-cuts and thirty-eight elaborately drawn figures on a steel plate beautifully executed by J. E. Gavitt, an amateur naturalist and artist of Albany, New York.

9. During the past year the catalogue of Coleoptera by Frederick Ernst Melsheimer, M. D., mentioned in a previous Report, has been published and distributed. It forms an octavo volume of 174 pages.

At first sight it would appear that the study of insects is the most trivial and furthest removed of that of any part of creation from useful purposes; but independently of the interest which attaches to it as an exposition of animated nature, and an exhibition of organization and life in curiously diversified forms, there is scarcely any branch of natural history more intimately connected with the pursuits of the husbandman, the naval architect, and even those of the artist and the bibliographer, than entomology. It is the duty therefore of this institution to afford every facility for the acquisition of this branch of knowledge, and to increase the number of those who make it their special study.

The coleoptera form one of the largest and most widely distributed class of insects; and on account of their boring habits, some of the species are highly destructive to timber. In order, however, to study them properly, it is necessary that the same species which exist in this country and in Europe may be identified, and that those which are new here may be separately described. The present memoir gives the names of all those which have been described, with references to the works where the descriptions may be found. Dr. Melsheimer has spent several years in the preparation of this work. It was referred for examination to Professor S. S. Haldeman and Dr. J. L. Le Conte, who reported in favor of its publication, and offered to superintend its

printing and to bring it down to 1851. This they have done at the expense of much time and labor, and have thereby added materially to the usefulness of the catalogue.

10. A second edition of the report on recent improvements in the chemical arts has been printed, and in due time an additional volume on this subject will be prepared.

11. The general interest which has been awakened by the recent application of electricity to purposes in the useful arts, and its recognised connexion with many important and mysterious phenomena of nature, led to the conclusion that an account of the recent discoveries in this branch of science would be highly prized by a large class of readers. In accordance with this view, a report by M. Müller, of Berlin, has been translated, and will be published as soon as the funds will allow of the expenditure. Stereotype copies of the original woodcuts have been obtained from the author.

It will be especially interesting to the English reader, because it gives more particularly the researches which have been made in Germany, and which are consequently not readily accessible to the inhabitants of this country and Great Britain.

12. Catalogue of North American reptiles in the museum of the Smithsonian Institution. Part 1.—*Serpents.*—By S. F. Baird & C. Girard, pp. 188.—This work is intended to exhibit the nature and extent of the collection of North American reptiles in the museum of the Smithsonian Institution. According to the statement of Professor Baird, it contains full and original descriptions from authentic specimens of 119 species of serpents, of which sixty have been first described by the authors, and from specimens in the Smithsonian collection. All the well ascertained species of North American serpents are included in this catalogue, which thus serves as a complete manual on the subject. The great work by Dr. Holbrook on the reptiles of North America, published in 1842, enumerates 49 species, as being all that were known to him; a number less than half of those in the possession of the Smithsonian Institution.

The *phenomena of magnetism*, which a few years ago were only recognised as existing in iron, and in a slight degree in a few other metals, are now known to belong to all matter; and with those of electricity, with which they are intimately connected, either in the relation of effect and cause, or the concomitant effects of a more general principle, are probably displayed in every part of the material universe. Recent researches render it probable that the sun and moon exert a magnetic influence upon our earth. Were the study of this mysterious principle immediately connected with none of the physical wants of man, or with the arts of life, it would in itself be an object of high interest; but when we reflect how dependent upon it is the art of navigation, and how extensively it is employed in this country in tracing the divisions and boundaries of land, we are, from utilitarian considerations, induced to give it the most minute and laborious investigation.

It is now known that the magnetic needle is never at rest; that it is the subject of various changes, some depending upon the hour of the

day, others upon the season of the year, others again upon longer periods of time.

It also varies in its direction at different places. Between the Atlantic and Pacific coast, or, for example, between Massachusetts bay and the mouth of the Columbia river, there is a variation of upwards of twenty-four degrees; but this variation is not constant even at the same place, but changes from year to year. With these changes it is necessary that the navigator should be familiar. It therefore becomes a matter of national importance that observations of these phenomena should be made at as many places, and those as widely separated from each other, as possible.

The Smithsonian Institution has endeavored to advance this branch of knowledge, by importing at different times, and at considerable expense, four entire sets of apparatus, besides separate instruments, for determining the direction and intensity of the magnetic force.

These instruments have been lent to observers, and in some cases sold to the government for the use of exploring parties, and have done, or are now doing, good service, in adding to the stock of facts which, by the process of induction, are to yield a knowledge of general laws.

It will be recollected that an appropriation was made at the last session of the Regents for supplying magnetic instruments to the Grinnell Expedition. These were procured from London, were given in charge to Dr. Kane, and, we trust, are at this time revealing to that intrepid explorer the fitful and mysterious changes of the magnetic force.

During the past year, a magnetic observatory has been erected within the grounds of the Smithsonian Institution. It principally consists, to insure an equable temperature, of an under-ground room, enclosed within two walls, between which a current of air is allowed to pass in order to prevent dampness. This observatory has been supplied with a set of apparatus for determining the continued variations in direction and intensity of terrestrial magnetism. By a very ingenious application of the photographic process, the invention of Mr. Brooks, of England, the instruments are made to record, on a sheet of sensitive paper moved by clock-work, their own motions.

First, to determine the variation of direction of the horizontal magnet: a steel bar, strongly magnetized, is suspended by several fibres of untwisted silk, so as to have perfect freedom of motion in the horizontal plane, and from a gas light, kept perpetually burning, a single ray of light is thrown upon a concave mirror permanently attached to the magnetic bar, and consequently partaking of its movements. This ray of light is reflected and brought to a focus at the surface of a revolving cylinder, moved by clock-work, on which the photographic paper is placed. When the magnet is at rest, the pencil of light is stationary, and consequently traces, on the moving paper, a simple straight line; but when the magnet is disturbed by terrestrial perturbations, its oscillations are recorded by the motion of the pencil of light in a curved or zigzag line.

To register the intensity of strength of the magnetic force, another bar magnet is suspended by two parallel silk threads about an inch apart, descending from two hooks fastened to the under side of a plate

attached to the ceiling or some other support. The plate is then made to revolve through an arc of a circle until, by the force of torsion, the bar is deflected from a north and south to an east and west direction. It is thus kept in a state of equilibrium between the force of torsion of the threads, tending to turn its north end round still further to the south, and the magnetism of the earth, on the other hand, tending to bring it back to its north and south direction. If in this position the magnetism of the earth becomes stronger, it will prevail, and the north end of the needle will turn towards the north; if the magnetism of the earth diminishes in intensity, the force of torsion will prevail, and the same end will move towards the south. These motions, as in the case of the other magnet, are recorded by a beam of light on the paper surface of the revolving cylinder.

But besides the change of direction of the horizontal needle, a magnet so supported as to be free to take any position, in this latitude will arrange itself with its north end dipping down towards the horizon. The amount of this dip, or variation, varies also in different places, and at different times; and to record these changes a bar is supported, in the direction of the magnetic north and south, on two knife edges like the beam of a balance. Any change which takes place in the position of a magnet thus arranged, is recorded by a mirror attached to the prolongation of the axis on which the bar turns.

It is proposed to keep these instruments constantly in operation, for the purpose of comparing results with other observations of a similar character in different parts of the world; and also for the purpose of furnishing a standard to which the observations made at various points by the Coast Survey, and the different scientific explorations which are now in progress in the western portions of the United States, may be referred, and with which they may be compared.

This establishment ought to be supported by government; but, as no provision has been made for it, and as the wants are pressing, in order to render more valuable the observations making in other countries as well as our own, the Smithsonian Institution, in connexion with the Coast Survey, has undertaken to commence it. In accordance, however, with the policy which has thus far governed the acts of the Institution, this observatory will be turned over to other hands as soon as other means are found for its support.

The other sets of magnetic instruments mentioned, which have been imported by the Institution, are intended to furnish portable magnetic observatories, in which the dip and the intensity are recorded by the pen from direct and personal observations.

Besides the facts which will be collected by the Coast Survey along our extended seaboard, those which the various exploring expeditions are furnishing, and those obtained by the instruments belonging to the Smithsonian Institution, a large number of records of observations exist as to the position of the magnetic needle in different parts of the United States in past times. A collection of these, and a comparison of them with more recent observations, would serve to throw light on the changes which have taken place in the course of years.

There is, also, on record in the land office, an extended series of

observations which, though not made with great precision, will still be of value in delineating the general direction of the magnetic lines in different parts of the United States. Steps have been taken to collect all the existing materials relative to this subject, with the view of submitting them in due time to reduction and careful investigation.

Correspondence.—There is one part of the Smithsonian operations that attracts no public attention, though it is producing, it is believed, important results in the way of diffusing knowledge, and is attended, perhaps, with more labor than any other part. I allude to the scientific correspondence of the Institution. Scarcely a day passes in which communications are not received from persons in different parts of the country, containing accounts of discoveries, which are referred to the Institution, or asking questions relative to some branch of knowledge. The rule was early adopted to give respectful attention to every letter received, and this has been faithfully adhered to from the beginning up to the present time.

These communications relate to a great variety of subjects. Any topic which strongly excites the attention of the public at a given time, such as the announcement in the papers of a wonderful discovery, or an important invention which promises to introduce extensive changes in the useful arts, is sure to bring upon the Institution an increase of labor in the way of correspondence. The ordinary inquiries addressed to the Secretary relate to the principles of mechanics, electricity, magnetism, meteorology, names of specimens of plants, minerals, insects, and, in short, to all objects or phenomena of a remarkable or unusual character.

Requests are frequently made for lists of apparatus, for information as to the best books for the study of special subjects, hints for the organization of local societies, &c. Applications are also made for information by persons abroad relative to particular subjects respecting this country. When an immediate reply cannot be given to a question, the subject is referred, by letter, to some one of the Smithsonian colaborers, to whose line of duty it pertains, and the answer is transmitted to the inquirer, either under the name of the person who gives the information or under that of the Institution, according to the circumstances of the case.

There is no country on the face of the earth in which knowledge is so generally diffused as in the United States; none in which there is more activity of mind or freedom of thought and discussion, and in which there is less regard to what should be considered as settled and well-established principles. It will not, therefore, be surprising that the Institution should be called upon to answer a great number of communications intended to subvert the present system of science, and to establish new and visionary conceptions in its stead, and that numerous letters should be received pertaining to such subjects as the quadrature of the circle, the trisection of the angle, the invention of self-moving machines, the creation of power, the overthrow of the Newtonian system of gravitation, and the invention of new systems of the universe.

Many of these communications are of such a character that, at first sight, it might seem best to treat them with silent neglect; but the rule

has been adopted to state candidly and respectfully the objections to such propositions, and to endeavor to convince their authors that their ground is untenable.

Though this course is in many cases attended with no beneficial results, still it is the only one which can be adopted with any hope of even partial good. In answering those who persist in declaring that the present received laws of mechanical action are erroneous, and that they have discovered new and more correct generalizations, they are requested to prove the truth of their assertions by predicting new and important phenomena, the existence of which may be immediately tested either by experiment or observation. It is not enough that the new system explains facts which we know, for this would be merely exhibiting old knowledge under a new form, but it should point out in the way of deduction new facts which have hitherto escaped the eye of the observer or the scrutiny of the experimenter.

It is to be regretted that so many minds of power and originality in our country should, from defective scientific training, be suffered to diverge so widely from the narrow path which alone leads to real advance in positive knowledge. Providence, however, seems in some measure to vindicate the equality of its distributions, by assigning to such a double measure of hope and self-esteem, which serves them instead of success and reputation.

The faithful discharge of the duty of the correspondence of the institution imposes a serious labor on the secretary and his assistants. Beside the correspondence above mentioned, there is added to their duties that which relates to the reception and publication of the memoirs; to the lectures; the letters sent forth by the institution respecting particular branches of research; the answers to the almost innumerable inquiries as to the character of the institution, and applications for its publications; all the business matters which relate to the printing, engraving, binding, transportation, payment of accounts; and all the foreign correspondence relating to the exchanges of publications.

All the letters received are bound in volumes, and a copy of every answer is carefully preserved, the whole thus forming a permanent record of all the transactions of the institution, as well as a history of the topics of scientific interest which have particularly occupied the public mind during any given period. The exposition of this labor, which has been increasing from year to year, will be a sufficient answer to the question which is sometimes asked as to what the officers of the institution find to do.

Meteorology.—The general system of meteorology described in the last and previous reports has been continued, and though some changes have taken place among the observers, yet the number and efficiency of the corps have been kept up. New instruments have been gradually introduced, and constant improvement has taken place with the experience of each year in the precision and accuracy of the observations. Since the beginning of the system, a large amount of valuable matter relative to the meteorology of the United States has been collected; and the institution has now commenced to reduce these observations, and to deduce from them the general laws which govern the climate of

this country. It is believed that such results will be obtained as will justify the amount of expenditure of the Smithsonian fund which has been devoted to this purpose.

The reductions which had been made up to the close of the last session of the Regents were presented with the annual report to Congress, and were ordered to be printed. It has been found, however, that the tables cannot be presented in an octavo form, and that a special resolution of the Senate will be required to print them in a quarto volume.

An interesting part of the meteorological observations is now in process of reduction at Greenwich, free of expense to the institution, by Captain Lefroy, late superintendent of the Toronto Observatory. He has undertaken this labor from a love of science, and has received some assistance in the way of clerk hire (as he informs me) from the fund placed in charge of the Royal Society by the British government for the promotion of science. The reduction will include not only all the observations collected by the Smithsonian Institution, but also those which can be obtained from every part of the earth during five years, beginning with 1848.

Among the questions proposed to be answered by Captain Lefroy in discussing the observations, are the following:

1. Does the aurora ever occur in low latitudes when it is wanting in higher ones?
2. Is it developed in continuous zones, or are there wide gaps in these zones; if the latter, have they any connexion with other atmospheric phenomena?
3. What are the ordinary diurnal laws of its development?
4. Can the facts be reconciled with any theory giving it a material objective existence, or is it an optical phenomenon?
5. Can the facts be reconciled with the zodiacal theory?
6. What are its geographical limits; and what causes their singular variation from day to day?
7. Are lines of equal frequency on the globe, or equal intensity, circles at all?

Definite answers to these questions would clear the ground for the establishment of a rational theory as to the cause of this phenomenon, the want of which, after all that has been said and written upon it, is an opprobrium to the science of the present century.

The results of Captain Lefroy's deductions will be presented in the form of a memoir to the Smithsonian Institution.

Propositions have been made during the past year to apply to government for aid in extending the meteorological system, or to transfer it from the Smithsonian Institution to the National Observatory, the Department of the Interior, or to an independent establishment supported by a direct appropriation from Congress.

In answer to these propositions the Secretary, in behalf of the Regents, has stated that it was not in accordance with the policy of the institution to ask the aid of Congress for the purpose of carrying on any of its operations; but that it is consistent with its policy to relinquish any line of research which can be carried on equally well by other means. If, therefore, any of the plans proposed can be accomplished, the institution will cheerfully relinquish this field, and devote

its labors to other objects. The Institution has, however, already expended a large amount of money in collecting meteorological data, and it is due to the memory of the founder that full credit shall be given to his name for all the results which may be produced by the expenditure of the income of his bequest. This is one of the conditions on which the trust was accepted, and in case of any transfer of this kind it should be borne in mind. I may also remark, in the same connexion, that while full credit should be given to the officers and assistants for the faithfulness and efficiency with which they discharge their duties, they should not be allowed to publish, under their own names, results which have been collected and elaborated at the expense and under the direction of the Institution. The establishment of definite rules on this point, though a delicate matter, is one which requires attention.

According to the estimate of Mr. Blodget, who is still employed in reducing and discussing the observations, the whole number of meteorological observers now on the books as regular contributors, or as entitled to exchange for valuable series of observations sent, or for reports regularly made in previous years is (520) five hundred and twenty. The number added during the year 1853 to the list of previous observers, and who have returned observations for some portions of the year, is (119) one hundred and nineteen. The number of manuscript series of observations in detail, or in full summaries of means and extremes of the observed conditions for each month of the whole period observed, received during the year, is (75) seventy-five, covering an aggregate period of temperature observation of eight hundred and fifty years. About half these series also include observations of amount of rain. Of printed and published series a large number have been sent.

Exchanges.—The system of exchanges mentioned in the last and preceding Reports has been continued during the past year with unabated vigor and corresponding useful results. The records for 1853, as will be seen by a reference to Prof. Baird's report, show a large increase, both in transmission and receipts, over 1852. This part of the system of Smithsonian operations has everywhere received the commendation of those who have given it their attention or have participated in its benefits. The Institution is now the principal agent of scientific and literary communication between the old world and the new. Its system of exchange is established on a reliable basis, namely: that of the publications of the Institution itself. So long as the present plan of operations is continued, the Institution will annually distribute its contributions, and will continue to receive in return the publications of all the literary and scientific societies of the world. The importance of such a system, with reference to the scientific character of our country, could scarcely be appreciated by those who are not familiar with the results which flow from an easy and certain intercommunication of this kind. Many of the most important contributions to science made in America have been unheard of in Europe, or have been so little known, or received so little attention, that they have been republished as new discoveries, or claimed as the product of European research. By means of the Smithsonian system of exchange, the American author is enabled to place officially, as it were, a copy of his work in the

hands of all those who are engaged in the same line of research, and to insure due credit to himself from the countenance and support of the Institution.

The packages transmitted during the past year amounted, in the aggregate, to 1,604. They weighed 12,220 pounds, and occupied nearly 400 cubic feet of space.

The receipts of works from abroad, in exchange for those sent out by the Institution, are much greater in value, as well as in number, than those of last year. The whole number of articles received for the library of the Institution during 1853, is 2,556. For other institutions, 1,052 packages have been received. The number of separate works which these contain is unknown.

The Museum.—Additions during the past year have been made to the museum from all branches of natural history and ethnology. They are principally derived from various portions of our own country, particularly from the region between the Mississippi river and the Pacific ocean.

The Institution has taken the temporary charge of most of the collections of the various exploring expeditions which have been sent out during the past year. For a detailed account of the additions, I beg leave to refer to the accompanying report of Prof. Baird.

In accordance with the spirit which should pervade all parts of the Institution, much good may be done in the way of promoting natural history by distributing duplicate specimens among the cabinets of the country and recommending the establishment, by associations of teachers and others, of local collections, and by giving directions for conducting museums of this kind. The Institution, during the past year, has done good service in this way, and will continue and extend this means of diffusing knowledge.

Researches.—Though little has been done immediately by the Institution, since the date of the last report, in the way of original research, yet it has rendered important aid to physical geography and natural history, by the facilities which it has afforded the several exploring parties which have been fitted out during the past year, for railway and boundary surveys, in the regions west of the Mississippi. The instruments have been compared, implements constructed, and practical instruction given in the art of observation and the means of preserving specimens.

The secretary has devoted considerable time, as a member of commissions appointed by government, to scientific investigations. These duties, as well as those above mentioned, are performed entirely without remuneration; and the Institution is thus, in various ways, repaying, to a considerable extent, whatever expenditure the government has made on account of the Smithsonian bequest.

The Library.—The library during the past year has received an addition of 5,433 articles, the most valuable portion of which have been derived from the Smithsonian exchanges. The whole number of books, etc., now in the library is 25,856.

At its last session, Congress appropriated $3,000 to begin the pre-

paration of a catalogue of its library on the Smithsonian plan proposed by Professor Jewett. This work has been successfully prosecuted since July last; and according to Professor Jewett's report, upwards of 6,000 volumes have been catalogued. This plan, the honor of the invention of which the Convention of Librarians has awarded to Professor Jewett, and which has been received with approbation by those well qualified to judge of its merits, is now in a fair way to be reduced to practice. The objects to be gained by adopting it are—

1. To avoid the necessity of preparing, composing, and correcting anew the titles once printed, when the library has received accessions; or the alternative of printing the titles of these accessions in supplements, which are very inconvenient appendages.

2. To prevent the repetition of the work of preparation of titles, composition, and correction of press, for copies of the same book in different libraries. The title once prepared and stereotyped remains at the Smithsonian Institution, to be used by any library having the same book.

3. To secure uniformity in the construction of catalogues, thus greatly facilitating the researches of the student.

For other facts and details, see Professor Jewett's report herewith submitted.

Lectures.—Lectures have been given as usual by a number of distinguished gentlemen on the following subjects:

A course of eight lectures by Dr. Robert Baird on "Modern Europe."

One lecture by Hon. Henry Barnard on "The School."

One lecture by Professor Stephen Alexander, of the College of New Jersey, on "Climate."

One lecture by Job R. Tyson, esq., of Philadelphia, "Patrick Henry."

One lecture by Rev. C. C. Pise, "Charles Carrol, of Carrolton."

One lecture by Dr. E. K. Kane, U. S. N., "On the New Expedition in search of Sir John Franklin."

A course of five lectures by Professor A. Guyot on "The Harmonies of Nature and History."

A course of seven lectures by Dr. J. B. C. Smith, of Boston, on "Modern Egypt and its Institutions."

One lecture by George Sumner, esq., on "France."

Lectures were also delivered during the season, in the Smithsonian lecture room, to the Washington Young Men's Christian Association, Metropolitan Mechanics' Institute, and the Teacher's Association.

We have concluded to adopt the plan of a continued course on a single subject extending through the entire session; and for this purpose Professor J. Lawrence Smith, of the University of Virginia, has been engaged to give a full course on chemistry during the present winter.

Meeting of the Establishment.—The Secretary was directed by the President of the United States to call a meeting of the members and

honorary members of the "Smithsonian Institution," or, in other words, of the body which is generally known by the name of the "Establishment." I may mention that this body consists of the President of the United States, the Vice President, the Chief Justice, the Mayor of Washington, the several officers of the cabinet, (excepting the Secretary of the Interior, this department having been created since the passage of the act establishing the Institution,) the Commissioner of Patents, and such other persons as they may elect *honorary members*. This body met in the Smithsonian building on the 3d of May, 1853, and at a subsequent meeting adopted a set of by-laws, and elected Professor Parker Cleaveland, of Bowdoin College, Maine, an honorary member.

In accordance with the third section of the act of incorporation, a full account of the proceedings of the Establishment will be given in connexion with the report of the proceedings of the Board of Regents.

Respectfully submitted,

JOSEPH HENRY,
Secretary Smithsonian Institution.

JANUARY, 1854.

REPORT OF THE ASSISTANT SECRETARY, IN CHARGE OF THE LIBRARY.

DECEMBER 31, 1853.

SIR: The following table exhibits the additions to the library during the year 1853, distinguishing the receipts by purchase, by donation and exchange, and by copyright:

SOURCES.	Books.	Pamphlets and parts of vols.	Engravings.	Maps.	Music.	Drawings.	Other articles.	Totals.
By purchase	259	1,554	.....	.....	.....	.....	.....	1,813
By donation and exchange	1,244	1,121	.....	88	.....	.....	.....	2,453
By copyright	505	181	14	8	448	.....	11	1,167
	2,008	2,856	14	96	448	.....	11	5,433

The whole number of books, pamphlets, maps, engravings, and other articles at present belonging to the library, is shown by the following table:

SOURCES.	Books.	Pamphlets and parts of vols.	Engravings.	Maps.	Music.	Drawings.	Other articles.	Totals.
By purchase	4,432	2,511	1,335	2	.....	.....	.....	8,280
By donation and exchange	3,901	5,164	58	1,813	.....	30	41	11,007
By copyright	2,809	420	38	59	2,274	9	97	5,706
By deposit	873	.....	.....	.....	.....	.....	.....	873
	12,015	8,095	1,431	1,874	2,274	39	138	25,866

The purchases during the year have been few and unimportant.

The receipts by exchange and donation have been numerous and valuable. A particular account of them is given by Professor Baird in his report upon the exchanges. It is not thought necessary, therefore, to dwell upon them here, further than to state that many of the works thus received are of great value from their intrinsic merit, and from the

difficulty of procuring them through the ordinary channels of the book trade.

It is much to be regretted that no measures have yet been taken for the better regulation of the copyright deposit. I have repeatedly called attention to the subject, and in my last two reports have expressed, at considerable length, views which I hoped might lead to a revision of the law. The interest of this Institution, of publishers, and of the literary public, require further legislation on this subject, and substantially such, it is believed, as was recommended in the reports alluded to.

Much inconvenience has been experienced from the delay in finishing the central building. The books stand in double rows on most of the shelves in the room where they are at present placed. Some of them have been injured, too, by exposure to dampness. It is impossible with the means provided to warm the room, and all who have been engaged in the library have suffered severely from colds contracted while working in it. It has been found necessary to remove many pamphlets and papers to the basement, where they are subject to injury, and where it is difficult to consult them. The labors of the library are doubled by the want of proper accommodations. On these accounts, it is much to be desired that the main library should be finished at as early a day as possible, in order that the books may be removed to a permanent, safe, and convenient lodgment.

Applications have been made to me during the year for the opening of the library in the evening, and some remarks on the subject have appeared in the newspapers. It was impossible to comply with these suggestions without employing an additional attendant. The present attendant is required to be on duty from daylight in the morning till five o'clock in the afternoon. It would be unjust to require services of him in the evening. Besides, no arrangements have been made for lighting the reading-room, nor can they well be made till the building is finished. It has seemed necessary, therefore, to postpone for the present the further consideration of the subject; which I do with the hope that it may hereafter be found practicable to extend the time for consulting the library, if desired by any considerable number of persons.

Another topic connected with the library to which I wish to direct the attention of the Board of Regents, is the framing of a set of by-laws and regulations for the management of the library and the use of the books. I would also suggest the appointment of a standing committee upon the library. Such a committee becomes the more necessary as the library becomes of more importance, both from its extent and the character of its books, and as the time is near at hand for the completion of the building, and the permanent arrangement of the collection.

The reading-room has continued to be a place of great resort for citizens and strangers. The list of periodicals is extensive, and comprises many of the best scientific and literary journals of this country and of Europe.

It is proper for me here to call attention to the desirableness of completing the series of periodicals and of transactions and journals of learned societies. But very few of our sets are complete. Inquiries are daily made for back numbers which are wanting. As it is probable that we have received all, or nearly all, of the earlier publications

of societies which they are able to supply, it seems advisable to furnish our agents in Europe with lists of the volumes which we possess, and authorize them to purchase, as opportunities may occur, the volumes that are wanting.

The "Notices of Public Libraries," prepared with considerable labor, and published three years ago by the Smithsonian Institution, is still almost daily called for, though about 6,000 copies, printed by Congress and by the Institution, have been distributed. Very few copies remain on hand. Since the book was published, a large amount of additional matter has been received. There is a great demand for information of this kind, and it seems desirable to issue a new and enlarged edition of the Notices. It has been impossible for me, during the past year, to gain time for this work from the daily duties of the library, and the unremitted labor which the superintendence of the catalogue system has imposed upon me.

The National Convention of Librarians and Bibliographers, which met in New York in September last, deserves to be particularly noticed in this report, on account of the frequent reference there made to the position and operations of the Smithsonian library, as well as on account of its importance to all libraries, and to the general interests of literature in this country. It was composed of more than eighty delegates, representing forty-seven libraries in all parts of the country, from Maine to California.

It is gratifying to know that the services of the Smithsonian Institution, in the department of bibliography, were fully recognised by this convention in the following resolution, which was unanimously adopted:

"*Resolved*, That the thanks of this convention be presented to the Board of Regents and officers of the Smithsonian Institution for their steady and effective efforts for the increase and diffusion of knowledge among men; and particularly for the measures which they have adopted for the encouragement and promotion of the public libraries of our country; and we have great pleasure in looking to that Institution as the central establishment of the United States for the furtherance of all such objects."

The convention also passed the following resolutions relative to the great central library of reference and research which it has been the intention of Congress to establish at the Smithsonian Institution:

"*Resolved*, That the establishment of a great central library for reference and research, while it is demanded by the condition of the United States as to general civilization and intellectual advancement, is especially interesting to this convention from the bearing it would have upon libraries throughout the country.

"*Resolved*, That we deem such an establishment as being eminently worthy of support from the national treasury; and that in no way can the government better promote the progress of learning through the whole country, than by placing a central national library under the administration of the Smithsonian Institution."

Among the topics which received particular attention at this convention was the preparation of a convenient manual as a guide to the organization of library societies, the collection of libraries, and their proper management. A committee was appointed to digest the plan

of such a work. So impressed were the members of the convention with its importance, that "the business committee were requested to consider the expediency of memorializing Congress to procure the preparation of such a manual through the agency of the Smithsonian Institution."

Every week, and almost every day, applications are made at this Institution, by letter or by visitors, for information which a book of this kind would contain. The answers have to be many times repeated. I have consequently had the intention of preparing such a manual. The collections for the purpose are mostly made. The volume of statistics and descriptions of libraries was an important antecedent. The development of the catalogue system must also precede any systematic and well considered work of the kind. The period has now come for the fulfilment of this design, and I hope to be enabled and to be authorized to devote such time as may be necessary to its execution.

The library interest has become in this country one of rare magnitude and importance. Nothing can be done by the government, by this Institution, or by individuals here, which tends to promote the establishment or the efficiency of libraries, without being noticed and gratefully appreciated by all the intelligent and educated men of all parties and names, in every city and almost every village and hamlet throughout the land. Every city has its library, so has almost every village, and so have a large number of our common schools. Familiar as this fact is to many of us, it presents a new phase of society, and one indicative of mighty influences. The library is the necessary complement of the school. To teach children to read, and then give them nothing to supply the desire awakened, is mockery. It is reading rather than school-training which has produced the general intelligence of the American people. These libraries must be of various grades—the school and social library of popular English books of history, biography, and general literature for reading; the larger collections in cities for more general study and reference; and the great central library for learned investigations. These should all be linked and bound together in one voluntary yet harmonious system. Such is the general wish most emphatically expressed—a wish which the Smithsonian Institution may do much to cherish and to realize.

It now remains for me to speak of the progress which has been made during the year upon the catalogue system.

A new and greatly enlarged and improved edition of the report, containing an account of the system, rules for the preparation of catalogues, and (as examples under the rules) the catalogue of the bibliographical works in the Smithsonian library, has been prepared and stereotyped. An edition of a thousand copies, as far as to the examples, has been printed. The printers have since been employed upon the catalogue of the Library of Congress, and consequently the work upon the report has been suspended. It would require but a few weeks and an inconsiderable additional expenditure of money to complete this work. The calls for it are frequent, and I feel very desirous of being able to answer them at an early day. The book will probably contain about three hundred pages.

At the last session of the Board of Regents, a resolution was passed,

requesting the Secretary of the Institution to call the attention of the joint Library Committee of Congress to the Smithsonian plan of cataloguing, and to the advantages—economical and literary—which would accrue to the Library of Congress and to other libraries, by their adoption of this plan. The committee examined the subject, and recommended to Congress an appropriation of three thousand dollars for commencing a catalogue. The work was begun in July last, and has proceeded most prosperously till the present time. Upwards of six thousand volumes have already been catalogued, and about one-third of the appropriation remains unexpended. The consideration of the magnitude of the enterprise thus commenced, has led to great caution in adopting the rules establishing precedents. A great part of my time has necessarily been given to the work. Less will probably be required for the future.

I have so frequently and at so much length explained the details and the advantages of the system, that it is not necessary for me to dwell upon them at present, except very briefly.

The title of every work and of each distinct edition of every work is stereotyped upon a separate plate. The author's name also stands on a plate by itself. Each plate shows at a glance the heading to which it belongs. It is obvious that these plates may be placed together in alphabetical or other order, as may be desired. They are mounted on blocks for printing, like other stereotype plates.

The great ends to be gained, and which will thus be secured, are:

1. To avoid the necessity of preparing, composing, and correcting anew the titles once printed, when the library has received accessions, or the alternative of printing the titles of these accessions in supplements, which are very inconvenient appendages.

2. To prevent the repetition of the work of preparation of titles, composition and correction of press, for copies of the same book in different libraries. The title, once prepared and stereotyped, remains at the Smithsonian Institution, to be used by any library having the same book.

3. To secure uniformity in the construction of catalogues, thus greatly facilitating the researches of the student.

It is obvious that the cost of the first catalogue will be greater than if it were not stereotyped. The work of preparation will also be more expensive; but the additional cost of the first edition will be more than saved in the first re-printing of the whole catalogue. It will be further understood that the sum paid by the first library is not only for its own benefit, but for that of every other library hereafter adopting the plan, so far as its books are the same. Congress is, therefore, now conferring a great boon upon other libraries, while at the same time it is taking the course the most economical for the procuring of its own catalogue.

It will be remembered that we had two classes of difficulties to meet, the one literary and the other mechanical. The theory of the system had first to be perfected in all its details. The practical application had then to be made. The time and money which have been expended in Europe in discussions connected with the subject of the best methods of cataloguing, indicate the difficulty of the theory. Prac-

tical stereotypers pronounced the scheme impracticable. A new mode of stereotyping, with a new material, had to be introduced, perfected, and applied for the purpose. There is no art so difficult of improvement as that of typography. These statements will indicate the mechanical difficulties which have been overcome.

It is gratifying to be able to state that the new process of stereotyping which we have adopted for this purpose is likely to be introduced into use on a large scale. The benefits which the Institution will thus have conferred upon the most perfect and most important of the arts, apart from the connexion of these improvements with the catalogue system, will not be the least among its achievements, as the efforts by which this end has been attained have not been the least of its labors.

Impressed as I was with the importance of the subject, and confident as I felt of its entire practicability in every particular, I was desirous that it should be fully discussed by librarians and practical bibliographers, as well as by printers, stereotypers, and experts in the typographical art. The convention to which I have alluded afforded a rare opportunity for this examination of our plans, and a fair and intelligent estimate of their value. I introduced the subject and invited discussion. It was manifest that those who were present had come together having formed various opinions as to the practicability of the scheme, though with but one sentiment as to its desirableness. The matter was discussed a whole day with freedom, and with the manifest desire to arrive at a just conclusion. I take great pleasure in quoting the following resolutions, which were unanimously adopted, as embodying the results of the long, careful, and interested examination:

"*Resolved*, That we have considered attentively the plan for constructing catalogues of libraries, and a general catalogue of the public libraries of the United States, by means of separate stereotype titles, originated and prepared by Professor C. C. Jewett, and developed by him while librarian of the Smithsonian Institution. That we regard it as an object of high importance to the interests of our public libraries, and to the promotion of learning, and worthy to share in the funds of the Institution and the zealous exertions of its officers; the more so as it is an enterprise which cannot be successfully prosecuted, except under the guidance, protection, and pecuniary support of this central establishment for the increase and diffusion of knowledge.

"*Resolved*, That we have learned with pleasure that Congress, on the recommendation of the library committee, made an appropriation for the practical testing of the plan in its application to the Library of Congress, and that the work is now in successful progress.

"*Resolved*, That, as practical librarians and bibliographers, we take pride and satisfaction in the fact that a measure of so great literary utility has received the prompt and efficient support of our national legislature; and we would express the earnest hope that this support may be extended to it liberally, till its first great result in the complete stereotyped catalogue of the Library of Congress shall be attained."

We may reasonably congratulate ourselves upon the complete success of these plans up to the present point. They still need the fostering care of this Institution. As soon as the catalogue of the Library of

Congress shall be completed, other institutions, and even individuals, are ready to avail themselves of the scheme for procuring their catalogues. Its general adoption—the crowning point of all our efforts—seems, therefore, as sure as the completion of the first work.

It is manifest that appropriations will every year be necessary from the Smithsonian fund for the procuring of type, apparatus, and fixtures, as well as for filling any intervals that may occur in the continuity of the work. But it seems now quite certain that the system will ere long grow up into a large and self-supporting establishment, regulated by the combined libraries of the country.

Respectfully submitted.

C. C. JEWETT.

To Joseph Henry, LL.D.,
Secretary of the Smithsonian Institution.

REPORT OF THE ASSISTANT SECRETARY IN CHARGE OF PUBLICATIONS, EXCHANGES, AND NATURAL HISTORY.

SIR: I herewith present to you the report of operations for the year 1853, in the departments assigned to my superintendence.

1. PUBLICATIONS.

During the year 1853, a much larger amount of matter has been printed and published by the Smithsonian Institution than in any year since the commencement of its operations. Two volumes of the quarto series have been completed, of which one has been distributed and the other is nearly ready. The following list contains the titles of the papers in these volumes.

List of Memoirs in Vol. V, Smithsonian Contributions.

1. Introduction; pp. 16.
2. A Flora and Fauna within living animals. By Joseph Leidy, M. D.; pp. 68, and ten plates.
3. Memoir on the Extinct Species of American Ox. By Joseph Leidy, M. D.; pp. 20, and five plates.
4. Anatomy of the Nervous System of *Rana Pipiens*. By Jeffries Wyman, M. D.; pp. 52, and two plates.
5. Nereis Boreali-Americana, or Contributions to the History of the Marine Algæ of North America. By William Henry Harvey, M. D., M. R. I. A; Part II, Rhodospermeæ: pp. 262, and twenty-four plates.
6. Plantæ Wrightianæ Texano-Neo-Mexicanæ; Part II, An Account of a collection of Plants, made by Charles Wright, A. M., in Western Texas, New Mexico, and Sonora, in the years 1851 and 1852. By Asa Gray, M. D.; pp. 120, and four plates.

Vol. VI, Smithsonian Contributions.

1. Introduction; pp. 16.
2. Plantæ Frémontianæ, or Description of Plants collected in California by Col. J. C. Frémont. By John Torrey, F. L. S.; pp. 24, and ten plates.
3. Observations on the *Batis Maritima* of Linnæus. By John Torrey, F. L. S.; pp. 8, and one plate.
4. On the *Darlingtonia Californica*, a new Pitcher Plant from Northern California. By John Torrey, F. L. S.; pp. 8, and one plate.
5. Synopsis of the Marine Invertebrata of Grand Manan, or the Region about the Bay of Fundy. By William Stimpson; pp. 68, and three plates.
6. On the Winds of the Northern Hemisphere. By James H. Coffin, Professor of Mathematics and Natural Philosophy, in Lafayette College; pp. 200, and thirteen plates.

7. The Ancient Fauna of Nebraska, or a Description of Remains of Extinct Mammalia and Chelonia, from the Mauvaises Terres of Nebraska. By Joseph Leidy, M. D., Professor of Anatomy in the University of Pennsylvania; pp. 126, and twenty-five plates.
8. Occultations for 1853.

Volume V contains pages	538	plates 45
Volume VI contains pages	476	plates 53
Or an aggregate of quarto publications	1,014	98

Of these volumes, volume V has been distributed. Volume VI has not yet been bound up, but will be delivered and distributed early in 1854.

In addition to the above, several memoirs for the seventh volume are in hand, and the engravings nearly complete; among these are:

Chappellsmith, on the Tornado of Indiana.

Leidy, on the Extinct Sloths of North America.

Bailey, on New Microscopic Forms.

The octavo publications have also been of considerable extent, and are as follows:

Seventh Annual Report of the Board of Regents of the Smithsonian Institution, for 1852; pp. 96.

Report of the Secretary of the Smithsonian Institution, for 1852; pp. 31.

Catalogue of North American Reptiles in the Museum of the Smithsonian Institution. Part 1—Serpents. By S. F. Baird and C. Girard, pp. 188.

Catalogue of the described Coleoptera of the United States. By Frederick Ernst Melsheimer, M. D. Revised by S. S. Haldeman and J. L. Le Conte, pp. 190.

In addition to these a large number of circulars, relating to various subjects, has been printed.

2. Distribution of Publications and Exchanges.

(*a.*) *Foreign Distributions and Exchanges.*

The records of foreign distributions and exchanges for the year 1853 show a large increase, both in transmissions and receipts, over 1852, thus exhibiting a steady enlargement of the sphere and extent of operations, gratifying to all who are interested in the speedy diffusion of knowledge throughout the world. As in past years, the Smithsonian Institution has been a most important medium of communication between the American scientific societies and their European correspondents.

The names of the institutions making use of the facilities afforded by the Smithsonian Institution, as well as the complete statistics of the whole business, will be found detailed in the accompanying tables.

The packages, amounting in the aggregate to 1,604, bearing 567 addresses, weighing 12,220 pounds, and occupying nearly 400 cubic feet of capacity, all left the Institution in May, and for a large number

of these packages acknowledgments have already been received. The names of institutions receiving the Smithsonian Contributions to Knowledge, 258 in number, will be found in the table. Nearly 400, however, have received publications of some kind from the Institution; the total number of addresses, including those parcels sent by others, being 567, as already stated.

A.—TABLE EXHIBITING THE STATISTICS OF PRINTED MATTER SENT ABROAD IN 1852, BY THE SMITHSONIAN INSTITUTION.

1. *Distributed by Dr. J. G. Flügel, Leipsic.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in preceding.	Total.	Number of principal packages.	Packages enclosed from others.	Packages enclosed for others.	Total.	Weight in pounds.	Capacity in cub. ft.	Boxes.	Letters accompanying parcels.
Sweden	7	7	.....	17	20	9	.....	.....	....	....	.....
Norway	4	1	.....	7	12	1	.....	.....	....	....	.....
Iceland	1	.....	.....	2	1	.....	.....	.....	....	....	.....
Denmark	7	4	.....	14	23	5	.....	.....	....	....	.....
Russia	15	6	.....	32	42	7	.....	.....	....	....	.....
Holland	12	3	.....	23	34	4	.....	.....	....	....	.....
Germany	85	58	.....	155	181	63	.....	.....	....	....	.....
Belgium	9	6	.....	18	34	8	.....	.....	....	....	.....
Switzerland	13	5	.....	19	49	6	.....	.....	....	....	.....
Total	153	90	243	287	396	103	786	6,250	200	25	190

2. *Distributed by Hector Bossange, Paris.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in preceding.	Total.	Number of principal packages.	Packages enclosed from others.	Packages enclosed for others.	Total.	Weight in pounds.	Capacity in cub. ft.	Boxes.	Letters accompanying parcels.
France	55	26	.....	80	102	29	.....	.....	....	....	.....
Italy	36	13	.....	43	56	15	.....	.....	....	....	.....
Total	91	39	130	123	158	44	325	2,250	72	9	110

3. *Distributed through the Royal Society and the agency of Henry Stevens, London.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in preceding.	Total.	Number of principal packages.	Packages enclosed from others.	Packages enclosed for others.	Total.	Weight in pounds.	Capacity in cub. ft.	Boxes.	Letters accompanying packages.
Portugal	1	1	.....	2	6	1	.....	.....	....	....	.....
Spain	4	2	.....	6	9	2	.....	.....	....	....	.....
United Kingdom	99	51	.....	163	150	59	.....	.....	....	....	.....
Australia	1	.....	.....	1	1	.....	.....	.....	....	....	.....
Total	105	54	159	172	166	62	400	2,786	90	7	140

4. *Distributed by others.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in preceding.	Total.	Number of principal packages.	Packages enclosed from others.	Packages enclosed for others.	Total.	Weight in pounds.	Capacity in cub. ft.	Boxes.	Letters accompanying packages.
Old world	17	.....	.....	20	30	.....	.....	.....	....	....	.....
South America	16	2	.....	23	18	2	.....	.....	....	....	.....
Total	33	2	35	43	48	2	93	914	30	7	35

5. *General summary.*

AGENTS.	Addresses of principal packages.	Addresses enclosed in preceding.	Total.	Number of principal packages.	Packages enclosed from others.	Packages enclosed for others.	Total.	Weight in pounds.	Capacity in cub. ft.	Boxes.	Letters accompanying packages.
Dr. J. G. Flügel	153	90	243	287	396	103	786	6,250	200	25	190
H. Bossange	91	39	130	123	158	44	325	2,250	72	9	110
H. Stevens	105	54	159	172	166	62	400	2,786	90	7	140
Others	33	2	35	43	48	2	93	914	30	7	35
Total	382	185	567	625	768	211	1,604	12,200	392	48	475

B.—TABLE EXHIBITING THE NUMBER OF PIECES RECEIVED FROM THE DIFFERENT INSTITUTIONS IN THE UNITED STATES FOR DISTRIBUTION ABROAD.

Obtained by the Smithsonian Institution from various sources, but exclusive of its own publications	2,410
Boston Society of Natural History, Boston	54
American Academy of Arts and Sciences, Boston	112
American Journal of Science	35
American Oriental Society, New Haven	33
Academy of Natural Sciences, Philadelphia	186
American Philosophical Society, Philadelphia	72
U. S. Coast Survey	131
Patent Office	100
Topographical Bureau	30
Indian Bureau	168
Light-House Board	5
Secretary of the Navy	29
J. Ross Browne	170
Miscellaneous institutions and individuals	319
	1,444
Total received	3,854

Most of the above consisted of single volumes; a number, however, were packages with several enclosures, which would probably bring the number of volumes to 4,000.

APPENDIX C.

List of Foreign Institutions in correspondence with the Smithsonian Institution.

SWEDEN.

Goteborg.—Kongl. Vetenskaps och Vitterhets Samhillet.
**Lund.*—Kongl. Universitetet.
Observatory.
**Stockholm.*—Kongliga Svenska Vetenskaps Akademien.
Kongl. Landbruks-Akademien.
*Kongl. Vitterhets Historie och Antiquitets Akademien.
*Riksbiblioteket.
Svenska Akademien.
**Upsala.*—Kongliga Vetenskaps Societeten.
*Kongl. Universitet.

Those marked * have received the fifth volume of "Contributions." The others have received separate memoirs and other publications.

NORWAY.

*Bergen.—Bergen's Museum.
*Christiania.—Det Kongelige Norske Universitet.
Observatory.
Physiographiske Forening.
Drontheim.—Det Kongel. Norske Videnskabernes Selskab.

ICELAND.

*Reykjavik.—Islands Stiftisbokasafn.

DENMARK.

*Copenhagen.—Kongelige Nordiske Oldskrift Selskab.
*Det Kongelige Danske Videnskabernes Selskab.
*Kongelige Bibliothek.
Königliches dänische Seecharten Archiv.
Observatory.
Skandinaviske Naturforskeres Forsamling.

RUSSIA.

Dorpat.—Gelehrte Estnische Gesellschaft zu Dorpat.
*Observatoire Impérial.
*Helsingfors.—Societas Scientiarum Fennica.
*Kasan.—University Library.
*Mittau.—Kurländische Gesellschaft für Literatur und Kunst.
*Moscow.—Société Impériale des Naturalistes de Moscou.
Pulkowa.—Observatoire Impérial.
*St. Petersburg.—Académie Impériale des Sciences.
Depot of Naval Charts of Russia.
Geodetic Survey of Russia.
*Imperial Public Library.
*Kais. Russ. Mineralogische Gesellschaft.
*L'Etat Major du Corps des Ingénieurs des Mines de Russie.
*Observatoire Physique Central de Russie.
*Société Impériale d'Archéologie.

HOLLAND.

*Amsterdam.—Académie Royale des Sciences à Amsterdam.
Genootschap Natura Artis Magistra.
Zoological Garden.
*Groningen.—Academia Groningana.
*Haarlem.—Hollandsche Maatschappij der Wetenschappen.
*Hague.—Bibliothèque Royale.
Leyden.—Botanical Society of the Netherlands.
Musée d'Histoire Naturelle.
*University Library.

*Middelburg.—Zeeuwsche Genootschap der Wetenschappen.
*Rotterdam.—Bataafsch Genootschap der proefondervindelijke Wijsbegeerte te Rotterdam.
*Utretcht.—Provinciaal Utrechtsch Genootschap van Kunsten en Wetenschappen.
Zwolle.—(Overyssel.)—Overysselsche Vereeniging tot Ontwikkeling van Provinciale Helvaart.

GERMANY.

*Altenburg.—Naturforschende Gesellschaft.
Altona.—Geodetic Survey of Holstein.
Observatory.
Berlin.—Anstalt des topographischen Bureaus im general Stabe.
Deutsche Geologische Gesellschaft.
*Geographische Gesellschaft.
Gesellschaft für Erdkunde.
*Gesellschaft Naturforschender Freunde.
Gewerbe Institut.
Ingenieur Schule.
*Königliche Bibliothek.
Königliches Landes Œconomie Collegium.
*Königliches Museum.
*Königlich, Preussische Akademie der Wissenschaften zu Berlin.
Observatory.
Wiegman's Archiv für Naturgeschichte.
*Blankenberg.—Naturwissenschaftlicher Verein des Harzes.
*Bonn.—Naturhistorischer Verein des preussischen Rheinlandes und Westphalens.
Observatory.
*University Library.
*Bremen.—Stadt-Bibliothek.
*Breslau.—Kaiserliche Leopoldinisch-Carolinische Akademie der Naturforscher.
*Dantzig.—Naturforschende Gesellschaft.
Darmstadt.—Grossherzogliche Bibliothek.
Deidesheim.—Pollichia Naturwissenschaftlicher Verein der bayerischen Pfalz.
*Dresden.—King of Saxony.
*Königliche Bibliothek.
K. Sammlung für Kunst u. Wissenschaften.
Dusseldorf.—Gesellschaft Naturforschender Freunde Westphalens.
Emden.—Naturforschende Gesellschaft.
Erfurt.—Akademie Gemeinnütziger Wissenschaften.
*Erlangen.—Königliche Universität.
*Frankfurt am Main.—Senckenbergische Naturforschende Gesellschaft.
*Freiberg.—Königlich-Sächsische Bergakademie.
*Freiburg.—University Library.
*Giessen.—University Library.
Görlitz.—Naturforschende Gesellschaft.

Göttingen.—Königliche Gesellschaft der Wissenschaften.
Göttingen.—*Königliche Universität.
Gotha.—Royal Library.
Grätz.—University Library.
Greifswald.—K. P. Staats u. Landwirthschaftl. Akademie Eldena.
*University Library.
Halle.—Deutsche Morgenländische Gesellschaft.
Naturforschende Gesellschaft.
*Naturwissenschaftlicher Verein in Halle.
Thüringisch-sächsischer Verein.
*University Library.
Hamburg.—Commerz Bibliothek.
Museum.
*Naturwissenschaftlicher Verein.
Observatory.
*Stadt-Bibliothek.
**Hannover.*—Königliche Bibliothek.
**Heidelberg.*—Grossnerzoglich-Badische Universität.
**Innsbrück.*—University Library.
*Ferdinandeum.
**Jena.*—Grossherzogl. herzogl. sächs. Gesammt-Universität.
**Karlsruhe.*—Grossherzogliche Hofbibliothek.
**Kiel.*—Academia Christiana Albertina.
**Königsberg.*—Observatory.
University Library.
Kremsmünster.—Observatory.
Leipsic.—Dr. J. G. Flügel.
Fürstlich-Jablonowski'sche Gesellschaft.
*Königlich-Sächsische Gesellschaft der Wissenschaften.
*Stadt-Bibliothek.
University Library.
Mannheim.—Mannheimer Verein für Naturkunde.
**Marburg.*—Gesellschaft zur Beförderung der gesammten Naturwissenschaften.
*University Library.
**Meissen.*—Isis.
Merseburg.—Central Direction für die Provinz Sachsen.
**Munich.*—Königlich Bayerische Akademie der Wissenschaften.
*Königliche Hof und Staats-Bibliothek.
Observatory.
Polytechnic School.
Neu Wied.—Maximilian Prinz von Wied.
**Nürnberg.*—Naturhistorische Gesellschaft.
Olmütz.—University Library.
**Pesth.*—Ungarische Gelehrte Gesellschaft.
*University Library.
**Prag.*—Das Böhmische Museum.
K. K. patriotisch oekonomische Gesellschaft.
*K. K. Universität.
*Königlich-Böhmische Gesellschaft der Wissenschaften.
Regensburg.—K. Baierische Botanische Gesellschaft.

**Rostock.*—University Library.
**Stettin.*—Entomologischer Verein.
**Stuttgart.*—Königliche öffentliche Bibliothek.
Verein für Vaterländische Naturkunde.
Tharand.—Königliche Akademie für Forst u. Landwirthe.
**Tübingen.*—Königliche Universität.
**Vienna.*—Kaiserliche Akademie der Wissenschaften.
*K. K. Geologische Reichsanstalt.
*K. K. Hofbibliothek.
K. K. Hof-u. Staatsdruckerei.
K. K. Naturalien Kabinet.
*K. K. Orientalische Akademie.
Observatory.
*University Library.
Zoologisch-botanischer Verein.
**Würzburg.*—Physikalisch-medicinische Gesellschaft.
*University Library.
Württemberg.—Der Verein für Vaterländische Naturkunde in Württemberg.

SWITZERLAND.

**Basel.*—Die Gesellschaft für Vaterländische Alterthümer in Basel.
College of Basel.
*Naturforschende Gesellschaft.
Bern.—College of Bern.
*Allgemeine Schweizerische Gesellschaft für die gesammten Naturwissenschaften.
*Naturforschende Gesellschaft.
**Genève.*—Bibliothèque de la ville de Genève.
Observatoire de Genève.
*Société de Physique et d'Histoire Naturelle de Genève.
Lausanne.—Société Vaudoise des Sciences Naturelles.
**Neuchatel.*—Société des Sciences Naturelles.
Zürich.—College of Zürich.
*Gesellschaft für vaterländish Alterthümer in Zürich.
*Naturforschende Gesellschaft in Zürich.

BELGIUM.

Antwerp.—Académie d'Archéologie.
Bruges.—Société des Sciences Naturelles.
**Bruxelles.*—Académie Royale des Sciences, des Lettres et des Beaux Arts.
Bibliothèque Royale de Belgique.
*Observatoire Royal.
*City Library.
**Gand.*—Université de Gand.
**Liege.*—Société Royale des Sciences de Liège.
**Louvain.*—Université Catholique.
**Mons.*—Société des Sciences, des Arts et des Lettres, du Hainaut.

FRANCE.

Angers.—Société d'Agriculture, Sciences et Arts.
Angoulême.—Société d'Agriculture, Arts et Commerce.
Arras.—Société d'Arras.
Bayeux.—Société d'Agriculture, Sciences, Arts et Belles-Lettres
Besançon.—Académie des Sciences, Belles-Lettres et Arts.
**Bordeaux.*—Académie Nationale des Sciences, Belles-Lettres et Arts.
*Société Linnéenne de Bordeaux.
Brest.—Académie Navale.
**Caen.*—Académie des Sciences, Arts et Belles-Lettres.
Société des Antiquaries de Normandie.
Société Linnéenne de Normandie.
**Charente.*—Soc. d'Agriculture, Arts, et Commerce du Dép. de la Charente.
Cherbourg.—Société Académique de Cherbourg.
Société des Sciences Naturelles de Cherbourg.
Clermont-Ferrand.—Académie des Sciences, Belles-Lettres et Arts de Clermont-Ferrand.
Dijon.—Académie des Sciences, Arts et Belles-Lettres de Dijon.
Evreux.—Société Libre d'Agriculture, Sciences, Arts et Belles-Lettres.
Le Mans.—Société d'Agriculture, Science et Arts.
Lille.—Société Nationale des Sciences, de l'Agriculture et des Arts.
**Lyon.*—Société Nationale de l'Agriculture, d'Histoire Naturelle et des Arts Utiles de Lyon.
*Académie des Sciences, Belles-Lettres et Arts de Lyon.
*Société Linnéenne de Lyon.
Marseilles.—Académie des Sciences, Lettres et Arts.
Mende.—Société d'Agriculture, Commerce, Sciences et Arts.
**Metz.*—Académie Nationale de Metz.
Société d'Histoire Naturelle.
**Montpellier.*—Société Archéologique de Montpellier.
Académie des Sciences et Lettres à Montpellier.
**Nimes.*—Académie du Gard.
**Orleans.*—Société des Sciences, Belles-Lettres et Arts d'Orleans.
**Paris.*—Bibliothèque de la Ville de Paris.
*Bibliothèque du Jardin des Plantes.
*Bibliothèque Impériale.
Bureau des Longitudes.
*Dépot des Cartes et Plans.
*Ecole Nationale des Mines.
*Institut de France.
*Institut Historique de France.
*Ministère de la Guerre.
*Ministère de la Marine.
*Ministère de l'Instruction publique et des Cultes.
Observatoire.
*Société des Antiquaires.
*Société Asiatique.
*Société de Géographie.
Société de l'Ecole des Chartes.

Paris.—Société Entomologique.
*Société Ethnologique.
Société Française de Statistique Universelle.
*Société Géologique de France.
Société Impériale d'Horticulture de Paris.
Société Météorologique de France.
Société Nationale des Antiquaries de France.
Société Nationale et Centrale d'Agriculture.
Société Philomatique.
Reims.—Académie de Reims.
**Rouen.*—Académie des Sciences, Belles-Lettres et Arts de Rouen.
Saint-Quentin.—Société des Sciences, Arts, Belles-Lettres, et Agriculture.
**Strasbourg.*—Société des Sciences, Agriculture et Arts, du Bas Rhin.
*Académie des Sciences Naturelles.
Toulon.—Académie Navale.
**Toulouse.*—Académie des Sciences, Inscriptions et Belles-Lettres de Toulouse.
Tours.—Société d'Agriculture, des Sciences, d'Arts, et des Belles-Lettres.
Trevoux.—Société d'Agriculture, Sciences et Arts.
Troyes.—Société d'Agriculture, Sciences, Arts et Belles-Lettres.

ITALY.

**Bologna.*—Accademia delle Scienze dell' Istituto di Bologna.
Brescia.—Ateneo di Brescia.
Catania.—Accademia Gioenia di Scienze Naturali.
Chamberry.—Société Royale Académique de Savoie.
Florence.—Accademia del Cimento.
*Biblioteca Magliabecchiana.
Imperiale e Reale Museo di Fisica e Storia naturale di Firenze.
Observatory.
Genoa.—Accademia delle Scienze, Lettere, ed Arti.
Accademia Medico-chirurgica di Genova.
**Lucca.*—Reale Accademia Lucchese di Scienze, Lettere ed Arti.
**Milan.*—Biblioteca Brera.
*Imperiale Regio Istituto Lombardo di Scienze, Lettere ed Arti.
*Museo Civico.
Modena.—Observatory.
Società Italiana delle Scienze.
Naples.—Accademia degli Aspiranti Naturalisti.
Observatory.
*Reale Accademia delle Scienze, e Belle Lettere.
**Palermo.*—Accademia Palermitana di Scienze e Lettere.
Observatory.
**Padua.*—Imperiale Regia Accademia di Scienze, Lettere ed Arti di Padova.
Pisa.—Accademia Valdarnese del Poggio.

*Pisa.—University Library.
*Ravenna.—Società Ravennate.
*Rome.—Accademia Romana di Archeologia.
*Accademia Pontifica dei Nuovi Lincei.
*Biblioteca Vaticana.
British Academy of Fine Arts.
Correspondenza Scientifica in Roma.
Osservatorio Astronomico del Collegio Romano.
Siena.—Accademia delle Scienze.
*Turin.—Accademia Reale delle Scienze.
*Venice.—Biblioteca Marciana.
I. R. Istuto Veneto di Scienze, Lettere ed Arti.
Naval School.
*Verona.—Accademia d'Agricoltura, Commercio ed Arti di Verona.

PORTUGAL.

*Lisbon.—Academia Real dos Sciencias.

SPAIN.

*Madrid.—Real Academia Española.
*Real Academia de Ciencias de Madrid.
*Real Academia de la Historia.
*Biblioteca Real.

GREAT BRITAIN AND IRELAND.

Bath.—Bath and West of England Agricultural Society.
Belfast.—Belfast Institution.
*Library of Queen's College.
*Natural History and Philosophical Society.
Berwick-on-Tweed.—Berwickshire Naturalists' Club.
*Cambridge.—Cambridge Philosophical Society.
*Cambridge Observatory.
*University Library.
*Cork.—Library of Queen's College.
Royal Cork Institution.
Dublin.—Botanical Society.
Dublin University Philosophical Society.
Geological Society of Dublin.
*Library of Trinity College.
*Royal Dublin Society.
Royal Irish Academy.
Edinburgh.—Botanical Society.
*Library of Faculty of Advocates.
Royal Institution for Encouragement of Fine Arts in Scotland.
*Royal Observatory.
Royal Physical Society of Edinburgh.
*Royal Scottish Society of Arts.

*Edinburgh.—Royal Society.
*Society of Antiquaries of Scotland
*University Library.
*Wernerian Society of Natural History.
*Galway.—Library of Queen's College.
Glasgow.—Andersonian Institute.
*University Library.
*Greenwich.—Royal observatory.
*Leeds.—Leeds Philosophical and Literary Society.
*Liverpool.—Free Public Library, Museum, and Gallery of Art, of the Town of Liverpool.
Historic Society of Lancashire and Cheshire.
Observatory.
Royal Institution.
London.—Aborigines Protection Society.
Annals and Magazine of Natural History.
*Archæological Institute of Great Britain and Ireland.
*Athenæum Club.
*Board of Admiralty.
*British Archæological Association.
*British Association for the advancement of Science.
*British Museum.
*Chemical Society of London.
Department of Practical Art.
Entomological Society.
*Ethnological Society of London.
*Geological Society of London.
*Horticultural Society of London.
Institute of Actuaries.
*Institution of Civil Engineers.
*Library of Corporation of City of London.
*Library of Committee of Privy Council for Trade.
*Library of Eaton College.
*Library of the Hon. the East India Company.
*Library of the House of Commons.
*Linnæan Society.
*London Institution (Finsbury.)
*London Library.
Meteorological Society.
*Microscopical Society.
*Museum of Practical Geology.
*Philological Society.
*Queen's Library.
*Royal Agricultural Society of England.
*Royal Asiatic Society.
Royal Astronomical Society.
*Royal College of Surgeons of England.
*Royal Geographical Society of London.
*Royal Institution of Great Britain.
Royal Society of Literature.
*Royal Society of London.

London.—*Society of Antiquaries of London.
*Society of Arts, Manufactures, and Commerce.
*Statistical Society of London.
Syro-Egyptian Society.
*Zoological Society of London.
**Manchester.*—Manchester Free Library and Museum.
*Literary and Philosophical Society of Manchester.
Maynooth.—College Library.
Newcastle-upon-Tyne.—Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne.
Oxford.—Ashmolean Society.
*Bodleian Library.
*Radcliffe Observatory.
Penzance.—Royal Cornwall Polytechnic Society.
*Royal Geological Society of Cornwall.
Salford.—Salford Borough Royal Museum and Library.
**St. Andrews.*—University Library.
**Woolwich.*—Military Academy.

GREECE.

**Athens.*—University Library.

TURKEY.

Constantinople.—Société Orientale de Constantinople.
*Library of the Sultan.

AFRICA.

**Grand Cairo.*—The Egyptian Society.
**Liberia.*—Government Library.
Mauritius.—Société d'Histoire Naturelle de l'Isle Maurice.

ASIA.

**Allahabad.*—Mission College.
**Batavia.*—Bataviaasche Genootschap van Konsten en Wetenschappen,
**Bombay.*—Royal Asiatic Society.
*Geographical Society.
**Calcutta.*—Asiatic Society.
Agricultural and Horticultural Society of India.
**Ceylon.*—Asiatic Sociaty.
Batticotta Seminary.
**Hong Kong.*—Asiatic Society of China.
**Madras* —Literary Society.
**Manilla.*—Royal Economical Society of the Phillipine Islands.

VAN DIEMEN'S LAND.

Launceton.—Launceton Library.
Hobarton.—Royal Society of Van Diemen's Land.

AMERICA.

**Bogota.*—Sociedad Economica de Amigos del Pais.
**Brazil.—Rio Janeiro.*—Imperial Brazilian Historical Society.
Royal Geological Society.
Sociedad auxiliadora de Industria Nacional.
**Caracas.*—Sociedad Economica de Amigos del Pais.
**Chili.—Santiago.*—Biblioteca Nacional.
Observatory of Santiago.
*University Library.
Demerara.—Queen's College.
**Guatemala.*—Sociedad Economica de Amigos del Pais.
**Habana.*—Real Sociedad Economica.
Mexico.—Mexico.—El Minerea.
El Museo Nacional.
Navy and War Tribunal.
*Sociedad Mexicana de Geografia y Estadistica.
Pueblo.—Colegio Palafoxano y de Pantaleon.
Vera Cruz.—Public Institute.

The receipts of works from abroad, in exchange for those sent out by the Smithsonian Institution, are much greater than those of last year. Many of these were of very great value, comprising a large number of more or less complete series of transactions and periodicals. For an enumeration of these, I would refer to the Report of the Assistant Secretary in charge of the Library.

D.—TABLE EXHIBITING THE NUMBER OF PIECES RECEIVED IN EXCHANGE FROM ABROAD, IN 1853.

Volumes.—Folio and quarto	511	
Octavo	929	
		1,440
Parts of volumes and Pamphlets.—Quarto	303	
Octavo	688	
		991
Maps and Engravings		125
Total		2,556

E.—TABLE EXHIBITING THE NUMBER OF PACKAGES RECEIVED FOR OTHER AMERICAN INSTITUTIONS, &c., IN 1853.

Bowdoin College	6
Boston.—American Academy	26
Natural History Society	6
Bowditch Library	7
Cambridge.—Observatory	11
Botanic Garden	7
Harvard College	13
Astronomical Journal	9
Amherst.—Amherst College	8

Worcester.—Antiquarian Society	1
New Haven.—Journal of Science	14
American Oriental Society	7
Albany.—New York State Library	6
New York.—Lyceum of Natural History	13
Ethnological Society	3
Geographical Society	4
Philadelphia.—American Philosophical Society	39
Academy of Natural Sciences	25
Franklin Institute	2
Geological Survey of Pennsylvania	4
Washington.—National Observatory	28
Coast Survey	22
National Institute	6
Surgeon General	1
American Association	2
Congress Library	8
Astronomical Expedition to Chili	4
United States Patent Office	3
State Department	2
Georgetown.—Observatory	10
Miscellaneous, including libraries of States, minor institutions, &c.	755
	1,052

6. Domestic Exchanges.

The copies of Volume V of Smithsonian Contributions to Knowledge intended for American institutions, were all sent off in May at the same time with those for foreign bodies. As heretofore, they were distributed through the following agents, who have made no charge for their service: Messrs. J. P. Jewett & Co., Boston; George P. Putman & Co., New York; Lippincott, Grambo & Co., Philadelphia; John Russell, Charleston; B. M. Norman, New Orleans; Dr. Geo. Engelmann, St. Louis; H. W. Derby, Cincinnati; and Jewett, Proctor & Worthington, Cleveland. Acknowledgments for nearly all have been already received.

NATURAL HISTORY.

INCREASE OF THE MUSEUM.

The additions to the museum during the year 1853 have been very extensive, covering the entire field of natural history and ethnology. Many of these consist of species altogether new to science; while others, though previously described, belong to forms of great rarity. The contributions to our knowledge of the geographical distribution of species have been of the most important character, the localities occurring as they do over the entire area of this country. A very large proportion

of these localities are in the region between the Mississippi and the Pacific, many of them never before represented in natural history cabinets. This condition of things has been, in great measure, due to the labors of the various government parties organized for the survey of the boundary line between the United States and Mexico, and of the several routes for a Pacific railroad. Without a single exception, all these parties have been fitted out at the Smithsonian Institution with all necessary instruments and apparatus for natural history research, much of it contrived with special reference to the exigencies of the particular service involved. Full instructions were also supplied, by which persons without previous practice were enabled to master all the general principles required for making observations and collections of every kind.

In addition to the above official explorations, many of a more private character, and of greater or less extent, have been made by different persons, and transmitted to the Institution. The general result is to be seen in the large number of jars, kegs, boxes, and shelves filled with specimens of all kinds. From this it will be seen that the army has contributed a very large proportion of the whole receipts, affording a gratifying proof of the interest felt in the deposit at the metropolis of complete collections of the natural history of North America.

Owing to the liberality of the officers of the various expeditions, and of the bureaus under whose charge they were fitted out, every facility was afforded in authorizing the necessary force and funds to meet the wants of science as connected with these explorations. In this way the entire cost was defrayed by government; so that the institution has been called upon only to make the necessary expenditures for government, and to give a general supervision to the whole.

Nor have the materials collected by the government parties been allowed to lie idle; on the contrary, they have been put, immediately on their arrival, into the hands of competent naturalists and skilful artists, for the elucidation and illustration necessary to fit them for appearing as a portion of the reports which the various parties have been called on to make.

I shall now proceed briefly to mention the general character of the additions to the museum during the year, referring for particular information to the alphabetical list of donors subjoined. It is impossible at the present time to give an accurate enumeration of all the species received, especially as so many are entirely new. Every specimen, however, is labelled, as soon as it arrives, with the name of the donor and locality; and in the descriptive catalogues, now in course of preparation, the complete account of the whole will be presented in a systematic form. The general history of the explorations, too, will be found to embrace more detail than can here be given.

Mammals.—During the past year many species of North American mammals have been received, embracing quite a notable proportion of the smaller forms from North America, especially the squirrels, spermophiles, and weasels. The Louisiana species have been received from Mr. Fairie; those of Wisconsin, from Dr. Hoy; of the Rocky mountain range, from the expedition of Governor Stevens; of the lower

Rio Grande, from Major Emory. Dr. O. W. Gibbs presented a musk deer from Java, and Mr. Steenburg has contributed many of the species from Greenland and Scandinavia. The collections of Captain Van Vliet and Lieutenant Couch include many species from Mexico and Texas. Some valuable specimens from Minnesota were received from Mr. Cavileer and Dr. Head.

Birds.—The additions to this department have been very great, amounting to over 400 species and more than 1,000 specimens. Of these, 250 species are from the Rio Grande country, North Mexico, the Rocky mountains, and west of the Rocky mountains. Here, as well as among mammals, there have occurred some new species. Of remarkable perfection of preparation was a collection of fifty species of California birds, presented by Dr. Hermann; and the North Mexican series of Lieutenant Couch have been of extraordinary magnitude and importance. Captain Van Vliet, Mr. J. H. Clark, and Mr. Arthur Schott, under Major Emory, and Dr. Crawford, have gathered many valuable specimens in Texas. Species from Michigan have been received from the Rev. Charles Fox; of Wisconsin, from Dr. Hoy and Mr. Barry; of Ohio, from Dr. Kirtland and Charles Pease; of Louisiana, from Mr. James Fairie.

Reptiles and Fishes.—As heretofore, owing to the particular attention invited to this department, the additions to the alcoholic collections have been most marked, especially of reptiles and fishes. Every portion of the country has been laid under contribution, and the additions to our knowledge of the distribution of species, as well as of their zoological character, have been of the greatest value. There is scarcely a State or Territory in the Union which has not sent a representation. The most marked results have been the addition to the fauna of the United States of the dipsadians among serpents, and the characini, ants, the fresh-water labroids among fishes. Nearly two thousand glass jars have been filled with the specimens received, after being assorted, of which two hundred were of serpents alone. The principal contributors have been Major Emory, Governor Stevens, Lieutenant Whipple, Dr. Hammond, Dr. Jeffrey, Professor Winchell, Drs. G. C. and B. F. Shumard, Dr. Hoy, Rev. A. C. Barry, Dr. Barratt, Mrs. Daniel, Major Rich, Captain Van Vliet, James Fairie, S. F. Baird, Major Hagner, Major Sibley, Rev. Charles Fox, Dr. Head, J. D. Sergeant, Mr. Kennicott, Mr. Dean, Captain Atwood, Leo Lesquereaux, J. H. Richard, Professor Agassiz, Captain Farragut, D. B. Boden, &c.

Invertebrata.—Many valuable collections of invertebrata have been added during the year, the most important being a series from Grand Manan, from Mr. William Stimpson, and illustrating his paper published in the Smithsonian Contributions to Knowledge. Others from the coast of Massachusetts were sent by Captain Atwood, and from Florida and the Gulf of Mexico, by Dr. Hammond, Dr. Jeffrey, and Major Emory. Some interesting contributions have consisted of specimens of *Gordius* from the bodies of crickets and grasshoppers, contributed hy Mr. Sanford and Mr. Eveleth.

Plants.—An extensive collection of plants of Alabama was received from Prof. A. Winchell, to whom the Institution is indebted for valuable specimens in all departments of natural history. Dr. Ravenel has

presented a suite of the Carolina fungi. Lieut. Whipple and Governor Stevens have sent in important collections from their fields of labor.

Minerals and Fossils.—In connexion with the survey of Gov. Stevens, Dr. Evans revisited the Mauvaises Terres last summer, and collected a large number of specimens of the fossil vertebrata of that region. These have been put into the hands of Dr. Leidy, who has detected the presence of some additional new species. Professor Winchell has sent quite a full series of the cretaceous and tertiary fossils of Alabama, and Major Emory the same from Texas. Many minerals have been received from Dr. Pendleton, of Georgia, and some Austrian stalactites from Mr. Dodge.

Ethnology.—Skulls of many tribes of Indians—as Lipans, Comanches, Apaches, Flat Heads—have been received from various sources; as also remains of works of art. An interesting contribution to this department is found in a specimen of the sculpture of the human foot in limestone by the early inhabitants of the country, and erroneously supposed to be an impression made while the stone was in a plastic state.

PRESENT CONDITION OF THE MUSEUM.

The collections belonging to or deposited with the Smithsonian Institution are at present scattered over the building in its various rooms. Much inconvenience is felt from the impracticability of arranging the specimens properly for examination and study. Everything is kept packed away in the smallest compass, and of course not easily referred to when needed for investigation. The alcoholic collections, however, have generally been accessible when required for use. When the new museum room is finished, which will be in the course of a few months, ample space will be afforded for the accommodation of all the specimens, although a considerable time must necessarily elapse before the cases can be put up and the collections properly arranged.

At the present time the Institution may be said to possess one of the best general collections of specimens of North American natural history in the country, although in particular branches it may be greatly exceeded by several, both public and private. It is pre-eminently rich in the mammals, with their skulls and skeletons; and still more in the reptiles. As an illustration of this, it may be stated that the species of North American serpents alone amount to 130, of which 70 were never described before being received by the Institution. The enumeration by Dr. Holbrook of North American serpents, in 1842, consisted of 49. The other departments of reptiles have experienced nearly proportional increase. The collection of birds is second only to that of the Philadelphia Academy of Natural Sciences; of fishes, only equalled by the private cabinet of Professor Agassiz; while in the various departments of invertebrata and of plants it holds much more than average rank. In fossil remains the collection is very rich, especially of the comparatively recent vertebrata of the various caverns throughout the country.

And, in connexion with this extent and importance of the Smithsonian museum, it may be well to call attention to the fact that it has

been the work of but three years to raise this collection from nothing to the front rank among American cabinets, exceeding all perhaps in the number of new species first brought to light within its limits. Nor has effort been confined merely to the acquisition of specimens, but to their concentration in mass, so as to supply all working naturalists with the materials of research. As already stated, applications for such assistance are constantly being received, and always met with all possible promptness; so that scarcely any natural history monograph or memoir of any extent has been published in this country within a year or two which has not been indebted in this way to the Institution. From the care, too, taken to keep separate all the localities, however near together, of any species, the collection affords information in reference to the geographical distribution of species of the very highest value.

WORK DONE IN NATURAL HISTORY.

The labor of unpacking and assorting collections as received, and labelling and recording the different specimens, has of course been very great, requiring much more time than the limited portion left after discharging the other duties assigned to me. In this, however, I have been assisted very greatly by Mr. Charles Girard, who has given much time and attention to this department, without any compensation for his services. By his help I have been enabled to keep up with the details of labor necessary to give these collections their proper scientific value.

Much has been done during the year towards distributing duplicate specimens of the Smithsonian collection among the other cabinets of the country. In no way can the Institution be of more use in elevating the standard of natural science than in distributing carefully-labelled suites of specimens to points where, from lack of libraries or other causes, the means of accurate identification are wanting. For remote regions of country this mode of assistance is of especial benefit; and arrangements have already been entered into, in several cases, to receive miscellaneous collections, and to return them properly labelled, with the addition of such other species as can conveniently be spared. Parties already in such connexion with the Smithsonian Institution, or about entering upon it, are found in New York, Ohio, Michigan, Wisconsin, Iowa, Illinois, Missouri, New Orleans, and North and South Carolina.

A collection of duplicates of North American serpents and Astaci has been presented to the Philadelphia Academy of Natural Sciences, including types of many new species published by the Institution. To the New York State Cabinet of Natural History was also sent a large collection of reptiles and fishes of New York, embracing many species not previously received there.

The cataloguing of the collections of the Institution progresses as rapidly as my other duties will allow. One way in which a museum may be very useful to those unable to visit it personally, is by publishing catalogues of the specimens contained therein. If these exhibit original descriptions of the species, and especially if the list be made complete by enumerating also the species not contained in the collection, they become of great value to investigators, and may readily serve as

manuals of science, attaining the rank of monographs. This has been done in the Catalogue of North American Serpents in the Museum of the Smithnian Institution, published in January, 1853, which, in a compact volume of one hundred and eighty-eight pages, contains full and original descriptions of one hundred and nineteen species—all belonging to the Institution, with the exception of five; and some of these, with many additional ones, have been received since that time. Similar catalogues of the other reptiles are in an advanced stage of progression, and will be ready for publication early in 1854.

In addition to the preparation of these catalogues, much has been done in the classification and description of the collections sent in by the various exploring expeditions. Considerable progress has been made towards the preparation of the several reports of the natural history of the United States and Mexican Boundary Survey, the survey of the North Pacific railroad route by Gov. Stevens, that of the Central route by Lieut. Whipple, that of the United States Astronomical Expedition to Chili by Lieut. Gillis, and several others. The preparation of many hundred sheets of drawings of new species for these reports has been carefully superintended. The reports prepared upon the natural history of the explorations by Capt. Sitgreaves and Capt. Marcy, have already been published by Congress. Some of these I now lay before you.

A large amount of valuable information relating to the descriptions, and the habits and manners of species, has been received during the year—much of it bearing directly upon important questions in science and rural economy. A very extensive correspondence has been required for the purpose of stimulating investigations and calling attention to the solution of particular problems. It is much to be regretted that the Institution has no medium of its own through which the information thus received can be promptly presented to the world. A monthly bulletin, of considerable size, could readily be filled with communications of this kind, as well as with brief notices and descriptions of collections received.

REGISTERS OF PERIODICAL PHENOMENA.

The blank registers of periodical phenomena issued in the winter of 1852–'3, have been returned filled, and in connexion with those for the previous year, still in manuscript, form a body of information of the highest value. These will be carefully reduced, and published at an early period. A new edition having become necessary, a revision of the old lists of plants was carefully made by Drs. Torrey and Gray, and the revised form will be distributed in a few weeks. Instructions for making collections of microscopical organisms and infusoria have been added.

ASSISTANCE IN THE MUSEUM.

As the time has already arrived when more attention and labor should be given to the collections of the museum to make them fulfil all the purposes of instruction of which they are capable, it is very

desirable that the museum force should be increased. I have already adverted to the labor necessarily expended during the past year in merely unpacking and arranging the collections of new matter received. While the old specimens need a certain amount of care, new ones are being constantly added. I would, therefore, recommend that Mr. Girard be regularly employed by the Institution, at such salary as you may think suitable; and one other person in addition, to attend to the purely mechanical work required in the way of unpacking, washing bottles, tying on labels, cleaning specimens, &c. Such service as this could be obtained for about twenty-five dollars per month; and the help of both persons would be also available in other departments where it is imperatively required. This is especially the case in respect to the publications, exchanges, and transportation, where, as in the museum operations, I have no regular assistance whatever.

ALPHABETICAL LIST OF DONORS TO THE MUSEUM OF THE SMITHSONIAN INSTITUTION.

Academy of Natural Sciences.—Skins of North American birds.

Prof. C. B. Adams.—Shells, &c., from Bermuda and St. Thomas.

Prof. L. Agassiz.—*Etheostoma* from Alabama and Missouri.

Capt. Atwood.—Fishes, crustacea, and radiata, from Provincetown, Mass.

Prof. A. D. Bache.—Surterbrand from Iceland.

Prof. S. F. Baird.—Twelve kegs, &c., of fishes, from Wisconsin, Michigan, Ohio, New York, and Canada.

Dr. J. B. Barratt.—Reptiles and fishes from South Carolina.

Dr. J. M. Bigelow.—Seeds from Texas and New Mexico.

Capt. Daniel Boden.—Specimens of lake trout and perch from Otsego lake, New York.

J. S. Bowman.—Reptiles and fishes from the vicinity of Fort Kearney.

Major J. H. Carleton, U. S. A.—Specimen of *theliphonus* from Santa Fé.

Charles Cavileer.—Mammals, &c., from Minnesota.

Robert Clarke.—Skulls of mammals and reptiles, in alcohol, from Essex county, N. J.

Prof. George H. Cook.—Living specimens of *Emys muhlenbergii* from New York.

Dr. G. E. Cooper, U. S. A.—Skulls of Comanche and Lipan Indians.

Dr. J. G. Cooper.—Reptiles from California; skin of *Gymnotus electricus.*

Lt. D. N. Couch, U. S. A.—Very extensive collections of the vertebrata, with numerous insects and specimens of antiquities from northern Mexico.

G. S. Cutting.—*Storeria dekayii* and *Chlorosoma vernalis*, from Middleboro', Mass.

Mrs. M. E. Daniel.—Reptiles from Anderson, S. C.

E. A. Dayton.—Skulls of beaver and fishes, (*Mustela canadensis;*) reptiles and fishes from the St. Lawrence river.

G. W. Dean.—Reptiles from Galveston, Texas.

Delaware County Institute, Pa.—Keg of fishes and reptiles; three hundred and eleven species of plants from Delaware county, Pa.

J. M. Dodge.—Stalactites from the cave of Adelsburg, Austria.

Rev. D. W. Eakins—Limestone slab, with sculpture of human feet, from Verdigris river, Creek Nation.

Dr. George Engelmann.—Reptiles and fishes from St. Louis.

Samuel A. Eveleth.—*Gordius* taken from a cricket.

Jas. Fairie.—Shells of *Chelonura temminckii* from Louisiana; Indian implements, reptiles, &c.

Capt. D. Farragut, U. S. N.—Fishes from Chesapeake bay.

Dr. E. Foreman.—*Unio hopetonensis* from Atlamaha river.

Rev. Charles Fox.—Living specimens of *Eutœnia;* fishes, reptiles, and mammals, from Michigan.

Dr. Julius Froebel.—Fossils from New Mexico.

Dr. Wolcott Gibbs.—Musk deer of Java, in the flesh.

B. R. Gifford.—Clays and concretions from Gay Head Bluffs, Martha's Vineyard.

Major Hagner, U. S. A.—*Siredon lichenoides* from Fort Defiance, Navajo country.

C. F. Hammond.—Phosphate of lime from Crown Point, N. Y.

Dr. J. F. Hammond.—Skin of *Crotalus adamanteus*, with fishes and reptiles, in alcohol, from Pensacola.

Dr. W. Hammond.—Skeletons and skulls from Fort Kearney.

Dr. J. F. Head.—Reptiles, fishes, and skulls of vertebrata, from Fort Ripley.

Dr. A. L. Hermann.—Skins of fifty species of birds from California.

Dr. P. R. Hoy.—Fishes, reptiles, birds, and mammals, from Wisconsin.

Dr. R. W. Jeffrey.—Fishes and reptiles from Pensacola.

S. K. Jennings, jr.—Shed skin of *Masticophis flavigularis*, Texas.

Robert W. Kennicott.—Fishes and reptiles from Cook county, Illinois.

J. A. Lapham.—Shells from Wisconsin.

Leo Lesquercaux.—Reptiles and fishes from Ohio.

Rev. Charles Mann.—Salamanders from Gloucester, Virginia.

Dr. Morrow.—Gold ore from Dorn's mine, Abbeville, South Carolina.

Richard Nettle.—Fishes from the lower St. Lawrence.

Dr. E. C. Pendleton.—Minerals and shells from Georgia.

H. W. Ravenel.—Specimens of Carolina fungi.

W. H. Ravenel.—*Sceloporus undulatus*, South Carolina.

Major Wm. Rich.—Reptiles, fishes, &c., from the city of Mexico.

J. H. Richard.—Fishes from Pennsylvania.

E. S. Robinson.—Skin of *Crotalus adamanteus.*

Mr. Sabine.—Reptiles from California; skin of *Gymnotus electricus.*

S. N. Sanford.—*Gordius* taken from the body of a cricket.

Sir Robert Schomburgk.—Tertiary shells and ancient pottery from St. Domingo.

J. D. Sergeant.—Reptiles from Rock Island, Illinois.

Major E. S. Sibley, U. S. A.—Reptiles and insects from Fort Union, New Mexico.

Capt. Shiras, U. S. A.—Specimen of *mygale*, Texas.

Dr. B. F. Shumard.—Specimens of *amblyopsis*, *astacus*, and insects and reptiles, from the Mammoth Cave, Kentucky, and vicinity; fishes from Louisville, Kentucky; reptiles from Mississippi.

Dr. G. C. Shumard.—Reptiles and fishes from the Arkansas river.

Geo. Smith.—Living specimens of *Emys muhlenbergii*, from Delaware county, Pennsylvania.

Commodore Joseph Smith.—Specimens of woods used in ship-building; illustrations of growth and ravages of *teredo*. Prepared by Mr. Jarvis, inspector of Portsmouth yard.

J. M. Stanly.—Dress and war-club of Blackfoot chief.

Judge Augustus Steele.—Fishes, crustacea, and shells, from Atseena, Florida.

Schach Steenberg.—Skins and skeletons of mammals, fish, and invertebrates, in alcohol; Greenland.

Wm. Stimpson.—Miscellaneous invertebrata from New England.

Capt. S. Van Vliet, U. S. A.—Skeleton of peccary; skins of birds; alcoholic specimens of reptiles, fishes, and crustacea, from the lower Rio Grande.

Col. B. L. C. Wailes.—Living tortoises, fossils, fishes, and reptiles, in alcohol, &c., from Mississippi.

Rev. Dr. Wheeler.—Lignite from Brandon, Vermont; *Osceola elapsoidea* from Florida.

Prof. Alexander Winchell.—Fossils, plants, reptiles, birds, &c., from Eutaw, Alabama; plants, fossils, and fishes, from Selma, Alabama.

Dr. S. Wylie Crawford, U. S. A.—Skin of *Cyrtonyx massena* from Texas.

List of meteorological observers reporting to the Smithsonian Institution at the beginning of 1854, *compiled by Lorin Blodget.*

State.	Name.	Residence.
Nova Scotia	Henry Poole	Albion Mines, Pictou.
Canada	Dr. Charles Smallwood	St. Martin's, near Montreal.
Maine	Rev. Samuel H. Merrill	Oldtown, Penobscot county.
	J. D. Parker	Steuben, Washington county.
	James G. Garland	Biddeford, York county.
	John J. Bell	Carmel, Penobscot county.
	Samuel A. Eveleth	Windham, Cumberland county.
	Joshua Bartlett	South Thomaston, Lincoln county.
	George W. Burrows	Fryeburg, Oxford county.
	William D. Dana	Perry, Washington county.
New Hampshire	George B. Sawyer	Salmon Falls, Stafford county.
	Robert C. Mack	Londonderry, Rockingham county
	Dr. William Prescott	Concord, Merrimack county.
	Hon. S. N. Bell	Manchester, Hillsborough county.
	Rev. L. W. Leonard	Exeter, Rockingham county.
	Albert A. Young, Prof. Ira Young	Hanover, Grafton county.
Vermont	John K. Colby, J. P. Fairbanks	St. Johnsbury, Caledonia county.
	Charles A. J. Marsh	Craftsbury, Orleans county.
	D. Buckland	Brandon, Rutland county.
	D. Underwood	Castleton, Rutland county.
	Prof. Zadok Thompson	Burlington, Crittenden county.
Massachusetts	William Bacon	Richmond, Berkshire county.
	Prof. E. G. Snell	Amherst, Hampshire county.
	Dr. Edward A. Smith	Worcester, Worcester county.
	Dr. H. C. Perkins	Newburyport, Essex county.
	Hon. John Brooks	Princeton, Worcester county.
	Dr. John George Metcalf	Mendon, Worcester county.
	Lucius C. Allen	Springfield, Hampden county.
	Samuel Rodman	New Bedford, Bristol county.
	Amasa Holcomb	Southwick, Hampden county.
	B. R. Gifford	Barnstable, Barnstable county.
	Henry Rice	North Attleboro', Bristol county.
	Hon. William Mitchell	Nantucket.
Rhode Island	Henry C. Sheldon	North Scituate, Providence.
	Prof. A. Caswell	Providence.
Connecticut	Rev. Tryon Edwards, D. D.	New London, New London county.
	Daniel Hunt	Pomfret, Windham county.
	James Rankin	Saybrook, Middlesex county.
	Dr. Ovid Plumb	Salisbury, Litchfield county.
New York*	Prof. Edward A. H. Allen	Troy, Rensselaer county.
	Thomas B. Arden	Beverly, Putnam county.
	Charles A. Avery	Senaca Falls, Seneca county.
	Prof. O. W. Morris	Institution for Deaf and Dumb, N. Y.
	C. Thurston Chase	Chatham, Columbia county.
	E. A. Dayton	Madrid, St. Lawrence county.
	E. W. Johnson	Canton, St. Lawrence county.
	Dr. P. O. Williams	Gouverneur, St. Lawrence county.

* New York Academy system in separate list.

LIST—Continued.

State.	Name.	Residence.
New York	J. H. Hart	Oswego, Oswego county.
	E. N. Byram	Sag Harbor, Suffolk county.
	C. S. Woodward	Beaver Brook, Sullivan county.
	Walker D. Yale	Houseville, Lewis county.
	John Bowman	Baldwinsville, Onondaga county.
	John Lefferts	Lodi, Seneca county.
	Elias O. Salisbury	Buffalo, Erie county
	Laurens A. Langdon	Falconer, Chautauque county.
	Dr. Stillman Spooner	Wampsville, Oneida county.
	L. F. Munger	Albion, Orleans county.
	John F. Jenkins	North Salem, Westchester county.
New Jersey	Robert L. Cooke	Bloomfield, Essex county.
	Prof. Adolph Frost	Burlington, Burlington county.
	W. A. Whitehead	Newark, Essex county.
Pennsylvania	Dr. A. C. Blodget	Youngsville, Warren county.
	W. O. Blodget	Sugar Grove, Warren county.
	Samuel Brown	Bedford, Bedford county.
	John Comly	Byberry, Philadelphia county.
	Joseph Edwards	Lima, Delaware county.
	Dr. R. P. Stevens	Ceres, McKean county.
	Francis Schriener	Moss Grove, Crawford county.
	W. W. Wilson	Pittsburg, Alleghany county.
	Prof. M. Jacobs	Gettysburg, Adams county.
	Fenelon Darlington	Pocopson, Chester county.
	Ebenezer Hance	Morrisville, Bucks county.
	Dr. J. Heisely	Harrisburg, Dauphin county.
	Rev. D. J. Eyler	Waynesboro', Franklin county.
	J. R. Lowrie	Hollidaysburg, Blair county.
	Rev. J. Grier Ralston	Norristown, Montgomery county.
	Prof. J. A. Kirkpatrick	Philadelphia, Philadelphia county.
	Dr. Paul Swift	Haverford, Philadelphia county.
Maryland	Prof. William Barr Miss H. M. Barr	Sykesville, Carroll county.
	Prof. L. H. Steiner	Baltimore, Baltimore county.
	Henry E. Hanshaw	Frederick, Frederick county.
Virginia	John W. Marvin	Winchester, Frederick county.
	Prof. George R. Rosseter	Buffalo, Putnam county.
	Dr. Thomas Patton	Lewisburg, Greenbrier county.
	Benjamin Hallowell	Alexandria, Alexandria county.
	Prof. N. B. Webster	Portsmouth, Norfolk county.
	David Turner	Richmond, Henrico county.
	Lieut. R. F. Astrop	Crichton's store, Brunswick county.
	William S. Kern	Huntersville, Pocahontas county.
North Carolina	Rev. Frederick Fitzgerald	Jackson, Northampton county.
	Prof James Phillips	Chapel Hill, Orange county.
South Carolina	Thornton Carpenter	Camden, Kershaw county.
Georgia	Dr. John F. Posey	Savannah, Chatham county.
	R. P. Gibson	Whitmarsh Island, Chatham co.
	Prof. John Darby	Culloden, Monroe county.
	Dr. E. M. Pendleton	Sparta, Hancock county.
Florida	Dr. A. S. Baldwin	Jacksonville, Duval county.
	Judge Aug. Steele	Cedar Keys, Levy county.

LIST—Continued

State.	Name.	Residence.
Florida	John Newton	Knox Hill, Walton county.
	John Pearson, master navy-yard	Pensacola, Escambia county.
Alabama	S. J. Cumming	Monroeville, Monroe county.
	Prof. H. Tutwiler	Havana, Greene county.
	Prof. M. Tuomey	Tuscaloosa, Tuscaloosa county.
	Benjamin F. Holley	Wetokaville, Talladega county.
Mississippi	Rev. E. Robinson	Garlandsville, Jasper county.
Louisiana	Dr. E. H. Barton	New Orleans, Orleans county.
Texas	Dr. S. K. Jennings	Austin, Travis county.
	Prof. J. C. Ervendberg	New Weld, Comal county.
Tennessee	Commandant navy-yard	Memphis, Shelby county.
	Prof. A. P. Stewart	Lebanon, Wilson county.
	W. M. Stewart	Glenwood, near Clarksville, Montgomery county.
	Prof. George Cooke	Knoxville, Knox county.
Kentucky	Dr. John Swain	Ballardsville, Oldham county.
	Rev. J. Miller	Millersburg, Bourbon county.
	O. Beatty	Danville, Boyle county.
	Lawrence Young	Springville, near Louisville, Jefferson county.
	A. H. Bixby	Pleasant Valley, Nicholas county.
	E. L. Bethune	Maysville, Mason county.
Ohio	Prof. R. S. Bosworth	College Hill, Hamilton county.
	L. Gronewez	Germantown, Montgomery county.
	Rev. J. McD. Matthews	Hillsborough, Highland county.
	George L. Crookham	Jackson C. H., Jackson county.
	J. G. F. Holston	Zanesville, Muskingum county.
	Prof. S. N. Sanford	Granville, Licking county.
	Prof. J. W. Andrews	Marietta, Washington county.
	F. A. Benton	Mt. Vernon, Knox county.
	E. Spooner	Keen, Coshocton county.
	Prof. J. H. Fairchild	Oberlin, Loraine county.
Michigan	Dr. Thomas Whelpy	Brest, Monroe county.
	L. Woodruff	Ann Arbor, Washtenaw county.
	Dr. M. K. Taylor	Brooklyn, Jackson county.
	Dr. W. M. Campbell	Battle Creek, Calhoun county.
	James J. Strong	St. James, Beaver Island.
	Rev. George Duffield, D. D.	Detroit, Wayne county.
Indiana	Prof. Joseph Tingley	Greencastle, Putnam county.
	W. W. Austin	Richmond, Wayne county.
	Dr. V. Kersey	Milton, Wayne county.
	John Chappellsmith	New Harmony, Posey county.
Illinois	Dr. L. B. Mead	Augusta, Hancock county.
	Joel Hall	Athens, Menard county.
	Dr. John James	Upper Alton, Madison county.
	Dr. J. O. Harris	Ottawa, La Salle county.
	Prof. William Coffin	Batavia, Kane county.
Missouri	Dr. George Engelmann	St. Louis, St. Louis county.

LIST—Continued.

State.	Name.	Residence.
Missouri	O. H. P. Lear	Hannibal, Marion county.
Iowa	Dr. J. E. Ball	Keokuk, Lee county.
	Dr. Benjamin F. Odell	Poulteney, Delaware county.
	Dr. E. C. Bidwell	Quasqueton, Buchanan county.
	D. E. Read	St. Mary's, Mills county.
	P. G. Parvin	Muscatine, Muscatine county.
	Dr. Asa Horr	Dubuque, Dubuque county.
Wisconsin	Dr. J. L. Pickard	Plattsville, Grant county.
	Prof. S. P. Lathrop	Beloit, Rock county.
	J. F. Willard	Janesville, Rock county.
	Thomas Gay, esq	Bellefontaine, Marquette county.
	Prof. S. H. Carpenter	Madison, Dane county.
	Edward S. Spencer	Summitt, Waukesha county.
Minnesota	Rev. Elisha W. Carver	Red Lake, Pembina county.
	Rev. S. R. Riggs	Lac qui Parle, Dahkota county.
	Rev. D. B. Spencer	St. Joseph's, Pembina county.

New York University system.

Name.	Station.
Prof. C. Dewey, D. D	Rochester, Monroe county.
Charles A. Avery	Seneca Falls, Seneca county.
Dr. M. M. Bagg	Utica, Oneida county.
E. A. Dickinson	Jamestown, Chautauque county.
W. H. Gillespie	Mexico, Oswego county.
Charles J. Hazeltine	Cherry Valley, Otsego county.
Ira F. Hart	Elmira, Chemung county.
T. H. Bates	Booneville, Oneida county.
Prof. O. Root	Hamilton College, Oneida county.
W. E. Guest	Ogdensburg, St. Lawrence county.
John F. Jenkins	North Salem, Westchester county.
John Kruger	Do do do.
Prof. O. W. Morris	Institution for Deaf and Dumb, N. York city.
E. W. Johnson	Canton, St. Lawrence county.
W. C. Kenyon	Alfred, Alleghany county.
D. T. Mayhew	Lowville, Lewis county.
W. Root Adams	Do do do.
W. McLaren	Glen's Falls, Warren county.
Warren P. Adams	Do do do.
Samuel A. Law	Meredith, Delaware county.
Rev. W. D. Wilson	Geneva, Ontario county.
H. H. Poucher	Hudson, Columbia county.
Judge E. C. Reed	Homer, Cortland county.
John S. D. Taylor	Plattsburg, Clinton county.
John D. Watkins	Liberty, Sullivan county.
Frederick L. Hanford	Do do do.
J. H. Wines	East Hampton, Suffolk county.
Rev. Thomas M. Strong, D. D	Flatbush, Kings county.
J. O. Stratton	Oxford, Chenango county.
Charles H. Payson	Pompey, Onondaga county.
A. Porteus	Adirondack, Essex county.
F B. Downes	Ithaca, Tompkins county.

LIST—Continued.

Name.	Station.
H. H. Hall	Newburgh, Orange county.
C. W. Heywood	Rochester, Monroe county.
Lyman W. Conkey	Syracuse, Onondaga county.
D. H. Cochran	Fredonia, Chautauque county.
Prof. George H. Cook	Albany, Albany county.
John N. Brinkerhoff	Union Hall, Jamaica, Queen's county.

Observations transmitted in series or summaries.

State.	Name.	Residence.
Canada	Magnetic and meteorological observatory	Toronto, Canada.
Indiana	Dr. Thomas Edmondson	Baltimore.
South Carolina	Rev. A. Glennie	Waccaman.
Florida	William C. Dennis	Key West.
Missouri	Dr. George Engelmann	St. Louis.
Iowa	E. H. A. Scheeper	Pella, Marion county.
California	Dr. J. H. Gibbons	San Francisco.
Bermuda	Surgeon Wellis	Centre Signal Station, Inland Island.
Montreal	J. H. Huguet Latour	
	Dr. Archibald Hall	
Central America	M. B. Halsted	Panama.
South America	Edward A. Hopkins	Ascension, Paraguay.

Observers commencing since January, 1854, *up to June* 1, 1854.

State.	Name.	Residence.
Massachusetts	Dr. James W. Robbins	Uxbridge, Worcester county.
	B. R. Gifford	Wood's Hole, Barnstable county.
	Albert Schlegel	Taunton, Bristol county.
	Prof. P. A. Chadbourne	William's College, Williamstown.
Rhode Island	Samuel Powel	Newport, Newport county.
	George Manchester	Portsmouth, Newport county.
Connecticut	T. S. Gold	West Cornwall, Litchfield county.
	Prof. John Johnston	Middletown, Middlesex county.
New York	Dr. E. M. Alba	Angelica, Alleghany county.
	John F. Jenkins	White Plains, Westchester.
	Warren P. Adams	Glen's Falls, Warren.
	Rev. W. D. Wilson	Geneva, Ontario county.
	Dr. Sandford B. Hunt	Buffalo, Erie county.
New Jersey	Prof. George H. Cook	New Brunswick, Middlesex county.
Pennsylvania	J. R. Lowrie	Warrior's Mark, Huntingdon co.
	R. Weiser	Andersville, Perry county.
	Prof. Thickstun	Meadville, Crawford county.

LIST—Continued.

State.	Name.	Residence.
Maryland	Rev. John P. Carter	Hagerstown, Washington county.
Virginia	Jed. Hotchiss	Bridgewater, Rockingham county.
	A. Nettleton	Lynchburg, Campbell county.
North Carolina	J. Bryant Smith, M. D.	Lincolnton, Lincoln county.
South Carolina	Thornton Carpenter	Charleston, Charleston county.
	H. W. Ravenel	Aiken, Barnwell county.
Georgia	William Schley	Augusta, Richmond county.
	Prof. Wm. D. Williams	Madison, Morgan county.
Mississippi	Rev. J. Avery Shepherd	Lake Washington, Washington co.
	Wm. Henry Waddell	Grenada, Yalabusha county.
	Prof. L. Harper	Oxford, La Fayette county.
	A. R. Green	Jackson, Jackson county.
Louisiana	Prof. W. P. Riddell	New Orleans, Orleans county.
Kentucky	A. H. Bixby	Lafayette, Christian county.
	J. D. Shane	Lexington, Fayette county.
Ohio	John Ingram	Savannah, Ashland county.
	D. G. W. Livesay	Gallipolis, Gallia county.
	Dr. J. P. Kirtland	East Rockport, Cuyahoga county.
	Edmund W. West	Huron, Erie county.
Michigan	Dr. S. F. Mitchell	East Saginaw, Saginaw county.
	Alfred E. Carrier	Grand Rapids, Kent county.
	Prof. Alexander Winchell	Ann Arbor, Washtenaw county.
Indiana	J. Knauer	Kendallville, Noble county.
	W. B. Coventing	Do do do.
	Daniel H. Roberts	New Garden, Wayne county.
Iowa	E. H. A. Scheeper	Pella, Marion county.
Wisconsin	G. Z. Livingston	Hudson, St. Croix county.
	J. A. Lapham	Milwaukie, Milwaukie county.
	Prof. William Porter	Beloit, Rock county.
Minnesota	Rev. Solon W. Mauncey	Fort Ripley.
	Dr. C. L. Anderson	St. Anthony's Falls, Ramsey county.
Oregon	John D. Post	Oregon City.
California	Dr. J. H. Gibbons	San Francisco.

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee submit to the Board of Regents the following report, relative to the present state of the finances, and the expenditures during the year 1853.

They are happy to inform the board that, after a strict examination of the accounts, they are enabled to present a very satisfactory statement of the present condition of the finances, and the result of the investigations as to the expenditures during the year.

The whole amount of the Smithsonian bequest, deposited in the treasury of the United States, (from which an annual income, at 6 per cent., is derived of 30,910 14,) is..... $515,169 00

Amount of unexpended interest, reported last year as in charge of Messrs. Corcoran & Riggs.....	$208,800 00	
From which deduct amount expended on the building during the past year.....	29,391 98	
	179,408 02	
Of this it is proposed to expend the further sum of.....	29,408 02	
Which will leave to be added to the principal, according to the original proposition of Professor Bache.....		150,000 00
The whole fund will then be.....		665,169 00

REPORT OF THE SECRETARY.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: It again becomes my duty to present to your honorable Board the Annual Report of the present condition of the Smithsonian Institution, and of its operations during the year 1854.

In this report I shall follow the course adopted in the previous ones, namely, to state such facts as may appear to be necessary to a connected history of the Institution, and to offer such suggestions as may seem important in reference to its future management.

At no period since the commencement of the Institution has it attracted more attention, or given rise to more discussion, than during the past year; but, thanks to the liberality of Congress, who ordered the printing of twenty thousand extra copies of the last report, to which were appended all the preceding reports of the secretary, together with sundry other documents, ample means have been afforded the reading public to become acquainted with the will of Smithson, his pursuits in life, with the law of Congress establishing the Institution, and with all the acts of the Regents in the discharge of their duty.

That the disposition of a bequest of so novel a character, the intention of which was so briefly though comprehensively expressed, should give rise to a diversity of opinion, or that the act of Congress in reference to it, which received repeated amendments, and was passed, after a discussion of several years, by a small majority, should be differently construed, is not surprising.

In the language of Mr. Adams: "A British subject, of noble birth and ample fortune, desiring to bequeath his estate to the purpose of increasing and diffusing knowledge throughout the whole community of civilized man, selected for the repository of his trust, with confidence unqualified, the United States of America. In the commission of every trust there is an implied tribute to the integrity and intelligence of the trustee; there is, also, an implied call for the faithful exercise of those properties to the fulfilment of the purposes of the trust. The tribute and the call acquire additional force and energy when the trust is committed for performance after the decease of him by whom it is confided, and when he no longer exists to witness or constrain the effective fulfilment of his design. The magnitude of the trust, and the extent of confidence bestowed in the committal of it, do but enlarge and aggravate the obligation which it carries with it. The weight of duty imposed is in proportion to the honor conferred by confidence without reserve."

"The principal purpose of Mr. Smithson was, evidently, the discovery of new truths, the invention of new means for the enlargement of human power, and not the mere communication of knowledge already pos-

sessed. In this point of view the bequest assumes an interest of the highest order, peculiar to itself, most happily adapted to the character of our republican institutions, and destined, if administered in the spirit in which it was bestowed, to command the grateful acclamations of future ages." No restriction is made as to any kind of knowledge; but it is knowledge, the source of all human wisdom and beneficent power, which is to be increased and diffused; "knowledge, which as far transcends the postulated lever of Archemides, as the universe transcends this speck of earth upon its face; knowledge, the attribute of Omnipotence, of which man alone, in the physical and material world, is permitted to participate." Let not, then, any branch or department of human knowledge be excluded from its equitable share of this benefaction. Again, no nation, community, or class of men, is designated as the special recipient of this bounty; and it would be inconsistent with the self-respect of a great confederated nation to receive, from the hands of a foreigner, a liberal fund for the increase and diffusion of knowledge throughout the world of man, and to apply it exclusively to its own purposes.

The Regents, at their first session, conscious of the importance and magnitude of the trust confided to them, and of the responsibilities which devolved upon them, gave to the whole subject attentive and laborious consideration. They were impressed with the fact that the object of the law was to carry out the will of Smithson, and if there were any doubtful points, it was their duty to construe them with a view to this object. In conformity with this a plan was adopted, which, while it fulfilled all the requirements of the law, was in strict accordance with a logical interpretation of the will of the donor. This plan, after seven years' experience, has been found to realize all the hopes and anticipations which were entertained in regard to it by its most sanguine advocates; and, though it was adopted provisionally, to be changed or modified as circumstances might indicate, yet no essential alteration has been considered necessary by those best acquainted with its operations. It is true that it is not, perhaps, in all respects, the simplest plan which could have been designed for carrying out the will of the testator; and had the Regents been entirely unrestricted, they would probably have devoted a less portion of the income to local objects; but, under all the conditions of the problem, it is believed that it was the best which could have been adopted to produce the desired result. And it may not be too much to say, that the present condition of the Institution, as to general reputation and financial prosperity, is much more favorable than experience in the management of public trusts would reasonably have led us to anticipate.

All the requirements of the act of Congress, in the opinion of the Regents, have been faithfully and fully observed. Liberal provision has been made for the accommodation of a library, a museum, and a gallery of art, with lecture rooms and a laboratory, in the construction of a building which has cost $300,000. A *library* has been commenced and means devised for its continual extension, which will soon form the best special collection of valuable works pertaining to all branches of positive knowledge to be found in this country. The books which it now contains, if estimated by the prices paid for those which have

been purchased, may be valued at not less than $40,000. A *museum*, the most complete of any in existence in several branches of the natural history of the North American continent, has been collected, which has been valued at $30,000. A valuable and extensive cabinet of *apparatus*, consisting of instruments of illustration and research, has been formed. A beginning has also been made of a *gallery of art*, consisting of a choice collection of specimens of engravings by the old masters.

Not only have the objects specified by Congress received due attention, but also by a series of *active operations* the influence of the Institution has been extended to almost every part of our own and foreign countries. The publications, the exchanges, and the researches which have been instituted and prosecuted by the Institution, have indissolubly connected the name of SMITHSON with the progress of knowledge in our day.

In accomplishing these objects the funds have not been exhausted, nor have debts been incurred. On the contrary, by strict adherence to a well devised system of finance, not only does the fund originally bequeathed by SMITHSON remain undiminished in the Treasury of the United States, but there is now on hand nearly $140,000 of unexpended income to be added to the principal.

In other words, the funds and property are now estimated at double the amount of the original bequest.

The plan of increasing and diffusing knowledge by means of researches and publications is in strict accordance with the will of Smithson. It embraces as a leading feature the design of interesting the greatest number of individuals in the operations of the Institution, and of extending its influence as widely as possible. It supplies a want which has long been felt in this country, and offers a greater inducement to profound study by rendering the products of original research more available than any other plan heretofore proposed. Every one who makes a discovery in any department of knowledge must of necessity be somewhat in advance of the reading public, at least in the special branch to which his discovery pertains; and therefore the number of readers, and consequently of purchasers of a work giving an account of these discoveries will be comparatively small. "I have frequently congratulated myself," says one of our collaborators, "upon living at a time when an Institution exists in our country which would publish discoveries and original investigations or positive additions to knowledge, without expense to the author. What would not poor Morton have done had he been able in this way to publish his researches, whereas his single work on *Crania Americana* was given to the world at the loss of several thousand dollars."

The Institution does much more than ordinary societies in the way of stimulating research. It not only gives to the world with the stamp of its approval the various papers which constitute its contributions to knowledge, but in a large number of cases it furnishes materials and pecuniary means for carrying on the investigations. The aid which it affords in this way, though small in amount, is sufficient to determine whether an investigation shall be prosecuted to a successful termination or abandoned almost at its very commencement.

It was at first proposed to offer premiums for original memoirs on

different branches of knowledge; but it has been found by experience that the inducements held out by the offer of publication free of expense under the sanction of the Institution, and the assistance which is occasionally afforded, will produce more material of the first quality than will exhaust the small portion of the income which can be devoted to researches and publication.

In first proposing the system of literary exchanges which is now extended over every part of the civilized world, a promise was made to all the foreign societies which should send their transactions to the Smithsonian library that, on the part of the Institution, at least one quarto volume of original contributions to knowledge would annually be given in return. The experience of seven years has rendered it evident that this promise can be fully redeemed. Indeed, were the funds sufficient, two large volumes might be published in the same time.

The seventh volume is nearly completed, and will be ready for distribution in the course of a few weeks. It will contain a number of memoirs, the largest of which are on the subject of American antiquities. An account of one of these, viz., that on the *Effigy Mounds* of Wisconsin, was given in the last report.

A number of memoirs have been examined and accepted for publication since the date of the last report.

1. A paper has been prepared at the special request of the Institution, by S. F. Haven, esq., librarian of the American Antiquarian Society, Worcester, Massachusetts, which will form a part of the seventh volume.

Its intention is to give a retrospective view of the progress of knowledge and opinions relative to the whole subject of American antiquities. For this purpose the author has, in the first place, presented a summary of the opinions of early writers upon the question of the origin and sources of the native population of this country, and in this connexion has noticed some of the more prominent writers of later date who have sustained one or other of the ancient hypotheses.

In the second place he has considered the accounts of the early Spanish and French adventurers, and the reports of the Jesuit missionaries, who first became acquainted with the inhabitants in their native condition, so far as those accounts have a bearing on the origin and uses of the earth-works of this country.

In the third place he has sought to ascertain the names of the early explorers who examined and described any of these ancient remains, and to give the extent of their investigations.

He has next followed the succession of observations and speculations of different periods down to the present time; and, lastly, he has given a concise *resumé* of the facts which have thus far been established.

These are, 1st. The nature and extent of the aboriginal monuments in the United States east of the Rocky mountains;

2d. Their location relatively to one another and to different portions of the country;

3d. Their affinities to the works of existing or recently extinct tribes.

The memoir is intended to have a bibliographical character, so far as this could be effected without interrupting the continuity of the narrative. It will be found important, not only in pointing out what has

been done and thought on this interesting subject, but also in indicating definite points of further research.

The preparation of this article has cost the author no small amount of labor. The information was principally to be found in publications which, in their day, had but a limited circulation; and now, even, when known to exist, are not easily found. It may be interesting to mention that there have been several periods during which attention has been particularly directed to the aboriginal remains of this country, and between them intervals of time in which they excited comparatively no interest. Before the war of the revolution, investigations had been commenced, which were of course suspended or terminated by that event. After peace was restored and military stations were established in the interior, and settlements began to be extended beyond the Ohio, accounts of remarkable works were published in the miscellaneous periodicals of the day. The officers of the army were the principal explorers; but two of the most active of these, General Parson and General Heart, were removed by death; and as the mounds became more familiar to the settlers, the interest in them comparatively declined. After the war of 1812, they again became the object of inquiry, which resulted in the publication of Mr. Atwater's researches under the auspices of the American Antiquarian Society. Since then, though occasional articles appeared, no important additions were made to our knowledge in regard to them until the publication of the first volume of the Smithsonian Contributions. The reputation acquired by this work has induced a number of other laborers to enter the field, which, we trust, will soon be fully explored. Indeed, it is believed that samples of nearly every variety of earth-work to be found within the limits of the territory of the United States, east of the Rocky mountains, have been figured in the publications of the Institution. It is intended, however, to continue to collect all the information which may be obtained, and in due time to publish a map of the relative position of all the works which are found to exist, at least within the limits of the United States.

The Institution from the first has given particular attention to antiquities, philology, and other branches of the new and interesting department of knowledge called ethnology, which relates to the natural history of man in his physical, moral, intellectual, and æsthetical characteristics. It is a common ground, in the cultivation of which lovers of literature and science are equally interested. The works we have thus far published on these subjects have elicited the highest commendations, and the Smithsonian Contributions are now generally referred to as containing important materials for their elucidation.

2. Some years ago an artist of considerable merit and great accuracy, Mr. Sawkins, visited the celebrated remains of ancient architecture at Mitla, in the State of Oajaca, Mexico. Mr. Sawkins made careful drawings of the ruins by means of a *camera lucida*, and recorded his observations upon the spot. Within a few months these drawings and memoranda have come into the possession of Mr. Brantz Mayer, of Baltimore, whose writings upon Mexico and its antiquities have been very largely circulated in this country during the last six or seven years. Mr. Mayer considered Mr. Sawkins's sketches and observations

as of so much value to the aboriginal history of our continent, and especially in completing the links of civilization between North and South America, that he prepared a brief memoir upon Zapotec remains, which the Institution has considered it advisable to publish with the drawings. We are happy to believe that this contribution will in some degree supply a deficiency which has been often acknowledged in regard to remains on the western slopes of the Mexican Cordillera.

3. Another memoir presented to the Institution is on the *Recent secular visitation of the Aurora Borealis*, by Professor Denison Olmsted, of Yale College. This paper partakes more largely of a hypothetical character than most of those which have been accepted for publication. The facts, however, which it contains are considered so important and so well deserving of permanent record, that they outweigh this objection.

On the evening of the 27th of August, 1828, after a long absence of any striking appearances of the aurora borealis, there commenced a series of exhibitions which increased in frequency and magnificence for the six following years, arrived at a maximum during the years 1835,–'6,–'7, and after that period regularly declined in number and intensity until November, 1848, when, according to the author, the series appeared to come to a close. The occurrence, however, of three remarkable exhibitions of the aurora during September, 1851, and of another of the first class as late as February, 1852, indicate that the close was not as abrupt as was at first supposed, but still there was a diminution in the number of brilliant exhibitions after 1848. Professor Olmsted, in this memoir, gives the history of the foregoing series of auroras, which, in his opinion, are the most remarkable which have ever occurred since the first recorded observations. The author first refers the several varieties of the aurora to six different forms, viz: 1. Auroral light; 2. Arches; 3. Streamers; 4. Coronas; 5. Waves; 6. Auroral clouds; and afterwards distributes these different forms into four distinct classes. The first is characterized by the presence of three out of four of the most prominent varieties, viz: arches, streamers, coronas, and waves.

The second class is formed of a combination of two or more of the leading characteristics of the first class.

The third class consists of the presence of only one of the rarer characteristics, either streamers or an arch, or irregular coruscations.

Class fourth consists of the most ordinary form of the aurora, as mere northern twilight or a few streamers.

From the year 1780 to 1827 striking exhibitions of the aurora were seldom observed, although, probably, a greater or less number of the inferior descriptions of those of the third and fourth classes occurred every year in our own latitude, and a still greater number in the regions nearer the poles. But aged persons who witnessed the displays of 1827, 1835, 1836, and 1837, testify that they were similar to such as occurred in their youth from 1760 to 1781. Strange sights were described as having been seen in the air during the old French war, which closed in 1763. From 1781 none of equal intensity had occurred for nearly half a century; the splendid arch, therefore, and other striking accompaniments of the aurora of 1827 took us by surprise, and

were viewed with wonder by nearly all the existing generation. Immediately after this great aurora, exhibitions of the phenomenon became more frequent. From 1827 to 1848, 885 appearances of the aurora are given in the records referred to by the author. Of these, 12 were of the first class, 45 of the second, 161 of the third, and 667 of the fourth.

The author places the middle of the period about 1837; and by subtracting from this 65 years, he arrives at the middle of another visitation. The duration of the period he considers to be a little more than 20 years. The middle of the next period of brilliancy, if this assumption be correct, will be about the beginning of the next century. Whatever may be the truth of this conclusion, the description of a large number of auroras which he has collected, given either from the records of others or from his own observations, renders his communication valuable. He does not adopt the hypothesis of the electrical origin of this meteor, but considers it connected with the phenomena of the zodiacal light. The most conclusive proof, however, of the truth of the former hypothesis is found in the fact of the disturbance of the magnetic needle, when delicately suspended, during the appearance of the aurora, and the actual transmission of currents of electricity along the lines of telegraphs which extend in a north and south direction. The last fact has been reported separately to us by different individuals belonging to the Smithsonian corps of observers.

Though no complete explanation has been given of all the facts of the aurora, yet the most plausible hypothesis is that which attributes the phenomena to electricity generated principally in the torrid zone by evaporation. By this process the earth is rendered negative, and the vapor which ascends into the upper atmosphere highly positive. It is thence transferred towards the poles by the return trade winds, and descends to the earth to restore the equilibrium. A current of electricity is thus constantly passing from the poles to the equator during the appearance of the aurora; and hence, according to this view, the disturbance of the needle.

As an appendix to this paper, Peter Force, esq., of this city, has presented to the Institution an extended series of notices of the aurora collected from all the publications in which they occur, from about 1827 to the present year, arranged in order of time and of latitude. This will be a valuable contribution of facts towards a definite determination of the law and physical cause of these mysterious meteorological phenomena.

It would scarcely be complimentary to the general intelligence of the public of the United States, if I were again to attempt to vindicate the importance of investigations like that of the aurora; and it may be a sufficient answer to those who would question it, to say that they are such as particularly occupied the attention of Smithson himself, and that they must, consequently, be included as a part of that knowledge which it was the intention of his bequest to increase and diffuse among men.

4. The next paper is on the Tangencies of circles and spheres, by Major B. Alvord, of the United States army. It consists in the solution of a series of problems which have at different times exercised the ingenuity and skill of the geometer. It was referred separately for examination to Professor Lewis R. Gibbes, of Charleston, South

Carolina, and Professor A. E. Church, of West Point. In the language of one of the examiners: "The solutions of the problems relating to the circles, though not entirely original, are yet brought more directly to depend upon the fundamental principle of tangency as enunciated by the author, and are more elegant, than those given in any works with which I am acquainted. The paper also presents the only clear and complete explanation of the number of solutions and of the various positions of the tangent circles (and spheres) in each case that I have seen. I have not been able to find heretofore any complete solutions of all the problems relating to the sphere. Those of the author of the memoir are accurate, and easy to be understood by any person familiar with the elements of solid and descriptive geometry, and I think their publication will furnish a valuable addition to geometrical knowledge.'

It is a fact not without interest, that an officer of the army is enabled, while discharging his duty at a distant post of the frontier of our country, to concentrate his thoughts, and exercise his talents, on so abstruse a part of pure mathematics. The paper will be illustrated by three engraved plates in quarto.

5. A dictionary of the Chippewa language has been offered to the Smithsonian Institution for publication by the Rev. S. A. Belcourt, a missionary among the Indians of British America. He has devoted 23 years to the study of this language. He urges its adoption by the Institution on the ground that in all probability this work, which, to use his own language, "has cost me so many years of labor and nights of thought, and which, in my humble opinion, will be valuable to science and philanthropy, especially to philology, will forever be lost; and who would undertake a work of such magnitude after learning the fate of this?"

The language of the Ojibewas, according to the author, is the parent of all the dialects existing from the mouth of the St. Lawrence north and following the 27th parallel to the source of the Missouri. Were the present funds of the Institution sufficient for the purpose we should not hesitate to accept this work, and we are not entirely without hope that some means may be procured independent of the Institution to defray a considerable portion of the expense of its publication.

Correspondence.—During the past year the Institution has received a large number of communications asking information on a variety of subjects, particularly in regard to the solution of scientific questions, the names and characters of objects of natural history, and the analysis of soils, minerals, and other materials which pertain to the industrial resources of the country. Answers have in all cases been given to these inquiries, either directly by the officers of the Institution, or by reports from the Smithsonian colaborers. Very frequently certificates are requested as to the value of certain minerals, with a view to bring them into market; but in these cases the inquirers are referred to certain reliable analytical chemists, who make a business of operations of this kind. The information procured and given at the expense of the Institution is such as relates to the general diffusion of knowledge, and not to that which may immediately tend to advance the pecuniary interest of individuals. Requests are often also made to have experiments instituted for testing proposed applications of science to the arts; and

provided these can be tried with the apparatus of the Institution, and the results which may flow from them are to be given to the public without the restriction of a patent, the request is granted.

EXPLORATIONS, RESEARCHES, &c.—(1.) About the beginning of the year 1853, Lieutenant D. N. Couch, U. S. A., communicated to the Smithsonian Institution a proposition to make at his own expense a scientific exploration in the States of Mexico, adjoining the lower Rio Grande. After this proposition was duly considered, and the details of the plan arranged, it was commended by me in a letter to the Secretary of War, and a request made that Lieutenant Couch might have leave of absence for the purpose of carrying out his design. The request was granted, and this young officer soon after embarked on his expedition. He was furnished with instructions and apparatus by the Institution, and his attention was especially directed to the existence in Mexico of a valuable collection of manuscripts and specimens in natural history, of which information had been communicated to us. He was requested to examine and report as to its character. He found the manuscripts to contain a large amount of historical and geographical information, chiefly pertaining to the States of the old republic which lay between the Sabine and Sierra Madre, and a series of maps and results of topographical and meteorological observations. The collections in natural history consisted of specimens in botany, zoology, mineralogy, &c.

These collections were made by Luis Berlandier, a native of Switzerland, and a member of the Academy of Geneva. He came to Mexico in 1826, for the purpose of making a scientific examination of that country. Soon after his arrival he was appointed one of the Boundary Commission organized by the then new republic, with the object of defining the boundaries, extent, resources, &c., &c., of the northern or frontier States. This position gave him unusual facilities for observation and investigation relative to the character of the country, and for making collections of its natural history. He, however, never returned to his native country, but married and settled in Mexico, and continued his researches until the period of his death in 1851. Lieutenant Couch purchased the whole collection from the widow of the deceased, and transmitted it immediately to the Institution, which bore the expense of transportation. It contains matter which would be valuable to the general government, and which it is hoped will be purchased, and a sufficient sum paid to reimburse the cost of procuring it. In the appendix will be found a catalogue of the manuscripts.

Lieutenant Couch himself collected a large number of specimens in natural history, which were presented to the Institution, and have already been examined and described. Among the specimens of mineralogy is a remarkable meteorite, weighing upwards of 250 pounds, portions of which have been analyzed by Professor J. Lawrence Smith, in our laboratory, and by Dr. Genth, in Philadelphia.

The scientific explorations in natural history, made under the auspices of the Smithsonian Institution during 1854, were those of Dr. Hoy, Mr. Barry, and Professor Baird. That of Dr. Hay was made in western Missouri and Kansas, and occupied about a month; during which he gathered together large collections of North American vertebrata,

and forwarded them to the Institution. Mr. Barry took northern Wisconsin for the field of his labors, and spent several months in traversing the State, penetrating into various regions scarcely visited before by the white man. Several lakes and streams, not on the map, were discovered, and named by him. His most important results consisted in very full series of fishes from many localities. Professor Baird spent six weeks on the coast of New Jersey, at Beesley's Point, collecting specimens, and studying the habits of the marine fishes of the neighborhood. Thence he proceeded to several places on Long Island, especially to Greenport and Riverhead; and afterwards made explorations at various points on and near the Hudson river, as far north as Sing Sing. Full series of fishes and crustacea were procured at all these places, and sent to the Smithsonian Institution.

(2.) *Terrestrial Magnetism.*—The observatory established at the joint expense of the Coast Survey and the Institution, described in the last report, for determining the changes in the different elements of the magnetic force, has not yet been fully supplied with all the necessary instruments. This has been occasioned by the illness of Mr. Brooks, of England, the inventor, who has not been able to furnish the apparatus for recording the variations in the dip and intensity. The only part of the system which has been in partial operation, is that of the variation or declination instrument; and in this, the glass cylinder which supports the sensitive paper, and which is needed to render the record more perfect, is wanting.

An attempt was made to supply this deficiency by means of a copper cylinder, coated with gold by the electrotype process. It was found, however, that the porosity of the gold allowed the acid to act upon the copper below, and thus to produce stains upon the paper. It is hoped this observatory will be fully equipped in the course of the present spring, and that a continued record will hereafter be kept up.

It was mentioned in the last report, that a set of instruments had been furnished the Grinnell expedition under command of Dr. Kane. No intelligence, however, has yet been received from this expedition; but should our most anxious hopes be realized in reference to this enterprise, we doubt not a series of results will be obtained which will well repay the cost of the instruments. If not, the Institution should receive some degree of commendation for aiding in an undertaking which reflects so much honor on the intelligence and liberality of one of our citizens, and the gallantry and enterprise of a young officer of our navy.

Four complete sets of instruments have been constructed in London for the Institution; three of these have been purchased by the general government, and have been employed in the different surveying expeditions. The fourth has been lent, in succession, to different individuals, for the purpose of accumulating magnetic observations in different parts of the United States.

A simple instrument for determining the minute changes in the direction of the magnetic needle, devised by Mr. J. E. Hilgard of the United States Coast Survey, is now in the process of construction, under the direction of this Institution, for the Academy of Natural Sciences California. The cost of this instrument is defrayed by the liberality of the President of the Academy, Dr. A. Randall.

Observations continued for a certain time at different periods along the coast of the Pacific, and compared with the photographic records obtained by the apparatus in this Institution, would afford interesting results as to the simultaneous perturbations of the magnetic force at distant places on the same continent.

Under the head of magnetism, it may be mentioned that a complete set of apparatus has been obtained from Ruhmkorff, of Paris, for exhibiting the facts of the new branch of science called dia-magnetism. A few years ago, but four metals were known to possess magnetic properties, namely, iron, nickel, cobalt, and manganese. It is now known that all bodies exhibit analogous phenomena when placed under the inductive influence of powerful magnets; but they are not all similarly affected. All bodies may, however, be divided into two classes: one in which polarity is developed at the extremities of a bar of the substance, as in the case of iron, and hence called simple magnetic bodies; and the other class, in which the polarity is transverse to the length of the bar, and the substance is hence called *dia-magnetic*. The simple repetition of these experiments in this country is of importance, and the apparatus may serve as a model for imitation to our ingenious artists.

(3.) On the 26th of last May, the central track of an annular eclipse passed over the northern part of the United States. The eclipse itself was visible over almost the entire area of the North American continent; and as no obscuration of the sun of equal magnitude would again occur in this country until 1865, it was important that all the facilities possible should be afforded for observing its different epochs and phases, as well as the concurring phenomena. For this purpose, in conjunction with the superintendent of the Nautical Almanac, a large map, exhibiting the times of beginning and ending, and the amount of obscuration and phases of the eclipse for every part of the United States, Canada, and Mexico, together with tables and explanations, were prepared and distributed to all the observers in correspondence with the Smithsonian Institution. A set of minute instructions, published under the direction of the American Association for the Advancement of Science, was also presented to the same persons. Unfortunately, the weather proved cloudy over a considerable portion of the space covered by the central part of the shadow, though a number of interesting observations were made. The expense of the map and tables were defrayed jointly by this Institution and by the appropriation for the Nautical Almanac.

The results of the observations, so far as they have been reported, have been published in the Astronomical Journal, edited by Dr. B. A. Gould, jr., Cambridge, Massachusetts. They are illustrated by photographic impressions of the sun, made under the direction of Professor Bartlett, at West Point, and also by others, made under the direction of Professor S. Alexander, of Princeton, New Jersey. The expense of these was borne by the Institution, for which full credit has been given.

I may mention in this connexion that Professor Coffin, of Lafayette College, Pennsylvania, has presented to the Smithsonian Collections an interesting map, on which are delineated the paths or central tracks of all the great solar eclipses of the nineteenth century which traverse the

United States. These are nine in number. Seven of them have passed; the first of the remaining two will occur in October, 1865, and the other in August, 1869.

There are but two journals exclusively devoted to astronomy now in existence. The first is published at the expense of the King of Denmark, and the second in Cambridge, Massachusetts, by Dr. B. A. Gould, jr. The latter is intended to give the earliest intelligence of astronomical discoveries—particularly those made in our own country. At the last meeting of the British Association, the president commended this publication, and expressed a wish that it might be continued. I regret, however, to say that though no branch of science is cultivated with more ardor and success at the present time in the United States than astronomy, yet this work, so essential to its continued progress, is very inadequately sustained. Not only the labor of conducting it has devolved upon the editor, but also a considerable portion of the expense of its publication. The Smithsonian Institution has, from the first, subscribed for a number of copies, to be distributed among its foreign correspondents, and, rather than suffer so meritorious a work, which does so much service to the cause of science and credit to our country, to be discontinued, it might be well to enlarge the subscription. It is to be hoped that, in due time, donations and bequests will be made by liberal individuals for the support of scientific enterprises of this character.

It is gratifying to learn that $10,000 of the Appleton bequest have been devoted to the publications of the American Academy, and an equal sum to those of the Historical Society of Massachusetts; and we may venture to ask whether there are not, in this country, wealthy individuals who can properly appreciate the importance of the labors of Dr. Gould, and establish his journal on a permanent foundation.

(4.) *The laboratory of the Institution,* during the past year, has been used by Professor J. Lawrence Smith in the examination of American minerals; and, on behalf of the Treasury Department, in investigations relative to the different kinds of molasses imported into this country. He also made a series of analyses of meteorites, among which were fourteen specimens belonging to the cabinet of James Smithson, the founder of this Institution.

An extensive series of experiments have been made during the last year, and are still in progress at the Institution, under the direction of a commission appointed by the Secretary of War, consisting of General Totten, Professor Bache, and myself, for testing the materials employed in the extension of the capitol. For the purpose of these investigations, we have employed the beautiful and ingenious machine invented by Major Wade, late of the United States army, which is so contrived as to give in pounds per square inch of the material, the resistance to crushing, to twisting, and to longitudinal and transverse fracture. The materials have been selected and prepared under the direction of Captain Meigs, superintendent of the capitol extension; and the details of the manipulations and calculations have been entrusted to Mr. William Shippen.

The commission has taken advantage of this opportunity to extend the experiments to a number and variety of other building materials

submitted to them from different parts of the United States; and they hope to be allowed to extend their inquiries until they also embrace the comparative strength of the most important articles used in the arts. For example, it is of great practical importance to know the relative and absolute strength of cordage, and the various textile fabrics manufactured by different processes from the raw materials produced in different countries. No complete series of experiments has ever been made upon the strength of the varieties of American timber. Enquiries, however, of this kind involve much labor and considerable expense, and can only be properly carried on by the aid of the government

(5.) *Meteorology.*—During the past year valuable additions have continued to be made to our meteorological collections. Though changes have taken place in the individuals, the number of the observers reporting immediately to the Institution is about the same as that given in the last report. A considerable number of full sets of standard instruments, made under our direction by Mr. JAMES GREEN, of New York city,* have been procured by observers, and the character of the meteorological returns has consequently continued gradually to improve in completeness and precision. The records we have collected now form a copious store of valuable materials for the solution of many interesting problems relative to the meteorology of this country, which have been resorted to by several original investigators for data necessary to their researches. But to render these materials more generally available for the advancement of science, it is desirable to reduce them to tabular forms, and to publish them in as much detail as our funds will allow. In this way the greatest number of persons will have an opportunity of submitting them to the inductive process, by which general laws are deduced from particular facts. There is no part of physical science in which so much is to be done, even in the way of partial generalization, as in meteorology; and hence the importance of engaging as many minds as possible in its investigation.

It is the policy of the Institution to furnish all the means in its possession to aid scientific research, and not to hoard up its treasures or confine their use to those who may be immediately connected with the establishment, or who may be supported by its funds. *Co-operation*, and not *monopoly*, is the motto which indicates the spirit of the Smithsonian operations. It is with this view that I have been anxious to have the materials in our possession reduced to a form for publication; and, indeed, it has been a source of much solicitude that we have not been able before this time to present to the observers the means by which they could compare the results of their records with those of others in different districts. Few persons, however, are aware of the labor, chiefly of a mechanical character, required to tabulate materials of this kind, and the cost of printing them in sufficient fullness of detail to render them generally applicable to scientific or economical purposes. Besides this, I regret to inform the Board that our attempts in the line of reduction have thus far not been successful. I employed for this purpose a person who seemed to possess all the requisite qualifications, and who engaged in the work with commendable industry and apparent

* No. 422 Broadway, New York.

enthusiasm; but, I am sorry to have to say that before the work was completed, he set up such claims to a personal right of property in it, and to a control over the manner in which it should be prepared and published, as were entirely incompatible with the rights of the Institution, and with a due regard to its reputation. I was, therefore, obliged, after many attempts to induce an opposite course, to place the work in other hands. The reductions are now entrusted to Professor COFFIN, of Lafayette College, Pennsylvania, the author of the memoir on the winds of the North American continent; and from his established reputation for scrupulous exactness and punctuality, as well as for intellectual and moral qualities, we may confidently expect to have at least one part of the work ready for the press before the next session of the Board of Regents.

The materials collected consist of two classes, viz: one which includes all the records of observations published in books and periodicals, or contained in manuscripts which have been lent us for reduction; and the other consists of the current observations, which now embrace all the returns we have received for several years past. The reduction of the first class, on which we have expended much money, was, I supposed, nearly ready for the press; but, on examination, it has been found necessary to subject the whole to a careful revision, in order to correct the errors in it which a critical examination has brought to light.

It may be well to state, for the information of the public, that the appropriation which was made for the purchase of instruments to distribute among observers has been exhausted, and that the experiment was not as successful as could have been wished. A considerable number of the instruments were broken, and but comparatively few returns have been received. It does not, therefore, appear advisable to renew the appropriation with the portion of our income which can at present be devoted to meteorology.

Blank forms are furnished liberally to individuals who may desire to record the changes of the weather, or the progress of periodical phenomena.

In order to prevent difficulties similar to those which have heretofore occurred, it is important to state that all communications on the subject of meteorology—and, indeed, on the general business of the establishment, should be addressed to the "Secretary of the Institution." He alone is responsible to the Regents; and it is, therefore, necessary that he should have full knowledge and control of the correspondence.

EXCHANGES.—The system of international exchange has been conducted with very important results during the last year. The additions to the library from this source exceed considerably, in number, those of any previous year; amounting, in the aggregate, to over three thousand volumes and parts of volumes. Many of these consist of expensive works published by governments or institutions in Europe, and such as are not found in any other library in this country. It will not be extravagant to estimate the value of these returns at three thousand dollars; since most of them are the current volumes of the year, and bear the high price of scientific periodicals.

As mentioned in previous reports, the Smithsonian Institution acts as the principal medium of communication between the scientific and literary associations of the old and the new world. During the past year

the number of the societies availing themselves of the facilities thus offered has largely increased, including, among others, nearly all the State agricultural societies of America, publishing transactions. This result has been produced by a circular which was issued by the Institution, early in the spring of last year, to make known more generally the system of exchange. Copious returns are being constantly received for the societies; and an intercourse is thus established which cannot fail to produce important results, both in an intellectual and moral point of view.

The governments of England and France have for some time admitted the packages of the Institution free of duty and without examination. A request for a similar favor was made to the Prussian government, during the past year, and it has been liberally granted by the commissioners of the Zollverein. There is, therefore, no port to which the Smithsonian parcels are shipped where duties are charged on them—a certified invoice of contents by the secretary being sufficient to pass them through the custom-house free of duty. On the other hand, all packages addressed to the Institution, arriving at the ports of the United States, are admitted, without detention, duty free. This system of exchange is, therefore, the most extensive and efficient which has ever been established in any country. Its effect on the character and reputation of our own country can scarcely be too highly estimated; while its influence, though silent, is felt in every part of the globe where literature and science are cultivated.

Library.—A difficulty which occurred between the librarian and myself has led to his separation from the Institution; and, since the 10th of last July, I have given the library, as far as my multiplied duties would allow, my personal supervision. With the assistance of Professor Baird and others, means have been devised for improving its condition and for rendering it more available for consultation. At present it is not thought advisable to appoint a special bibliographer, but to endeavor to conduct the business of the library by means of the assistants now employed, and by such temporary help as may be found necessary. An assistant has been employed to make a catalogue of all the books received by exchange, and to prepare the volumes and parts of volumes for binding. The list is now complete and will be appended to the next report to Congress, for the purpose of pointing out to our correspondents the deficiencies in the sets of transactions, and thus affording the opportunity to supply them. What we cannot procure in this way we shall endeavor to supply by purchase.

I have also directed that the statistics of the library should be kept, namely, the number of different persons who come to read, and the number and character of the books they call for. During the last six months 150 different individuals have read or consulted 742 books in the library; of these 400 were works of light literature, belonging to the copyright deposit. During the same period 2,576 names were entered in the registry of visitors. The principal value of the library has been to the officers of the Institution, and to other persons engaged in research connected with the Smithsonian publications. These, during the period above-mentioned, have drawn out of the library 450 volumes, principally of a scientific character.

The reading room of the library receives the leading periodicals of this country and Great Britain, together with a number from France, Germany, &c.; and, therefore, offers desirable facilities for the reading community of Washington, and for those who visit the seat of government, to keep up with the general progress of knowledge; while by means of the more profound transactions of learned societies the student is afforded the opportunity of becoming acquainted with the advances made in special branches of literature and science.

Very erroneous ideas have been entertained as to the amount which has been expended on the library. It is true the whole sum directly paid for books has not exceeded $14,139 16; but this does not include the binding, the transportation, the superintendence, and all the other expenses connected with an establishment of this kind. Neither does it exhibit the value of the books procured by exchanging the publications of the Institution for the current volumes of learned societies, or the cost in clerk hire and postage of the books received from the copyright system. The whole expenditure on the library and operations connected with libraries, including a proportional part of the general expenses since the beginning of the Institution, is $71,429 45. To this should be added at least $130,000 for the cost of the part of the building devoted to the library, and we shall then have an expenditure of the income of the Smithsonian bequest on the library and objects immediately connected with it of about $200,000.

In the original programme of organization, a proposition was introduced by Professor Bache to render the Institution a centre of bibliographical knowledge, to which students in every part of the country could apply, by letter or otherwise, for information as to what books existed on a particular subject, and in what libraries they could be found. For this purpose a large number of works on bibliography have been obtained, and efforts have been made to procure copies of all the catalogues of libraries in this country. To facilitate the answers to enquiries relative to the places where particular books could be found, it was proposed to secure three copies of each catalogue, one to be preserved in its original form, and the other two to be cut up, in order that the titles on each side of a leaf could be pasted on cards, and the whole arranged in drawers so as to form a general catalogue. Considerable progress was at one time made in this work, and several thousand cards were prepared by a bookbinder.

It was, however, stopped in order to prosecute the system proposed by Professor Jewett, namely, that of forming a general catalogue of libraries by means of stereotyping separate titles. It appears to me, however, that the first plan ought to be carried out as far as possible, particularly in regard to collecting catalogues; and these should not be confined to those of the libraries of the United States, but embrace, as far as practicable, those of the libraries of Europe. It may happen that an extract may be required by a student from a book not to be found in this country, and that this can be effected through the correspondence of the Institution, provided the location of the work in Europe is known.

About three years ago a series of experiments were undertaken at the expense and under the direction of the Institution for improving and applying a new method of stereotyping. The right to use the process

was purchased of the original inventor, but it was not found in a condition to be applied, particularly to stereotyping catalogues, and in order to improve it an artizan from Boston was employed under the immediate direction of the librarian. The experiments were successful, and the improved process has been employed by Mr. John C. Rives in printing the Congressional Globe. I was anxious that it should be generally applied, in order that the art might not depend on the contingency of the life or will of a single individual. Besides this, should the process be generally introduced, the use of it for the Institution could be more cheaply procured by contract than by attempting to do our own work by a separate establishment in the building. I have, however, just learned that a patent has been applied for, in the name of the artizan before mentioned, for the very improvements which were made at the expense of the Smithsonian fund. This act, though it may be in accordance with the usages of employees under the government, is not, in my judgment, compatible with the liberal spirit of the will of Smithson. While due credit and proper remuneration should be given to any employee for his labors, the results should redound to the reputation of the Institution and to the general good of the public. This remark is also especially applicable to the claims set up by an employee in the meteorological department.

During the past year the process of cataloguing the Congressional library in accordance with the plan adopted by this Institution has been carried on under the direction of Professor Jillson, of Brown University. The whole number of titles catalogued has been 9,654, and of volumes 21,805. The stereotyping of the titles has been suspended for the present, in order to give the workmen who have been engaged on it an opportunity of applying the new art to the printing of the Congressional Globe. It is hoped that an additional appropriation will be made during the present session of Congress sufficient to complete the whole catalogue. We shall then have the statistics necessary to ascertain the cost of preparation of a catalogue of this kind, and the means necessary to give definite information, in reference to it, to the principal libraries of the country.

The edition of Notices of the Public Libraries in the United States, published by the Institution in 1851, is exhausted; and it will be necessary during the present year to collect the materials for a new and enlarged edition. A circular* for this purpose will be issued as soon as possible, and it is hoped that the work will be prepared in time to be submitted to Congress with the annual report for 1855. I have entrusted the duty of collecting the materials for this purpose to Mr. William J. Rhees, who now occupies the place formerly filled by Dr. Foreman, the latter having been appointed to the position of examiner in the Patent Office.

The purchases, though few in number, are of considerable value; and the additions from the system of exchange, as has before been stated, have increased in importance. The articles received on account of the copyright law were more numerous last year than the year before, but not more valuable. 848 separate pieces of music

*A circular distributed by the Institution is given in the Appendix to this Report.

have been received, for each of which two separate manuscript copies of every word of the title page was required. From this single fact it is evident that the operation of the present copyright law does not confer a material benefit upon the Institution, unless it be as a means of swelling the number of articles annually added to the library, which would appear to be at present a matter of some popular importance. It would be well to ask Congress, at least, to relieve the Institution from the burden imposed upon it by the additional postage to which we are constantly subjected on this account.*

The additions to the library during the year 1854 are shown by the following table:

	Books.	Pamphlets and parts of vols.	Engravings.	Maps.	Music.	Drawings.	Other articles.	Total.
Purchase	529	391	.....	.....	.....	.....	.....	920
Donation and exchange	920	2,397	1	323	.....	1	.....	3,642
Copyright	441	203	16	28	848	5	69	1,610
Deposit	.....	.....	.....	.....	.....	.....	.....	.....
Total	1,890	2,991	17	351	848	6	69	6,172

If we add these to the number given in the report of the librarian last year, we shall have the following—

Aggregate to 1855.

	Books.	Pamphlets and parts of vols.	Engravings.	Maps.	Music.	Drawings.	Other articles.	Total.
Purchase	4,961	2,902	1,335	2	.....	.....	.....	9,200
Donation and exchange	4,821	7,561	59	2,136	.....	31	41	14,649
Copyright	3,250	623	54	87	3,122	14	166	7,316
Deposit	873	.....	.....	.....	.....	.....	.....	873
Total	13,905	11,086	1,448	2,225	3,122	45	207	32,038

* Since this was written, Congress has passed an act allowing all copyright publications to be sent to the Institution *free of postage* through the mail. A circular sent to all the publishers in the United States on this subject will be found in the Appendix.

MUSEUM AND COLLECTIONS.—(1.) The principal object of the Smithsonian collection of specimens is to present a full illustration of the natural history of North America. The income is not sufficient to collect and support a miscellaneous museum to illustrate all the branches of the physical geography of the globe. Such an establishment can only be sustained by the general government. Were the Institution to embrace all the opportunities which are afforded it to collect specimens, the cost of transportation alone would soon absorb the greater portion of the sum which can be devoted to this branch of the general plan of operations. We are, therefore, obliged to limit our exertions, and to direct them to objects which are more immediately necessary in facilitating certain definite lines of research, and to leave to other institutions the collection of such materials as may be required to make up the complement of specimens necessary to represent the mineral and organic products of our continent.

During the last year, the additions to the museum have been more numerous and valuable than in any previous period of the same extent. Much has been done by parties aided more or less by the Institution, and much by persons in an individual and independent capacity.

The Institution has taken charge of the arrangement and preservation of all the specimens obtained by the various expeditions of the government; but, as these embrace all objects of natural history, they would scarcely fall within the plan of a special museum. The principal aim, therefore, in taking charge of all the specimens is not to swell the Smithsonian collection, but to preserve them from destruction, and to render them immediately available to science, with the hope that Congress will, at some future day, make a liberal appropriation to support a national collection, of which these will form the nucleus.

In order to carry out the general policy of the Institution, a liberal distribution of the duplicate specimens should be made to societies and other establishments in this country and abroad. During the past year something has been done in this line; and when the collections are properly arranged, and the number of duplicates ascertained, the system of distribution may be so extended as materially to affect the progress of natural history in this country and the world. But the amount of good which may be done in this way must again be limited by the portion of the income which can be expended for this purpose; due regard being had to the claims of all branches of knowledge, of which this is but one.

The primary object of the establishment being kept constantly in view, the specimens in all cases will be open to the use of individuals who may desire to increase knowledge by original research; and the only condition which will be required to be strictly observed is that full credit be given to the Institution for the facilities which it may afford.

No branch of the operations of the Institution can be carried on without the expenditure of a greater amount of labor than might, at first sight, appear to be necessary. Some idea of that required to attend to the specimens added to the museum may be obtained from the fact that over 360 different lots, consisting of barrels, kegs, cans, boxes,

&c., besides many single specimens, have been received during the last year. All these had to be assorted, labelled, and recorded in books, and in most instances duplicate lists sent to the donors. In the case of smaller animals, large numbers of extra specimens are generally collected, to serve for anatomical investigation, or for distribution and exchange.

(2.) *Achromatic Microscope.*—In the first report of the Secretary it was mentioned that an individual, in the interior of the State of New York, had successfully devoted himself to the study and construction of the microscope, and was able to produce specimens of this instrument which would compete with the best of those constructed in Europe; and that, to do justice to the talents and labor of this person, Mr. Spencer had been requested to construct a microscope of the first quality, to be paid for by the Institution, if a commission appointed to examine it should find it capable of producing certain effects. The artist made a number of instruments which fully satisfied the conditions required by the agreement, but which still fell short of the ideal standard of perfection which existed in his own mind.

He has, however, at length completed a microscope, the performance of which far exceeds that which was anticipated when the proposition was made; and the Institution has thus not only secured a valuable instrument of research, but has assisted in developing the talents and making more generally known the skill of a native artist of surpassing merit. I may mention that Mr. Spencer has associated with himself Professor Eaton, of Troy, New York; and they are now able to supply the increasing demand in this country for this invaluable means of research which, within the last few years, has opened a new world to the physiologist and botanist, as well as to the investigator of inorganic matter.

(3.) *Gallery of Art.*—The Stanley collection of Indian portraits still remains deposited in the west wing of the building. They were removed, however, for a short time for exhibition at the Maryland Institute, Baltimore, and the State Agricultural Fair at Richmond, Virginia. They have constantly excited much interest, and it will be a subject of great regret if means cannot be procured to preserve entire a series of portraits which has been produced at so much labor and cost, and which is so faithful a representation of the peculiar physiognomy and costume of the different tribes of Indians now found within the boundaries of the territories of the United States. Mr. Stanley was engaged as the artist of the Pacific railroad survey under Governor Stevens, and has thus had an opportunity of adding much to his material for enlarging the collection. Since it was first deposited in the Institution he has also added to it portraits of several individuals belonging to the Indian delegations which, within the last two years, have visited Washington.

(4.) Professor Wilson, of the British Commission, appointed to attend the Exhibition at the New York Crystal Palace, presented to the Institution, in behalf of the London Society of Arts, a collection of models, drawings and instruments, to facilitate instruction in the art of design. In order to render these immediately useful, they were lent to the School of Design, which has been established in this city by the Metropolitan

Mechanics' Institute, under the charge of Professor Whitaker; and they are still in possession of this society, and are not only valuable on account of the immediate use to which they are applied, but also in serving as patterns for imitation for other schools of a similar character.

The Institution possesses, as has been stated in a previous report, a valuable collection of engravings by the first masters; but these have, from the first, been deposited in drawers, and have therefore not been accessible to the general visitor. It may be well, if the expense is not too great, to have them placed in groups, under glass, in large frames, and thus exhibited to all.

Building.—The main building of the Smithsonian Institution is at length completed. During the last six years, the wings, the connecting ranges, and the apartments in the southern tower, have alone been occupied. The unfinished condition of the edifice has undoubtedly produced an unfavorable impression on the numerous strangers who visit the city of Washington. The object, however, of the delay, as has been repeatedly stated in previous reports, was, first, that a more permanent building, and one better adapted to the uses of the Institution, might be provided; and secondly, that funds might be saved from the accruing interest to furnish an additional income sufficient at least to defray the annual expense of so large and costly an edifice. Both these objects have been attained. The interior of the building, instead of being constructed of wood and plaster, as was originally intended, has been finished with fire-proof materials; and improvements have been made in the plan first adopted which render the edifice better suited to the purposes for which it was intended. The first story consists of one room 200 feet long and 50 feet wide, which can be divided by a screen into two apartments, one of which may be devoted to the library and the other to the museum. The second story is divided into three spaces, the middle one of which is occupied by the great lecture room, capable of containing 2,000 persons, and constructed on acoustic and optical principles. It is believed that this room is the most perfect of its kind in this country, and that it will serve as a model for apartments of a similar character. The spaces adjoining the lecture room east and west form rooms each fifty feet square, which may contain cases around the walls for apparatus and other collections of objects of art, and at the same time serve for meetings of societies or for lectures to smaller audiences on special subjects. On the north side of the lecture room, in the front towers, are rooms intended for the preparation of the experimental illustrations of lectures, but which may be used as committee rooms, while the large lecture room serves for the more public addresses and exhibitions.

The object kept in view in all the changes which have been made in the original design of the building is its adaptation to purposes of general interest, and particularly to the accommodation of conventions and associations intended to promote knowledge or improve the arts of life.

During the past year a number of societies have availed themselve of the facilities afforded by the Institution, and have held their session in the Smithsonian building. The first was the United States Agricultural Society, which continued its session for three days, with lectures

in the evening. It was attended by delegates from almost every part of the United States, and has published a journal of its proceedings, in which due credit is given to the Institution.

The second was the American Association for the Advancement of Science, which met the last of April and continued in session until about the 10th of May. Special preparation was made for this association; and although the building was still in an unfinished state, it is believed the members were well satisfied with their accommodation, as well as the hospitality and attention they received from the President and officers of the general government.

The third was the Association of Medical Superintendents of Hospitals for the Insane, which continued in session several days. The subjects discussed were not only of much importance relative to the treatment of diseases of the mind, but also of interest to the psychologist. Some, too, were of a practical character, connected with the general economy and management of public institutions. The subjects of heating and ventilating were fully discussed.

The fourth was the meeting of the American Association for the Advancement of Education, which has just closed its session. The Smithsonian Institution is thus assisting to render the city of Washington a centre of literary and scientific association, which may serve to diversify its character as the political metropolis of the nation.

Lectures.—In conformity with the law of Congress, a series of lectures was given during the winter of 1853–'4, and the experiment was made of establishing a full course on a single subject, namely, of chemistry. This was given by Dr. J. Lawrence Smith, late of the University of Virginia, and now professor of chemistry in the Louisville Medical College. The interest in all the lectures was fully sustained until the last.

A number of lectures were also given before the Mechanic's Institute and the Young Men's Christian Association in the Smithsonian lecture room.

The following is a list of the lectures given, with the names of the gentlemen by whom they were delivered.

A course of three lectures by Benjamin Hallowell, of Alexandria, Virginia.

1st. The general principles of astronomy, with the movements and consequent phenomena of the bodies of the solar system.

2d lecture. The sun, Neptune, the asteroids, and comets.

3d lecture. Fixed stars, nebulæ, and stellar systems.

A course of three lectures by Professor C. W. Hackley, of Columbia College, New York. Subject: History of institutions of learning and science.

A course of two lectures by W. Gilmore Simms, esq., of Charleston, South Carolina. Subject: The moral character of Hamlet. Also two lectures for the Young Men's Christian Association, on poetry and the practical.

One lecture by Professor W. J. Whitaker, of Massachusetts. Subject: Method of teaching the art of design.

A course of three lectures by Park Benjamin, of New York. Sub-

jects: 1st. Fashion; 2d. Americanisms; 3d. Intellectual and social amusements.

One lecture by W. G. Dix, of Cambridge, Massachusetts. Subject: The Andes and Ecuador.

A course of twenty-two lectures by Professor J. Lawrence Smith, of the University of Virginia.

1st. The importance of the study of chemistry, and its close connexion with the progress of the arts and manufactures of the present age; also general notice of the nature of bodies, more especially gaseous bodies.

2d. The elements of the atmosphere: oxygen, nitrogen, and ozone, or oxygen in its allotropic condition.

3d. The physical properties of the atmosphere: its weight, color, elasticity, &c.

4th. The compounds of nitrogen and oxygen.

5th. Sulphur and some of its compounds.

6th. Sulphuric acid and its applications. Phosphorus and phosphoric acid.

7th. Chlorine, its applications in the arts and its combination with oxygen. Iodine and its uses, with a notice of its application in the photographic art.

8th. Some of the compounds of chlorine and iodine, bromine, hydrogen, and its application to æronautics.

9th. Compounds of oxygen and hydrogen; the oxyhydrogen blowpipe and the Drummond light; water in several of its relations.

10th. Combinations of hydrogen with nitrogen, sulphur, phosphorus, and chlorine.

11th. Carbon under its various forms of diamond, charcoal, and mineral coal; the combinations of carbon and oxygen.

12th. The agency of carbonic acid in forming incrustations of carbonate of lime; the respiration of plants and animals; the formation of coal-beds and the composition of coals; carbonic oxide and some of the compounds of carbon.

13th. Compounds of carbon and hydrogen; explosions in coal mines; Sir Humphrey Davy's lamp; combustion.

14th. On the phenomena of combustion and ebullition.

15th. On the phenomena of illumination, with an exhibition of every variety of illumination, from a candle to the electric light.

16th. On the phenomena of illumination, with illustration of every form of artificial illumination; an account of the construction and principle of the Fresnel light used in light-houses.

17th. On the ebullition and congelation of water, with a short account of the application of the vapor of water as a motive power.

18th. The conversion of water into steam; its application as a motive power, with some remarks on the explosion of boilers; an account of some of the vapors and gases proposed as substitutes for steam as motive power.

19th. General properties of the metals; potash and soda, with an account of their applications to the arts of glass and soap making, &c.

20th. On the compounds of lime, alumina, and silica, with their applications.

21st. On some of the properties of gold, silver, mercury, and lead, with the manner of their occurrence in nature.

22d. On the properties of copper and iron, with the manner of their occurrence in nature; on meteoric iron and meteorites.

From the foregoing account of the transactions of the past year, it must be evident to every intelligent and unprejudiced person that the Institution has perseveringly continued its course of usefulness, and that, although some of its operations are not of a character to attract public attention or elicit popular applause, yet they are eminently productive of the benevolent results intended by the bestower of the bequest. From the report of the Executive Committee, it will be seen that the funds are still in a good condition; although, on account of unforeseen difficulties in the completion of the building, and of the unexpected rise in the price of labor and material, a larger draft has been made upon the extra fund than was intended. This can be made up, however, if thought necessary, in the course of a few years, by means of the interest which will accrue from the same fund.

It is evident that the collections of books and specimens have increased as rapidly as is consistent with the best interests of the Institution. Every addition to these collections increases the cost of attendance and supervision, and therefore must, with a fixed income, tend to diminish the power of acquisition; and when it is recollected that the Institution is, theoretically at least, to be perpetual, it will be evident that we should be more solicitous in regard to the quality of articles than to their number or quantity. Though these views may not commend themselves to all, I believe they will be found to meet the approval of a large majority of the intelligent community.

In order to preserve the continuity of the history of the Institution in the annual reports of the secretary, it is necessary to allude to the fact that during the past year internal difficulties and changes have occurred which have given rise to a series of attacks on the policy and management of the Institution; but however painful occurrences of this kind may be to those immediately concerned, yet they seem almost inevitable in the first organization of an establishment where precedence is wanting, and where experience furnishes no instruction. They had their origin in the want of a definite recognition of the responsibilities and consequently of the powers of the secretary.

It is evident there can be no efficient action in an Institution of this character without entire harmony of views and unity of purpose, and these can only be secured by one executive head. The Regents have settled this principle, and thus removed all cause of future difficulty of a similar character.

JOSEPH HENRY,
Secretary of the Smithsonian Institution.

JANUARY, 1855.

APPENDIX TO THE REPORT OF THE SECRETARY.

REPORT OF THE ASSISTANT SECRETARY.

SIR: I beg leave to present herewith a report for the year 1854 of operations in such departments of the Smithsonian Institution as have been particularly entrusted by you to my care.

Respectfully submitted,

SPENCER F. BAIRD,
Assistant Secretary.

To JOSEPH HENRY, L.L. D.,
Secretary of the Smithsonian Institution.

1. PUBLICATIONS.

The sixth volume of Smithsonian Contributions to Knowledge, although for the most part printed in 1853, was not published and distributed until the present year. The seventh volume, to consist mainly of Lapham's Memoir on the Ancient Remains of Wisconsin, is in hand, though delayed somewhat by the failure of the contractor to supply paper. The plates, over sixty in number, are nearly all lithographed and printed, and the numerous wood-cuts engraved. The paper, by Professor Bailey, on new microscopic organisms, with one steel plate, has been printed and distributed to microscopists in advance of its appearance in the full volume.

The octavo publications during the year are as follows:

Eighth annual report of the Board of Regents of the Smithsonian Institution, pp. 310.

On the construction of catalogues of libraries, and of a general catalogue. Second edition, pp. 96.

Directions for collecting, preserving, and transporting specimens of natural history, prepared for the use of the Smithsonian Institution. Second edition, pp. 28.

List of foreign institutions in correspondence with the Smithsonian Institution, pp. 20.

List of domestic institutions in correspondence with the Smithsonian Institution, pp. 16.

a—FOREIGN EXCHANGES.

The following table exhibits the statistics of the sixth transmission of packages to Europe, made by the Institution in June, 1854.

The circular issued by the Institution early in the spring, offering its services to the scientific societies of the country, in the transmission of packages to Europe, was eagerly responded to by a large number. The rules requiring that all parcels be delivered free of cost in Washington, that each one be legibly addressed with the name of the donor, and that a separate invoice be sent by mail, or apart from the packages, were pretty generally complied with. It is to be regretted, how-

ever, that the last named regulation was not observed in some instances, thus greatly increasing the labor of the officers in charge, by rendering it necessary to make a transcript of the titles from the bundles themselves.

Such publications as were sent without specific addresses were distributed as appropriately as the information in possession of the Institution allowed.

The boxes containing the packages enumerated in the list, left the Institution towards the end of June, and, having been shipped by packet, did not reach their European ports until some time in September. They were immediately unpacked by the agents of the Institution, and the parcels distributed, with the accompanying circulars, to their respective addresses. Acknowledgments for many of them have already been received.

A.—TABLE SHOWING THE AMOUNT OF PRINTED MATTER SENT ABROAD IN 1854 BY THE SMITHSONIAN INSTITUTION.

1. *Distributed by Dr. J. G. Flügel, Leipsic.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in the preceding.	Total of addresses.	Number of principal packages.	Packages enclosed from American institutions.	Packages enclosed from other parties.	Total of packages.	Weight of boxes.	Number of boxes.
Sweden	8	19	.....	15	41	22	.....	.....	....
Norway	3	2	.....	5	13	3	.....	.....	....
Iceland	1	.....	.....	2	7	.....	.....	.....	....
Denmark	4	11	.....	9	33	13	.....	.....	....
Russia	16	9	.....	29	73	13	.....	.....	....
Holland	9	11	.....	19	61	14	.....	.....	....
Germany	97	110	.....	142	209	112	.....	.....	....
Switzerland	11	17	.....	18	42	21	.....	.....	....
Belgium	9	12	.....	13	45	16	.....	.....	....
Total	158	191	349	252	524	214	990	4,875	22

2. *Distributed by Hector Bossange, Paris.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in the preceding.	Total of addresses.	Number of principal packages.	Packages enclosed from American institutions.	Packages enclosed from other parties.	Total of packages.	Weight of boxes.	Number of boxes.
France	64	47	.....	80	148	47	.....	.....	....
Italy	28	24	.....	37	69	27	.....	.....	....
Portugal	1	.....	.....	2	14	.....	.....	.....	....
Spain	4	.....	.....	5	20	.....	.....	.....	....
Total	97	71	168	124	251	74	449	1,884	6

3. *Distributed through the Royal Society and Henry Stevens, London.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in the preceding.	Total of addresses.	Number of principal packages.	Packages enclosed from American institutions.	Packages enclosed from other parties.	Total of packages.	Weight of boxes.	Number of boxes.
Great Britain and Ireland...	93	98	191	109	206	108	423	2,013	5

4. *Distributed by other parties.*

COUNTRIES.	Addresses of principal packages.	Addresses enclosed in the preceding.	Total of addresses.	Number of principal packages.	Packages enclosed from American institutions.	Packages enclosed from other parties.	Total of packages.	Weight of boxes.	Number of boxes.
Rest of old world.....	18	2	.....	19	45	2	.....	.....	....
South America.....	9	.....	.....	22	26	.....	.....	.....	....
Total.....	27	2	29	41	71	2	114	1,019	5
Grand total.....	375	362	737	526	1,052	398	1,976	9,791	38

The number of foreign institutions to which full series of Smithsonian publications were sent for 1854 amounted to 263, or five more than the previous year. The list is necessarily subject to considerable variation, new names being added, and others taken off for non-compliance with the regulations of the Institution, or other causes. An acknowledgment of the reception of one package is imperatively required before another is sent, and in the failure to meet this rule, some first class institutions are dropped for one or two years, or until the omission is rectified.

There is no port to which the Smithsonian parcels are shipped where any duties are charged on them, a certified invoice of contents from the Institution being sufficient to carry them through the custom-houses free of duty.

Receipt of books by exchange.—The additions to the library of the Smithsonian Institution, by its exchanges, have been very marked during the year. Attention was called in the last report to the very great increase in our foreign exchanges, in consequence of the extension of the list of recipients of Smithsonian publications. During 1854, the works received have been fully equal in value to those of 1853, containing actually a larger number of pieces, and binding up to a greater number of volumes. The following table exhibits the record of this department. The discrepancy between this record and that of the

library is owing to the fact that the latter included donations from individuals and other sources in this country, which the former did not, and that some separate sheets of maps were all bound together before being placed in the library:

B.—TABLE EXHIBITING THE NUMBER OF PIECES RECEIVED IN EXCHANGE DURING 1854.

Volumes.—Folio and quarto	271	
Octavo	655	
		926
Parts of Volumes and Pamphlets.—Folio and quarto	447	
Octavo	1,021	
		1,468
Maps and Engravings		434
Total		2,828

As was to be expected, a large proportion of receipts by exchanges consisted of the publications of learned societies, many of which, in addition to their current volumes, have sent their back series, either in whole or part. This department of the library is rapidly becoming more and more complete, and is believed even now to exceed that of any other library in the country. The catalogue now in preparation of the publications of societies and periodicals belonging to the Institution will furnish a ready means of indicating what are the desiderata of this nature.

In addition, however, to returns from societies, the receipts from public libraries and universities of duplicates from their shelves have been very numerous, and consisting, as they usually do, of important scientific works, have proved highly acceptable. Owing to the constant communication kept up with the principal men of science at home and abroad, and the transmission to them of such publications of the Smithsonian Institution as related to their specialities, very many valuable memoirs and works have been received in return from this source

In the very great number of large donations received during the year it has been found impossible to give a particular enumeration of them without encroaching too much in the space allotted to me. This is, however, less necessary, as the catalogues now in preparation, and shortly to be printed, will convey full information on the subject.

The following tables contain a statement of the packages received from the various sources specificed, for distribution in Europe as well as those received from Europe for this country:

C.—TABLE OF PACKAGES FROM AMERICAN INSTITUTIONS FOR DISTRIBUTION ABROAD.

Cambridge.—Nautical Almanac	35
Boston.—American Academy of Arts and Sciences	133
Boston Society of Natural History	42
New Haven.—American Journal of Science	47
New York.—New York Lyceum of Natural History	99
American Ethnological Society	19
Philadelphia.—Academy of Natural Sciences	136
American Philosophical Society	116
Philadelphia College of Pharmacy	9
Washington.—United States Patent Office	150
National Observatory	111
Light-house Board	15
New Orleans.—New Orleans Academy of Natural Sciences	300
Columbus, Ohio.—Ohio Board of Agriculture	21
Detroit, Michigan.—Michigan State Agricultural Society	200
Madison, Wisconsin.—Wisconsin State Agricultural Society	143
San Francisco, California.—Geological Survey of California	60
Santiago, Chile.—Observatory of Chili	48
From miscellaneous sources, including individuals, &c	1,132
Total received	2,816

D.—TABLE OF PACKAGES RECEIVED FROM EUROPE FOR DISTRIBUTION TO VARIOUS SOCIETIES IN AMERICA.

Canada.—Various Societies	3
Boston.—American Academy of Arts and Sciences	50
Natural History Society	26
Bowditch Library	5
Cambridge.—Observatory	7
Botanic Garden	3
Harvard University	13
Astronomical Journal	12
American Association	13
Worcester.—Antiquarian Society	1
New Haven.—American Journal of Science	37
American Oriental Society	5
Albany.—New York State Library	10
New York.—New York Lyceum of Natural History	11
American Ethnological Society	1
Geographical and Statistical Society	3
American Institute	5
West Point.—United States Military Academy	1
Philadelphia.—American Philosophical Society	47
Academy of Natural Sciences	40
Franklin Institute	1
Geological Survey of Pennsylvania	5

Washington.—President of the United States	1
State Department	3
United States Patent Office	12
Congress Library	7
Coast Survey	6
National Observatory	30
National Institute	3
Commissioner of Indian Affairs	1
United States Naval Astronomical Expedition, Chili	15
Georgetown, District of Columbia.—Georgetown College	6
Chicago, Illinois.—Mechanics' Institute	5
Colleges in different places	19
Various State libraries	37
Miscellaneous societies and individuals	543
Total	987

In concluding this portion of my report, I would beg to call your attention to the zeal and fidelity with which the agents of the Institution in London, Leipsic, and Paris, have discharged their duties. The thanks of the Institution are most especially due to Dr. J. G. Flügel, of Leipsic, whose efforts in the great cause of tightening the bonds of union between the literary and scientific men and institutions of the two worlds are beyond all praise.

3.—Domestic Exchanges.

The copies of volume 6 of Smithsonian Contributions were distributed early in the summer, through the agents of the Institution in different cities of the Union, as follows: Messrs. J. P. Jewett & Co., Boston; Geo. P. Putnam & Co., New York; Lippincott, Grambo & Co., Philadelphia; John Russell, Charleston; B. M. Norman, New Orleans; Dr. Geo. Engelmann, St. Louis; H. W. Derby, Cincinnati; and Jewett, Proctor & Worthington, Cleveland. The services of these gentlemen, involving considerable expense of time and trouble, have, in every instance, been given without charge.

4.—Museum.

a—*Increase of the Museum.*

During no period in the history of the Institution have the receipts of specimens been so numerous, or valuable, as in the year 1854. Contributions have been steadily flowing in from widely remote regions, many of which had been previously but little known. Expeditions, both public and private, individuals and societies, have all aided in gathering together what is now confidently believed to be the most valuable collection in the world of many divisions of the natural history of North America. Much has been done by parties aided directly to a greater or less extent by the Smithsonian Institution, and much by persons acting in an individual and independent capacity. The most im-

portant additions have, however, been received from the various government expeditions mentioned hereafter. Many officers of the army, as heretofore, have forwarded more or less complete collections, made in the neighborhood of the posts at which they have been stationed.

The government expeditions by which collections have been made are as follows:

United States Mexican Boundary Commission, under the scientific direction of Major Emory, United States army; General Robert B. Campbell, commissioner. The region illustrated by the collections received consisted of the Rio Grande, from Eagle Pass to its mouth. Under the present organization of the commission, with Major Emory acting as commissioner in addition to his former duties, there is reason to hope for new results of the most important character.

Survey of route for railroad to the Pacific—

A. Northern route, under Governor I. I. Stevens. Region traversed extending from Fort Benton, on the Missouri, to the Pacific ocean.

B. Parallel of 38°, under Lieutenant E. G. Beckwith. From the Arkansas, by way of Fort Massachusetts and Salt Lake, to San Francisco.

C. Parallel of 35°, under Lieutenant Whipple. From Fort Smith, on the Arkansas, via Albuquerque, Zuñi, San Francisco mountains, and the Mohave, to San Francisco.

D. Partial route, under Lieutenant R. S. Williamson. Extending from San Francisco to the Mohave, and Tejon Pass to camp Yuma.

E. Parallel of 32°, under Lieutenant J. G. Parke. Extending from camp Yuma via Tueson to El Paso.

F. Parallel of 32°, under Captain J. Pope. From El Paso, across the head of the Brazos and Colorado, to Preston in Texas.

Exploration of the coast of California, by Lieutenant W. P. Trowbridge, United States army.

Exploration of the La Plata and its tributaries, by Lieutenant Page, United States navy.

A more particular account of these several expeditions will be found in the article on scientific explorations.

From these different expeditions a large number of collections have been received, embracing material of the first importance and interest. Full reports are in preparation, and will be presented to Congress for publication with the other results of the explorations, and with such amount of illustrations as circumstances may require or authorize.

Among the more private explorations, from which results of the greatest importance have been received, are those of Dr. P. R. Hoy, in Missouri; Reverend A. C. Barry, in Wisconsin; Gustavus Wurdemann, in Louisiana; Lieutenant H. G. Wright, at Garden Key, Florida; Robert Kennicott, northern Illinois; Dr. L. A. Edwards, Fort Towson, &c.; together with my own, on the Jersey coast. Further accounts of these will be hereafter given.

In view of the vast multitude of objects received during the year, it is manifestly impossible to give full details respecting them; and I can here only refer to this subject in the most general manner, taking up the collections in the following order:

Mammals.—A specimen of the so-called Sampson fox, a peculiar va-

riety of the red fox, or *Vulpes fulvus*, was received from Dr. Ackley and Dr. Kirtland, of Cleveland. Various kinds of *Sorex*, and other small mammals, from Reverend Chas. Fox, of Grosse Isle, Michigan.* The fœtus of a whale, from the arctic regions, was presented by Lieutenant Maury. The fresh skin and horns of a fallow deer (*Cervus dama*), and elk (*Elaphus canadensis*,) by Colonel Tuley, of Clarke county, Virginia, whose extensive park contains many fine specimens of these species. A pair of living wild cats (*Lynx rufus*,) were sent by Dr. Evans through Dr. D. D. Owen. The most important additions, however, have been received from Lieutenant Trowbridge, collected on the Pacific coast, including skins of deer, wolves, foxes, hares, lynxes, &c., with many small mammals. In this collection are several new species of hare.

Birds.—A very large collection of the birds of California was received from Lieutenant Trowbridge, embracing nearly all of the larger aquatic species of the coast, and another from Mr. Cutts. A collection of over 100 skins, from Gustavus Wurdemann, at Calcasieu, Louisiana, included several very rare and new species. Dr. Brewer presented some specimens from Wisconsin, and Mr. William M. Penrose an albino blackbird from near Carlisle, Pennsylvania.

Reptiles and fishes.—As usual, it is in this department that the additions have been greatest. The species of Wisconsin have been received from Dr. Hoy and Mr. Barry; of New Jersey and New York, from Mr. Brevoort and myself; of Mississippi, from Colonel Wailes and Reverend Benjamin Chase; of California, from Dr. Newberry, Mr. Bowman, and Lieutenant Trowbridge; of Illinois, from Mr. J. D. Sergeant, Robert Kennicott, and Mr. Harris; of South Carolina, from Professor Holmes, Mrs. Daniel, and Dr. Barker; of North Carolina, from Mr. Bridger, Mr. McNair, and Mr. Lineback; of Louisiana, from Mr. Wurdemann; of Missouri, from Dr. Hoy, Dr. Engelmann, and Mr. Lear; of Alabama, from Mr. Edgeworth; of Minnesota, from Mr. Riggs; of Tennessee, from Professors Owen and Johnson; of Chihuahua, from Mr. Potts; of Gulf of Mexico, from Lieutenant Wright; of Surinam, from Dr. Wyman; of Brazil, from Mr. Austin; of Trinidad and Key West, from Professor W. H. Thomas; of Africa, from Dr. Steele; together with many others. My limited space will not allow me to go into details respecting these collections beyond stating that those of Lieutenant Trowbridge are the most important, adding, as they do, some fifty new species of fishes alone to the North American fauna. Collections of reptiles deposited by Dr. Webb, who procured them in northern Mexico, New Mexico, and Texas, are likewise very valuable.

Quite a large number of living reptiles—snakes, lizards, turtles, &c., were received during the year, but, owing to the want of means for their proper preservation, few survived. Among those, however, at present in apparent good health, may be mentioned a northern rattlesnake (*Crotalus durissus*) from Virginia; the black massasauga, (*Crotalophorus massasauga,*) sent from Ohio by Dr. Kirtland; six specimens of *C. tergeminus*, Say, or prairie rattle, from Illinois, by Robert

* To this gentleman the Institution has been under very great obligations for numerous specimens illustrating the zoology of Michigan, accompanied, usually, by copious notes on the habits and peculiarities of the species. It is with profound regret that I have to record his death by cholera during the past summer.

Kennicott; two young alligators from Professor Forshey, Texas; a snapping turtle, *(Chelonura serpentina)* from Mississippi, and various others. Another season will, however, find us better prepared for a great variety of species already promised. Few collections of living animals excite more interest in the spectator than those of reptiles, while the habits of many species, at present unknown, can only be ascertained by their study in captivity. None admit of such confined accommodations, or require so little attendance and food.

Invertebrata.—Marine invertebrata of Jersey, were collected by myself, and of Louisiana by Mr. Wurdemann. A highly interesting and valuable collection made by Mr. Jarvis, inspector of timber in the Portsmouth navy yard, and presented by Commodore Smith, chief of the Bureau of Docks and Yards, illustrates well the growth of the teredo and barnacle, with the real or pretended artificial methods of preventing their ravages. From the experiments of Mr. Jarvis, however, it would seem to be proved conclusively that the white zinc paint, made by the New Jersey Company, as long as the surface covered by it remains unbroken, forms as effectual a protection to a ship's bottom as copper sheathing itself. Nearly all the alcoholic collections received included specimens of astaci and insects from different parts of North America.

Fossils.—Many valuable collections of fossil remains have been received. An interesting series from the vicinity of Satow was forwarded by the Rev. L. Vortisch; Mr. G. Lambert, of Mons, presented a series of carboniferous fossils of Belgium; specimens from Texas were sent in by Lieutenant J. G. Benton, United States army, and by Dr. Julius Froebel; from Panama by Dr. E. L. Berthoud; from Illinois by Dr. Stevens; from North Carolina by Mr. Bridger. A complete set of minerals and fossils of the remarkable brown-coal beds of Brandon, Vermont, was received from David Buckland. Sharks teeth and mastodon bones of Florida, from Captain Casey, United States army; fossil-wood of California, from Mr. Langton, and infusorial earth of Monterey, from Major Barnard.

Minerals.—A valuable collection of specimens illustrating the materials of which some of the principal public buildings in Europe are constructed, gathered by Mr. Evans, was deposited in his name by Lieutenant Gillis, and minerals of New Mexico and Texas were received from Lieutenant Colonel J. K. Mansfield, United States army, and Dr. Froebel; opal of Mexico from Mr. Rogers. A series illustrating the auriferous deposites of Bridgewater, Vermont, was presented by Mr. Cunningham.

Plants.—Some very large collections of plants of the Rocky Mountains and the regions west were brought in by the exploring expeditions. Others were sent from Texas by Dr. Ervendburg, from Minnesota by Mr. Riggs, from Madagascar by Messrs. Cotheal, &c. A very large leaf of the Talipot tree was presented by Commodore Aulick.

Antiquities.—Various specimens of Indian remains in North America have been received during the year from various sources, as also an ancient Peruvian vase from Talcahuana.

b—*Work done in the Museum.*

The labor of receiving, unpacking, and assorting the specimens received during the year has been very great, occupying a large share of my time as well as that of Mr. Girard.

Some idea of the labor involved may be obtained from the fact that in 1854 there were received 35 kegs and barrels, 26 cans, 175 jars, 94 boxes, and 32 packages, all containing a greater or less number of specimens, giving an aggregate of over 350 different lots, without including numerous specimens received singly. All these had to be assorted or repacked, labelled by localities, at least, and recorded in the proper books, and in most cases duplicate lists sent to the donors. We have, however, succeeded without other than mechanical aid in accomplishing all that was immediately necessary to be done, leaving very few arrears for the ensuing year.

Considerable progress has, likewise, been made in the determinations and descriptions of the collections themselves. A number of reports upon the vertebrata of the several explorations, both of the Pacific railroad survey, and of the United States navy astronomical expedition, under Lieutenant Gillis, have been either completed by Mr. Girard and myself or are in an advanced state of progress. The series of descriptive systematic catalogues of the collections has been extended by the preparation of an elaborate account of the North American toads by Mr. Girard, and of the frogs and tree frogs by myself; these are entirely finished and ready for press, and will make a volume nearly as large as the catalogue of North American serpents. Full descriptions of the families, genera, and species of all inhabiting North America (including about 20 new ones) are given, and analytic and exhaustive methods applied to the species. Such catalogues, forming as they do so many manuals in North American zoology, extend the benefits of the museum far beyond its walls. The demand, indeed, for them is so great, from all parts of the world, that of the catalogue of serpents two editions of 1,000 copies each have been called for and distributed.

A good deal of time has also been taken up in the preparation of specimens for examination, cleaning skeletons and skulls, dissecting, &c., while the selection, labelling, packing, and recording of the collections sent from the Institution have created no inconsiderable amount of labor.

In connxtion with the subject of the work done in the museum, it may, perhaps, be proper to refer to the article in the appendix containing the result of my observations on the habits and peculiarities of the fishes of the Jersey coast, as made in the summer, together with descriptions of the colors from life of such species as are apt to fade in spirits.

c—*The present Condition of the Museum.*

The paragraph upon the work done in the Museum covers to some extent the subject of the present heading. No change has been made in the places of deposit of the specimens owing to the very recent

period at which the new hall intended to receive the collections was completed, and this year, it is earnestly hoped, will not pass without an improvement in this respect. The new hall is quite large enough to contain all the collections hitherto made, as well as such others belonging to the government as may be assigned to it. No single room in the country is, perhaps, equal to it in capacity or adaptation to its purposes, as, by the proposed arrangement, it is capable of receiving twice as large a surface of cases as the old Patent Office hall, and three times that of the Academy of Natural Sciences of Philadelphia. In this room, then, there will be abundant opportunity to arrange all the collections which have been made or may be expected for some time to come in the order best suited to the wants of the student and most interesting to the casual visitor. In the mean time, under the conditions of the past year, everything has been done to render the collections as available and accessible as circumstances would allow; all the North American mammalia, amounting to over 500 specimens in skins, have been arranged systematically in drawers of dust and insects-proof walnut cases. The birds have been similarly treated, while the reptiles and fishes (each species from each locality in a separate jar) have been assorted as systematically as the over crowding of the present confined space would allow. During the year several thousand jars have been filled with alcholic specimens, which are illy accommodated on shelves, nearly every square inch of which was occupied at the beginning of the year. The shells of mollusca with the minerals and fossils, have generally been repacked after entry and stored away for the present, requiring as they do a less vigilant supervision. This has, to a certain extent, likewise been done with the plants.

d—*Distribution of Collections.*

In accordance with the spirit of the Institution, quite a large number of specimens, in sets varying in magnitude, have been distributed during the past year to various institutions and individuals desiring them for purposes of special investigation. Some of these may be looked upon in the light of returns for similar favors received or promised, but they have generally been furnished without reference to an equivalent of any kind. As the facilities of the Institution for receiving and properly arranging its collections increase and the duplicates are ascertained, by a proper examination of the specimens, this system of distribution may be carried to an extent that shall materially affect the progress of science throughout this country and the world.

To the investigator who has heretofore been obliged to spend the best years of his life in collecting together the materials of his labor, gathered amid toils and privations to which, in the end, he may be forced to succumb, the advantage of finding all he needs ready to his hand, and in greater extent and variety than he could singly hope to obtain, are beyond all calculation. For this reason it is that the accumulation of a large amount of duplicate material becomes necessary,

in addition to the complete series of specimens to be retained on the shelves.

Among the more important collections thus distributed may be mentioned one of 145 species of North American birds, in 199 specimens, to the Swedish Academy of Sciences at Stockholm, in return for a very valuable collection of skins and skeletons of north European mammalia; 97 species and 160 specimens of North American birds to Mr. F. Sturm, of Nürnburg, in return for collection of birds, &c., from central Europe; 104 lots of fishes and invertebrates to Professor Agassiz, of Cambridge, in return for numerous donations of duplicates from his pre-eminently valuable collection; fishes of Massachusetts to Dr. D. H. Storer, of Boston, to assist him in the preparation of his memoir on the fishes of the State; numerous birds and quadrupeds, both European and North American, to the Philadelphia Academy of Natural Sciences; eggs of American birds to Dr. T. M. Brewer, for his work on North American oology; large numbers of North American coleoptera to Dr. Leconte, for his memoirs on this department of entomology, &c. The list is capable of considerable extension, but there is enough to show how the Institution has endeavored to co-operate with all societies and individuals, engaged in special investigations, requiring materials additional to those already in their possession.

It will, however, be sufficiently evident that the Smithsonian Institution cannot indiscriminately undertake systematic exchange of specimens with other parties—with individuals especially. The force of the natural history department is not now sufficient for this, and may never be. To the mere collector, as distinguished from the investigator, it will not be expedient to distribute specimens to any considerable extent, as the disposable stock may be reduced so low as to render it difficult or impossible to do proper justice to the student. While, however, the Institution cannot undertake the mere business of exchange with individuals, unless in exceptional cases, and even with institutions, it can do and has done much to facilitate such exchange between other parties. Scarcely a week passes without the communication of information of the readiness or desire of exchange in particular departments on the part of different individuals or associations. All notifications or applications of the kind are systematically recorded in the proper books and duly referred to when occasion requires.

LIST OF THE PRINCIPAL DONATIONS TO THE MUSEUM OF THE SMITHSONIAN INSTITUTION DURING 1854.

Professor E. B. Andrews.—Keg of fishes from the Ohio river.

Commodore J. Aulick, U. S. N.—Leaf of Talipot palm *(Corypha umbracaulifera)* from Ceylon.

Joseph B. Austin.—Jar of reptiles from Para.

Spencer F. Baird.—Two kegs and one hundred jars of fishes, and invertebrates, with skins of birds, skulls and teeth of sharks and rays; from Beesley's Point, Cape May county, New Jersey. One keg of fishes from Greenport and Riverhead, Long Island. One keg of fishes from the fresh and brackish waters about Sing-Sing. New York. One keg

of fishes from the Hackensack river and Sparkill, Rockland county, New York.

Dr. S. W. Barker.—Living specimens of *Nerodia erythrogaster*, *Heterodon niger*, *Ophibolus getulus*, and *Elaps fulvus* from South Carolina.

Major J. G. Barnard, U. S. A.—Infusorial earth from Monterey, California.

Rev. A. C. Barry.—Keg of fishes from southern Wisconsin; two kegs of mammals, reptiles, fishes, &c., from northern Wisconsin.

Lieutenant J. G. Benton, U. S. A.—Box of fossils from San Antonio, Texas.

Dr. E. L. Berthoud.—Fossils from the isthmus of Panama. Indian relics and fishes from Bourbon county, Kentucky.

J. S. Bowman and S. M. Bowman.—Fishes and reptiles collected on the route from Salt Lake city to Marysville, California.

C. C. Brevoort.—Fresh specimens of *Esox fasciatus* from Long Island. Fresh specimens of trout and hake from New York. Fishes, in alcohol, from the vicinity of Brooklyn, New York.

T. M. Brewer, M. D.—Skins of birds from Dane county, Wisconsin.

J. L. Bridger.—Stand containing a series of tertiary fossils, with living serpents, *Farancia abacurus*, and two birds, *Ortyx Virginianus*, from Edgcombe county, North Carolina.

David Buckland.—Box of minerals and fossils from the brown coal deposit of Brandon, Vermont.

Captain Casey, U. S. A.—Fossil teeth of mastodon and sharks from Florida.

Rev. Benjamin Chase.—Stuffed *Sternothaerus* from Concordia lake, Louisiana.

Captain Chatten.—Specimens, in alcohol, of *Ophidium marginatum* from Beesley's point, New Jersey.

Charleston College, S. C.—Duplicates of a collection of Batrachia.

Messrs. Cothcal & Co., New York.—Specimens of seeds of silk cotton; leaves, fruit, and manufactured cloth from the Rafar palm, Madagascar. Model of Madagascar canoe.

John P. Cunningham.—Box of minerals illustrating the auriferous deposits of Vermont.

R. D. Cutts.—Skins of thirty species of birds from San Francisco county, California.

Mrs. M. E. Daniel.—Can of reptiles and fishes from Anderson, South Carolina.

Edward T. Denig.—Reptiles and fishes from Fort Union, Nebraska.

T. J. Dryer.—Specimens of minerals from the summit of Mount Hood, Oregon.

J. Eckels, (United States consul, Talcahuana.)—Peruvian vase and ear of corn, disintered near Talcahuana.

A. E. Edgeworth.—Can of reptiles and fishes, with dried plants, shells, &c., from Marengo county, Alabama.

Dr. L. A. Edwards, U. S. A.—One box of fossils, one bale of plants, ten jars of reptiles and insects, and various heads and feet of birds, from Fort Towson, Arkansas.

Dr. George Engelmann.—One barrel fishes, reptiles, and mammals from St. Louis.

L. C. Ervendburg.—Package of seeds of Texas plants.

Dr. J. Evans and Dr. D. D. Owen.—Two living wild cats, (*Lynx rufus*,) from the Upper Missouri.

Dr. Julius Froebel.—Box of fossils and minerals from Texas and New Mexico.

Professor Charles Fox.—Skin of shrew, (*Sorex dekayi.*)

Lieutenant J. M. Gilliss, U. S. N.—Specimens of building materials collected in Europe, by W. W. Evans. Deposited.

John Greiner.—Specimens of *Phrynosoma*, in alcohol, from Santa Fé.

Dr. A. M. Grinnan.—Collection of plants from near Fredericksburg, Virginia. Can of reptiles and fish from Madison, Virginia.

J. O. Harris.—Fossils, insects, fishes, and reptiles, from Ottawa, Illinois.

Dr. Henderson, U. S. N.—Jar of fishes from Columbia county, Pennsylvania.

Mrs. Mary Hereford.—Bones of *Zeuglodon*, from a marl bed in Calvert county, Maryland.

Dr. Hereford.—Living specimens of *Leptophis æstivus*, from Prince George's, Maryland.

Dr. P. R. Hoy.—Fishes from southern Wisconsin; keg of fishes, reptiles, and mammals, from Illinois and Missouri; two kegs of fishes and reptiles from western Missouri; reptiles from Mansfield county, Ohio.

Rev. Thomas R. Hunt.—Red shale, with teeth of fishes, from northern Pennsylvania.

R. W. Kennicott.—Two jars of reptiles, fishes, &c., from northern Illinois; box containing six living *Crotalophorus tergeminus*, and other species of serpent, with other reptiles, from northern Illinois.

Dr. W. S. King, U. S. A.—Skins of chaparal cock, (*Geococcyx Mexicanus,*) from San Diego, California.

C. F. Kirtland.—Keg of fishes from Yellow creek, Ohio.

Professor J. P. Kirtland and Dr. Ackley.—Fresh specimen of Sampson fox, (*Vulpes fulvus,*) from Cleveland, Ohio.

Prof. J. P. Kirtland.—Four living specimens of *Crotalophorus massasanga.*

G. Lambert.—Fossils and rocks from Belgium.

W. F. Langton.—Fossil wood and sulphuret of iron, from the Minnesota mines in California.

O. H. P. Lear.—Fishes from Marion county, Missouri.

Major John Le Conte.—Jar of reptiles from Liberty county, Georgia; skin of *Sorex* from Georgia.

J. C. Lineback.—Can of reptiles and fishes from Salem, North Carolina.

Marshall McDonald.—Living specimen of *Scotophis Alleghaniensis*, Alleghany black snake, from Hampshire county, Virginia.

Lieutenant A. McRae, United States navy.—Scorpions and crustaceans from Panama.

J. C. McNair.—Eight jars of reptiles and fishes from Summerville, North Carolina.

R. C. Mack.—Specimens of Zanzibar copal, enclosing an insect and a lizard.

Rev. Charles Mann and *Masters George and William Mann.*—Salamander *(Amblystoma opacum)* with eggs taken in February, 1854. Can of fishes and reptiles from Gloucester county, Virginia.

Colonel J. K. Mansfield, United States Army.—Box of minerals and fossils, collected between Fort Atkinson and Santa Fé, New Mexico.

Hon. George P. Marsh.—Keg of fishes and reptiles with shells, &c., from Palestine, Syria, &c.

Lieutenant M. F. Maury, United States Navy.—Fœtus of right whale, and portion of the skin of sperm whale of 75 barrels, from the North Atlantic.

Professor O. W. Morris.—Young *Menopoma* just excluded from the egg, Holston river, Tennessee.

W. E. Moore.—Skin of humming bird, from the Island of Juan Fernandez.

Dr. J. S. Newberry.—Jar of reptiles from Bodega, California (deposited.)

Professor R. Owen.—Keg of reptiles and fishes from Tennessee.

William M. Penrose.—Skin of albino female of *Agelaius phoeniceus*, shot near Carlisle, Pennsylvania.

Charles Pillichody.—Two cans of fishes from Mobile, Alabama.

John Potts.—Skins of mammalia and reptiles in alcohol, from New Mexico. Skins of *Lepus artemisia* and of several birds, with a can of reptiles and fishes, from Chihuahua.

Alfred L. Riggs.—Can of reptiles and fishes, from Lac qui Parle, Minnesota.

Jeremiah Rogers.—Precious opal from Mexico.

Hon. Sion H. Rogers.—Fossil bone from Roanoke, North Carolina.

Sir R. Schomburgh.—Land shells, from Guiana.

J. D. Sergeant.—Specimens of *Pityophis* and *Eutænia*, from Illinois.

Dr. G. G. Shumard.—Five cans of fishes, one can of reptiles and two boxes of insects, from Fort Smith, Arkansas.

Captain E. K. Smith, U. S. A.—Fishes and reptiles, from St. Augustine, Florida.

Commodore Smith, U. S. N.—Series of specimens illustrating the experiments of Mr. John Jarvis, inspector of timber, navy yard, Portsmouth, Virginia, on the growth and ravages of teredo and barnacle, and means of protection against them.

Dr. Thomas L. Steele.—Four jars of reptiles and fishes, with one *Pteropus*, from Cape Palmas, west Africa.

Dr. R. P. Stevens.—Box of fossils and shells, from Illinois.

Professor W. H. B. Thomas.—Jar of reptiles, from Trindad, and one from Key West, Florida. Skin of *Scalops breweri.*

Lieutenant W. P. Trowbridge, U. S. A.—One keg and can of reptiles and fishes, with two boxes of skins of birds and mammals, skeletons, shells, &c., from San Diego, Monterey, and Presidio, California.

Colonel Joseph Tuley.—Skins and horns of male fallow deer, *Cervus dama*, and elk, *Elaphus canadensis*, from his park in Clarke county, Virginia.

Pfarrer L. Vortisch.—Collections of minerals, fossils, and antiquities, from Satow, Germany.

Colonel B. L. C. Wailes.—Three kegs of fishes, from Mississisippi. Keg of reptiles and fishes, from Washington, Mississippi.

Dr. T. H. Webb.—Reptiles, mammals, insects, &c., from California, New Mexico, and Texas. (Deposited.)

Lieutenant H. G. Wright, U. S. A.—Keg of fishes, from Fort Jefferson, Garden Key, Florida.

Gustavus Wurdemann.—Fishes, reptiles, and invertebrates, from Aransas, Texas, and New Orleans. Box of bird skins, and ten jars of reptiles, fishes, &c., from Calcasieu, Louisiana. Six jars of fishes, &c., from Fort Morgan, Mobile, Alabama. Reptiles, fishes, and invertebrates, Brazos, Texas. Fishes, reptiles, and invertebrates in alcohol, with skins of birds and mammals, from Aransas, Texas.

Dr. J. Wyman.—Can of fishes and reptiles, from Surinam and Guiana.

List of Meteorological Stations and Observers.

State.	Name of observer.	Residence.	County.
Nova Scotia	Henry Poole	Albion Mines	Pictou.
	A. T. S. Stuart	Wolfville, Acadia College	
Canada	Dr. Charles Smallwood	St. Martin's, near Montreal.	
Maine	George B. Barrows	Fryeburg	Oxford.
	Joshua Bartlett	South Thomaston	Lincoln.
	John J. Bell	Carmel	Penobscot.
	William D. Dana	Perry	Washington.
	Samuel A. Eveleth	Windham	Cumberland.
	Rev. S. H. Merrill	Bluehill	Hancock.
	J. D. Parker	Steuben	Washington.
New Hampshire	Samuel N. Bell	Manchester	Hillsborough.
	Rev. L. W. Leonard	Exeter	Rockingham.
	R. C. Mack	Londonderry	Rockingham.
	Dr. William Prescott	Concord	Merrimack.
	George B. Sawyer	Salmon Falls	Stafford.
	Henry E. Sawyer	Great Falls	Stafford.
	Albert A. Young, Prof. Ira Young	Hanover	Grafton.
Vermont	D. Buckland	Brandon	Rutland.
	James K. Colby, J. P. Fairbanks	St. Johnsbury	Caledonia.
	Charles A. J. Marsh, James A. Paddock	Craftsbury	Orleans.
	D. Underwood	Castleton	Rutland.
	Zadock Thompson	Burlington	Crittenden.
Massachusetts	Lucius C. Allin	Springfield	Hampden.
	William Bacon	Richmond	Berkshire.
	John Brooks	Princeton	Worcester.
	Marshal Conant	Bridgewater	Plymouth.
	Prof. P. A. Chadbourne	Williamstown	Berkshire.
	Emerson Davis	Westfield	Hampden.
	B. R. Gifford	Wood's Hole	Barnstable.
	Amasa Holcomb	Southwick	Hampden.
	George Chandler, M. D.	Worcester	Worcester.
	D. J. Holmes, James Orton	Williamstown	Berkshire.
	Hon. Wm. Mitchell	Nantucket	Nantucket.
	R. D. Mussey	Rockport	Essex.
	Dr. J. Geo. Metcalf	Mendon	Worcester.
	Dr. H. C. Perkins	Newburyport	Essex.
	Henry Rice	North Attleboro'	Bristol.
	Samuel Rodman	New Bedford	Bristol.
	Dr. James Robbins	Uxbridge	Worcester.
	Prof. E. S. Snell	Amherst	Hampshire.
	Dr. E. A. Smith	Worcester	Worcester.
	Albert Schlegel	Taunton	Bristol.
Rhode Island	Prof. A. Caswell	Providence	Providence.
	George Manchester	Portsmouth	Newport.
	Samuel Powel	Newport	Newport.
	Henry C. Sheldon	North Scituate	Providence.
Connecticut	Rev. T. Edwards	New London	New London.
	T. S. Gold	West Cornwall	Litchfield.
	D. Hunt	Pomfret	Windham.
	Prof. J. Johnston	Middletown	Middlesex.
	Dr. Ovid Plumb	Salisbury	Litchfield.
	James Rankin	Saybrook	Middlesex.
New York	E. M. Alba	Angelica	Alleghany.
	Edward A. H. Allen	Troy	Rensselaer.
	Thomas B. Arden	Beverly	Putnam.
	Warren P. Adams	Glen's Falls	Warren.
	Charles A. Avery	Seneca Falls	Seneca.
	John Bowman	Baldwinsville	Onondaga.
	S. De Witt Bloodgood	New York	New York.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
New York—Con.....	Eph. N. Byram.....	Sag Harbor.....	Suffolk.
	J. Everett Breed.....	Smithville.....	Jefferson.
	C. Thurston Chase.....	Chatham.....	Columbia.
	E. A. Dayton.....	Madrid.....	St. Lawrence.
	J. S. Gibbons.....	New York.....	New York.
	W. E. Guest.....	Ogdensburg.....	St. Lawrence.
	J. Caroll House.....	Lowville.....	Lewis.
	J. H. Hart.....	Oswego.....	Oswego.
	Dr. S. B. Hunt.....	Buffalo.....	Erie.
	E. W. Johnson.....	Canton.....	St. Lawrence.
	John Lefferts.....	Lodi.....	Seneca.
	L. A. Langdon.....	Falconer.....	Chautauque.
	Charles A. Lee.....	Peekskill.....	Westchester.
	Capt. W. S. Malcom....	Oswego.....	Oswego.
	L. F. Munger.....	Le Roy.....	Genessee.
	Prof. D. J. Pratt.....	Fredonia.....	Chautauque.
	Dr. J. W. Smith.....	East Franklin.....	Delaware.
	Elias O. Salisbury.....	Buffalo.....	Erie.
	Dr. H. P. Sartwell.....	Penn Yan.....	Yates.
	Rev. Thomas H. Strong.	Flatbush.....	Kings.
	Stillman Spooner.....	Wampsville.....	Madison.
	C. S. Woodward.....	Beaver Brook.....	Sullivan.
	P. O. Williams.....	Gouverneur.....	St. Lawrence.
	Walter D. Yale.....	Houseville.....	Lewis.
New Jersey.....	Robert L. Cooke.....	Bloomfield.....	Essex.
	Prof. Geo. H. Cook.....	New Brunswick.....	Middlesex.
	Rev. Ad. Frost.....	Burlington.....	Burlington.
	E. T. Mack.....	New Brunswick.....	Middlesex.
	W. A. Whitehead.....	Newark.....	Essex.
Pennsylvania.....	Samuel Brown.....	Bedford.....	Bedford.
	W. O. Blodget.....	Sugar Grove.....	Warren.
	Dr. A. C. Blodget.....	Youngsville.....	Warren.
	John Comly.....	Byberry.....	Philadelphia.
	D. S. Deering.....	Brookville.....	Jefferson.
	Fenelon Darlington.....	Pocopson.....	Chester.
	Joseph Edwards.....	Chromedale.....	Delaware.
	Rev. D. J. Eyler.....	Waynesboro'.....	Franklin.
	John Heisely.....	Harrisburg.....	Dauphin.
	Ebenezer Hance.....	Morrisville.....	Bucks.
	O. T. Hobbs.....	Randolph.....	Crawford.
	John Hughes.....	Pottsville.....	Schuylkill.
	M. Jacobs.....	Gettysburg.....	Adams.
	Prof. J. A. Kirkpatrick..	Philadelphia.....	Philadelphia.
	J. R. Lowrie.....	Warrior's Mark.....	Huntington.
	Rev. J. Grier Ralston...	Norristown.....	Montgomery.
	Paul Swift.....	Haverford.....	Philadelphia.
	Francis Schreiner.....	Moss Grove.....	Crawford.
	Dr. H. Smyser.....	Pittsburgh.....	Alleghany.
	Dr. R. P. Stephens.....	Ceres.....	McKean.
	T. H. Thickstun.....	Meadville.....	Crawford.
	A. D. Weir.....	Freeport.....	Armstrong.
	W. W. Wilson.....	Pittsburgh.....	Alleghany.
	R. Weiser.....	Andersville.....	Perry.
Delaware.....	Prof. W. A. Crawford...	Newark.....	New Castle.
	J. P. Walker.....	Dover.....	Kent.
Maryland.....	Prof. William Baer....	Sykesville.....	Carroll.
	Miss H. M. Baer.....		
	Rev. John P. Carter.....	Hagerstown.....	Washington.
	Henry E. Hanshaw.....	Frederick.....	Frederick.
	Benj. O. Lowndes.....	Blenheim.....	Prince George's.
	Prof. Jas. F. Maguire....	New Windsor.....	Carroll.
Virginia.....	Lieut. R. F. Astrop.....	Crichton's Store.....	Brunswick.
	Samuel Couch.....	Ashland.....	Putnam.
	Benj. Hallowell.....	Alexandria.....	Alexandria.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
Virginia—Continued.	Jed. Hotchkiss	Bridgewater	Rockingham.
	Samuel X. Jackson	Leesburg	Loudon.
	William S. Kern	Huntersville	Pocahontas.
	Charles J. Meriwether	Montcalm	Albemarle.
	J. W. Marvin	Winchester	Frederick.
	A. Nettleton	Lynchburg	Campbell.
	Thomas Patton	Lewisburg	Greenbier.
	Prof. Geo. R. Rosseter	Buffalo	Putnam.
	David Turner	Richmond	Henrico.
	Prof. N. B. Webster	Portsmouth	Norfolk.
North Carolina	Rev. Fred. Fitzgerald	Jackson	Northampton.
	Dan. Morelle	Thornbury	Northampton.
	Prof. Jas. Phillips	Chapel Hill	Orange.
	Dr. J. Bryant Smith	Lincolnton	Lincoln.
South Carolina	Thornton Carpenter	Camden	Kershaw.
	Alex. Glennie	Waccaman	All Saints Parish.
	H. W. Ravenel	Aiken	Barnwell.
	J. A. Young	Camden	Kershaw.
Georgia	R. T. Gibson	Whitemarsh Island	Chatham.
	William Haines	Augusta	Richmond.
	John F. Posey	Savannah	Chatham.
	Dr. E. M. Pendleton	Sparta	Hancock.
	William Schley	Augusta	Richmond.
	Prof. Wm. D. Williams	Madison	Morgan.
Florida	Dr. A. S. Baldwin	Jacksonville	Duval.
	W. C. Dennis	Key West	Monroe.
	John Newton	Orange Hill	Washington.
	John Pearson	Pensacola	Escambia.
	Aug. Steele	Cedar Keys	Levy.
Alabama	George Benagh	Tuscaloosa	Tuscaloosa.
	S. J. Cumming	Monroeville	Monroe.
	Prof. John Darby	Auburn	Macon.
	Ben. F. Holley	Wetokaville	Talladega.
	R. T. Meriwether	McMath's P. O.	Tuscaloosa.
	H. Tutwiler	Green Springs	Green.
	Prof. M. Tuomey	Tuscaloosa	Tuscaloosa.
Mississippi	A. R. Green	Jackson	Jackson.
	Prof. L. Harper	Oxford	Lafayette.
	Rev. E. S. Robinson	Garlandsville	Jasper.
	Wm. Henry Waddell	Grenada	Yalabusha.
Louisiana	Dr. E. H. Barton	New Orleans	Orleans.
	Prof. W. P. Riddel	Jackson	St. James Parish.
Texas	Prof. L. C. Ervendberg	New Wied	Comal.
	J. W. Glenn	Austin	Travis.
	Dr. S. K. Jennings	Austin	Travis.
Tennessee	Dr. Robert T. Carver	Friendship	Dyer.
	George Cooke, Prof. L. Griswold	Knoxville	Knox.
	Jas. Higgins	Memphis	Shelby.
	Prof. Hamilton	Trenton	Gibson.
	Prof. Ben. C. Jillson	Lebanon	Wilson.
	W. M. Stewart	Glenwood	Montgomery.
	Prof. A. P. Stewart	Lebanon	Wilson.
Kentucky	O. Beatty	Danville	Boyle.
	E. L. Berthoud	Maysville	Mason.
	Rev. J. Miller, Rev. G. S. Savage	Millersburg	Bourbon.
	L. G. Ray	Paris	Bourbon.
	Dr. John Swain	Ballardsville	Oldham.
	J. D. Shane	Lexington	Fayette.
	Mrs. Lawrence Young	Springdale	Jefferson.
Ohio	Prof. J. W. Andrews	Marietta	Washington.
	Prof. G. M. Barber	Berea	Cuyahoga.
	R. S. Bosworth	College Hill	Hamilton.
	F. A. Benton	Mount Vernon	Knox.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
Ohio—Continued	Geo. L. Crookham.....	Jackson, C. H.....	Jackson.
	Miss Ardelia Cunningham	Unionville.....	Lake.
	Jacob N. Desellem.....	Richmond.....	Jefferson.
	Lewis M. Dayton.....	Newark.....	Licking.
	J. H. Fairchild.....	Oberlin	Loraine.
	L. Groneweg.....	Germantown	Montgomery.
	G. A. Hyde	Norwalk	Huron.
	F. Hollenbeck.....	Perrysburg	Wood.
	Dr. J. G. F. Holston....	Zanesville.....	Muskingum.
	F. W. Hurtt.....	Cincinnati	Hamilton.
	Dr. John Ingram.....	Savannah	Ashland.
	Dr. J. P. Kirtland	East Rockport.....	Cuyahoga.
	G. W. Livezay.....	Gallipolis	Gallia.
	John F. Lukens.....	Zanesfield.....	Logan.
	J. McD. Mathews.....	Hillsboro'.....	Highland.
	G. S. Ormsby	College Hill	Hamilton.
	Prof. S. N. Sanford	Granville.....	Licking.
	Robert Shields.....	Bellcentre.....	Logan.
	E. Spooner.....	Keen	Coshocton.
	Edmund West	Huron	Erie.
Michigan	William Campbell.....	Battle Creek.....	Calhoun.
	Alfred E. Currier.....	Grand Rapids.....	Kent.
	Rev. Geo. Duffield.....	Detroit.....	Wayne.
	Dr. S F. Mitchell.....	East Saginaw.....	Saginaw.
	Capt. A. D. Perkins.....	Monroe	Monroe.
	H. R. Schetterly	Grand Traverse.....	Michilimackinac.
	L. H. Streng	Saugatuck.....	Alleghany.
	J. J. Strang	St. James	Michilimackinac.
	Dr. M. V. Taylor.....	Brooklyn.....	Jackson.
	Miss Octavia C. Walker.	Cooper.....	Kalmazoo.
	Dr. Thomas Whelpley...	Brest.....	Monroe.
	Lorin Woodruff.....	Ann Arbor	Washtenaw.
	A. Winchell.....	Ann Arbor	
Indiana.....	W. W. Austin.....	Richmond.....	Wayne.
	C. Barnes	Madison.....	Jefferson.
	A. H. Bixby.....	Lafayette.....	Tippecanoe.
	J. Chappelsmith.....	New Harmony.....	Posey.
	W. B. Coventry.....	Kendallville.....	Noble.
	Dr. V. Kersey.....	Milton	Wayne.
	J. Knauer.....	Kendallville	Noble.
	H. Peters.....	Lafayette.....	Tippecanoe.
	D. H. Roberts.....	New Garden.....	Wayne.
	Prof. Joseph Tingley	Greencastle.....	Putnam.
Illinois.....	Prof. W. Coffin.....	Batavia	Kane.
	L. G. Edgerly.....	Granville.....	Putnam.
	John Grant.....	Manchester.....	Scott.
	Joel Hall.....	Athens.....	Menard.
	Dr. J. A. Harris.....	Ottawa.....	La Salle.
	Dr. John James.....	Upper Alton.....	Madison.
	Dr. S. B. Mead.....	Augusta.....	Hancock.
Missouri	Fred. Behmer.....	Fort Pierre.....	
	Dr. Engelmann	St. Louis.....	St. Louis.
	O. H. P. Lear	Dry Ridge.....	Marion.
Iowa	Miss Ida E. Ball	Keokuk	Lee.
	E. C. Bidwell.....	Quasqueton	Buchanan.
	Dr. Asa Horr.....	Dubuque.....	Dubuque.
	Daniel McCready	Fort Madison.....	Lee.
	Benjamin F. Odell.....	Poultney	Delaware.
	Rev. Joshua Phelps.....	Alexander College...	Dubuque.
	P. G. Parvin.....	Muscatine	Muscatine.
	E. H. A. Scheeper.....	Pella.....	Marion.
Wisconsin	Miss M. E. Baker.....	Ceresca.....	Fond du Lac.
	Thomas Gay.....	Belle Fontaine.....	Marquette.
	L. A. Lapham.....	Milwaukie.....	Milwaukie.
	Prof. S. P. Lathrop.....	[illegible]	Rock.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
Wisconsin—Contin'd.	G. F. Livingston	Hudson	St. Croix.
	Dr. J. L. Pickard	Plattevillè	Grant.
	J. McQuigg, W. Porter	Beloit	Rock.
	S. H. Carpenter, J. W. Sterling	Madison	Dane.
	Edward S. Spencer	Summit	Waukesha.
	J. F. Willard	Janesville	Rock.
	Carl Winkler	Milwaukie	Milwaukie.
Minnesota	C. F. Anderson	St. Anthony's Falls	Ramsey.
	Rev. Elisha W. Carver	Red Lake	Pembina.
	A. O. Kellum	St. Joseph	Pembina.
	Rev. S. W. Mauncey	Fort Ripley	
	S. R. & A. L. Riggs	Lac qui parle	Dahkota.
	David B. Spencer	St. Joseph	Pembina.
California	Dr. H. Gibbons	San Francisco	San Francisco.
	Dr. F. W. Hatch	Sacramento	Sacramento.
	Rev. J. A. Shepherd	San Francisco	San Francisco.
Nebraska	D. E. Reed	Bellevieu	
Paraguay	E. A. Hopkins	Ascension	

Meteorological observers—New York University system.

Name.	Residence.	County.
M. R. Batchelder	Fredonia	Chautauque.
John N. Brinkerhoff	Union Hall, Jamaica	Queen's.
Prof. Chester Dewey	Rochester	Monroe.
John Felt, jr	Liberty	Sullivan.
W. H. Gillespie	Mexico	Oswego.
Ira F. Hart	Elmira	Chemung.
John F. Jenkins	White Plains	Westchester.
Mrs. M. T. Lobdell	North Salem	Westchester.
A. W. Morehouse	Spencertown	Columbia.
Prof. O. W. Morris	Institute for Deaf and Dumb.	New York city.
Prof. David Murray	Albany	Albany.
Edw. C. Reed	Horner	Cortland.
Prof. O. Root	Clinton	Oneida.
J. O. Stratton	Oxford	Chenango.
Jos. W. Taylor	Plattsburg	Clinton.
Rev. R. D. Van Kleek	Flatbush	King's.
Prof. W. D. Wilson	Geneva	Ontario.

ALPHABETICAL LIST OF METEOROLOGICAL OBSERVERS.

Name.	Residence.	State.
Adams, Warren P.	Glen's Falls.	New York.
Alba, E. M.	Angelica	New York.
Allen, Edw. A. H.	Troy	New York.
Allin, Lucius C	Springfield	Massachusetts.
Anderson, C. F	St. Anthony's Falls	Minnesota.
Andrews, Prof. J. W.	Marietta	Ohio.
Arden, Thos. B.	Beverly	New York.
Astrop, Lieut. R. F	Crichton's store	Virginia.
Austin, W. W.	Richmond	Indiana.
Avery, Chas. A.	Seneca Falls	New York.
Bacon, Wm	Richmond	Massachusetts.
Baer, Miss H. M.	Sykesville	Maryland.
Baer, Prof. Wm.	Sykesville	Maryland.
Baker, Miss M. E.	Ceresca	Wisconsin.
Baldwin, Dr. A. S.	Jacksonville	Florida.
Ball, Miss Ida E.	Keokuk	Iowa.
Barber, Prof. G. M.	Berea	Ohio.
Barnes, C	Madison	Indiana.
Barrows, Geo. B.	Fryeburg	Maine.
Bartlett, Joshua	South Thomaston	Maine.
Barton, Dr. E. H.	New Orleans	Louisiana.
Batchelder, M. R.	Fredonia	New York.
Beatty, O	Danville	Kentucky.
Behmer, F.	Fort Pierre	Missouri.
Bell, John J	Carmel	Maine.
Bell, Samuel N	Manchester	New Hampshire.
Benagh, George	Tuscaloosa	Alabama.
Benton, F. A	Mount Vernon	Ohio.
Berthoud, E. L.	Maysville	Kentucky.
Bidwell, E. C.	Quasqueton	Iowa.
Bixby, A. H	Lafayette	Indiana.
Blodget, Dr. A. C.	Youngsville	Pennsylvania.
Blodget, W. O.	Sugar Grove	Pennsylvania.
Bloodgood, S. De Witt	New York	New York.
Bosworth, R. S	College Hill	Ohio.
Bowman, John	Baldwinsville	New York.
Breed, J. Everett	Smithville	New York.
Brinkerhoff, John N.	Union Hall, Jamaica	New York.
Brooks, John	Princeton	Massachusetts.
Brown, Samuel	Bedford	Pennsylvania.
Buckland, D.	Brandon	Vermont.
Byram, E. N	Sag Harbor	New York.
Campbell, Wm.	Battle Creek	Michigan.
Carpenter, S. H.	Madison	Wisconsin.
Carpenter, Thornton	Camden	South Carolina.
Carter, Rev. Jno. P	Hagerstown	Maryland.
Carver, Rev. E. W.	Red Lake	Minnesota.
Carver, Dr. Robt. T.	Friendship	Tennesse.
Caswell, Prof. A	Providence	Rhode Island.
Chadbourne, Prof. P. A.	Williamstown	Massachusetts.
Chandler, Dr. George	Worcester	Massachusetts.
Chappelsmith, John.	New Harmony	Indiana.
Chase, C. Thurston.	Chatham	New York.
Coffin, Prof. W.	Batavia	Illinois.
Colby, Jas. K.	St. Johnsbury	Vermont.
Comly, John	Byberry	Pennsylvania.
Conant, Marshal	Bridgewater	Massachusetts.
Cooke, George	Knoxville	Tennessee.
Cooke, Robert L.	Bloomfield	New Jersey.
Cook, Prof. George H.	New Brunswick	New Jersey.
Couch, Samuel	Ashland	Virginia.
Coventry, W. B.	Utica	New York.
Crawford, Prof. W. A.	Newark	Delaware.

METEOROLOGICAL LIST—Continued.

Name.	Residence.	State.
Crookham, George L.	Jackson	Ohio.
Cumming, S. J.	Monroeville	Alabama.
Cunningham, Miss A.	Unionville	Ohio.
Currier, Alfred E.	Grand Rapids	Michigan.
Dana, William D.	Perry	Maine.
Darby, Prof. John.	Auburn	Alabama.
Darlington, Fenelon.	Pocopson	Pennsylvania.
Davis, Emerson.	Westfield	Massachusetts.
Dayton, E. A.	Madrid	New York.
Dayton, Lewis M.	Newark	Ohio.
Deering, D. S.	Brookville	Pennsylvania.
Dennis, W. C.	Key West	Florida.
Desellem, Jacob N.	Richmond	Ohio.
Dewey, Professor Chester.	Rochester	New York.
Duffield, Rev. George.	Detroit	Michigan.
Edgerly, L. G.	Granville	Illinois.
Edwards, Joseph.	Chromedale	Pennsylvania.
Edwards, Rev. T.	New London	Connecticut.
Engelmann, Dr.	St. Louis	Missouri.
Ervendburg, Prof. L. C.	New Wied	Texas.
Eveleth, Samuel A.	Windham	Maine.
Eyler, Rev. D. J.	Waynesboro'	Pennsylvania.
Fairbanks, J. P.	St. Johnsbury	Vermont.
Fairchild, J. H.	Oberlin	Ohio.
Felt, John.	Liberty	New York.
Fitzgerald, Rev. F.	Jackson	North Carolina
Frost, Rev. A.	Burlington	New Jersey.
Gay, Thomas.	Bellefontaine	Wisconsin.
Gibbons, Dr. H.	San Francisco	California.
Gibbons, J. S.	New York.	New York.
Gibson, R. T.	Whitemarsh Island	Georgia.
Gifford, R. R.	Wood's Hole	Massachusetts.
Gillespie, W. H.	Mexico	New York.
Glennie, Alexander.	Waccaman	South Carolina.
Glenn, J. W.	Austin	Texas.
Gold, T. S	West Cornwall	Connecticut.
Grant, John.	Manchester	Illinois.
Green, A. R.	Jackson	Mississippi.
Griswold, Prof. L.	Knoxville	Tennessee.
Groneweg, L.	Germantown	Ohio.
Guest, W. E.	Ogdensburg	New York.
Haines, William	Augusta	Georgia.
Hall, Joel.	Athens	Illinois.
Hallowell, Benjamin.	Alexandria	Virginia.
Hamilton, Professor	Trenton	Tennessee.
Hance, Ebenezer	Morrisville	Pennsylvania.
Hanshaw, Henry E.	Frederick	Maryland.
Harper, Prof. L.	Oxford	Mississippi
Harris, Dr. J. O.	Ottawa	Illinois.
Hart, Ira F	Elmira	New York
Hart, J. H.	Oswego	New York.
Hatch, Dr. F. W.	Sacramento	California.
Heisley, John.	Harrisburg	Pennsylvania.
Higgins, James.	Memphis	Tennessee.
Hobbs, O. T.	Randolph	Pennsylvania.
Holcomb, Amasa.	Southwick	Massachusetts
Hollenbeck, F.	Perrysburg	Ohio.
Holley, B. F.	Wetokaville	Alabama.
Holmes, D. J	Williamstown	Massachusetts
Holston, Dr. J. G. F.	Zanesville	Ohio.
Hopkins, E. A.	Ascension	Paraguay.

METEOROLOGICAL LIST—Continued.

Name.	Residence.	State.
Horr, Dr. Asa	Dubuque	Iowa.
Hotchkiss, Jed	Bridgewater	Virginia.
House, J. Carroll	Lowville	New York.
Hughes, John	Pottsville	Pennsylvania.
Hunt, D	Pomfret	Connecticut.
Hunt, Dr. S. B	Buffalo	New York.
Hurtt, F. W	Cincinnati	Ohio.
Hyde, G. A	Norwalk	Ohio.
Ingram, Dr. John	Savannah	Ohio.
Jackson, Samuel X	Leesburg	Virginia.
Jacobs, M	Gettysburg	Pennsylvania.
James, Dr. John	Upper Alton	Illinois.
Jenkins, J. F	White Plains	New York.
Jennings, Dr. S. K	Austin	Texas.
Jillson, Professor B. C	Lebanon	Tennessee.
Johnson, E. W	Canton	New York.
Johnston, Professor J	Middletown	Connecticut.
Kellum, O. A	St. Joseph's	Minnesota.
Kersey, Dr. V	Milton	Indiana.
Kirkpatrick, Prof. J. A	Philadelphia	Pennsylvania.
Kirkland, Dr. J. P	East Rockport	Ohio.
Knauer, J	Kendallville	Indiana.
Langdon, L. A	Falconer	New York.
Lapham, I. A	Milwaukie	Wisconsin.
Lathrop, Prof. S. P	Beloit	Wisconsin.
Lear, O. H. P	Dry Ridge	Missouri.
Lee, Charles A	Peekskill	New York.
Lefferts, John	Lodi	New York.
Leonard, Rev. L. W	Exeter	New Hampshire.
Livezay, G. W	Gallipolis	Ohio.
Livingston, G. Z	Hudson	Wisconsin.
Lobdell, Mrs. Mary J	Salem Centre	New York.
Lowndes, B. O	Blenheim	Maryland.
Lowrie, J. R	Warrior's Mark	Pennsylvania.
Lukens, John F	Zanesville	Ohio.
Mack, E. T	New Brunswick	New Jersey.
Mack, R. C	Londonderry	New Hampshire
Maguire, Prof. J. F	New Windsor	Maryland.
Malcom, Captain W. S	Oswego	New York.
Manchester, George	Portsmouth	Rhode Island.
Marsh, Charles A. J	Craftsbury	Vermont.
Marvin, J. W	Winchester	Virginia.
Mauncey, Rev. S. W	Fort Ripley	Minnesota.
Matthews, J. McD	Hillsboro'	Ohio.
McCready, D	Fort Madison	Iowa.
McQuigg, J	Beloit	Wisconsin.
Mead, Dr. S. B	Augusta	Illinois.
Meriwether, Charles J	Montcalm	Virginia.
Meriwether, R. T	McMath's	Alabama.
Merrill, Rev. S. H	Bluehill	Maine.
Metcalf, Dr. J. G	Mendon	Massachusetts.
Miller, Rev. J	Millersburg	Kentucky.
Mitchell, Dr. S. K	East Saginaw	Michigan.
Mitchell, Hon. Wm	Nantucket	Massachusetts.
Morehouse, A. W	Spencertown	New York.
Morelle, D	Thornbury	North Carolina.
Morris, Prof. O. W	New York	New York.
Munger, L. F	Le Roy	New York.
Murray, Prof. David	Albany	New York.
Mussey, R. D	Rockport	Massachusetts.

METEOROLOGICAL LIST—Continued.

Name.	Residence.	State.
Nettleton, A	Lynchburg	Virginia.
Newton, Jno	Orange Hill	Florida.
Newton, W. H	Fond du Lac	Minnesota.
Odell, B. F	Poultney	Iowa.
Ormsby, J. S	College Hill	Ohio.
Orton, Jas.	Williamstown	Massachusetts
Paddock, Jas. A	Craftsbury	Vermont.
Parker, J. D	Steuben	Maine.
Parvin, T. S	Muscatine	Iowa.
Patton, Thos	Lewisburg	Virginia.
Pearson, Jno	Pensacola	Florida.
Pendleton, Dr. E. M	Sparta	Georgia.
Perkins, Capt. A. D	Monroe	Michigan.
Perkins, Dr. H. C	Newburyport	Massachusetts.
Peters, H	Lafayette	Indiana.
Phelps, Rev. Joshua	Alexander College	Iowa.
Phillips, Prof. Jas	Chapel Hill	North Carolina.
Pickard, Dr. J. L	Plattsville	Wisconsin.
Plumbe, Dr. Ovid	Salisbury	Connecticut.
Poole, Henry	Albion Mines	Nova Scotia.
Porter, W	Beloit	Wisconsin.
Posey, John F	Savannah	Georgia.
Powel, Sam'l	Newport	Rhode Island.
Pratt, Prof. D. J	Fredonia	New York.
Prescott, Dr. Wm	Concord	New Hampshire.
Ralston, Rev. J. G	Norristown	Pennsylvania.
Rankin, James	Saybrook	Connecticut.
Ravenel, H. W	Aiken	South Carolina.
Ray, L. G	Paris	Kentucky.
Reed, D. E	Belleview	Nebraska Territory.
Reed, Edward C	Homer	New York.
Rice, Henry	North Attleboro'	Massachusetts.
Riddle, Professor W. P	Jackson	Louisiana.
Riggs, S. R. and A. L	Lac qui Parle	Minnesota.
Robbins, Dr. James	Uxbridge	Massachusetts.
Robinson, Rev. E. S	Garlandsville	Mississippi.
Rodman, Samuel	New Bedford	Massachusetts.
Root, Professor O	Clinton	New York.
Rosseter, Professor Geo. R.	Buffalo	Virginia.
Salisbury, Elias O	Buffalo	New York.
Sanford, Professor S. N	Granville	Ohio.
Sartwell, Dr. H. P	Penn Yan	New York.
Savage, Rev. G. S	Millersburg	New York.
Sawyer, George B	Salmon Falls	New Hampshire.
Sawyer, Henry E	Great Falls	New Hampshire.
Scheeper, E. H. A	Pella	Iowa.
Schetterly, H. R	Grand Traverse	Michigan.
Schlegel, Albert	Taunton	Massachusetts.
Schley, William	Augusta	Georgia.
Schreiner, Francis	Moss Grove	Pennsylvania.
Shane, J. D	Lexington	Kentucky.
Sheldon, Henry C	North Scituate	Rhode Island.
Shepherd, Rev. J. A	San Francisco	California.
Shields, Robert	Bellecentre	Ohio.
Skeen, William	Huntersville	Virginia.
Smallwood, Dr. Charles	St. Martin's	Canada.
Smith, Dr. E. A	Worcester	Massachusetts.
Smith, Dr. J. Bryant	Lincolnton	North Carolina.
Smith, Dr. J. W	East Franklin	New York.
Smyser, Dr. H	Pittsburg	Pennsylvania.
Snell, Professor E. S	Amherst	Massachusetts.
Spencer, David B	St. Joseph	Minnesota.

METEOROLOGICAL LIST—Continued.

Name.	Residence.	State.
Spencer, Edward S.	Summit.	Wisconsin.
Spooner, E.	Keen	Ohio.
Spooner, Stillman.	Wampsville	New York.
Steele, Augustus.	Cedar Keys.	Florida.
Sterling, J. W.	Madison.	Wisconsin.
Stevens, Dr. R. P.	Ceres	Pennsylvania.
Stewart, Prof. A. P.	Lebanon.	Tennessee.
Stewart, W. M.	Greenwood.	Tennessee.
Strang, J. J.	St. James	Michigan.
Stratton, J. O.	Oxford.	New York.
Strong, L. H.	Saugatuck.	Michigan.
Strong, Rev. T. H.	Flatbush.	New York.
Stuart, A. P. S.	Wolfville	Nova Scotia.
Swain, Dr. John.	Ballardsville.	Kentucky.
Swift, Paul.	Haverford	Pennsylvania.
Taylor, Jos. W.	Plattsburg.	New York.
Taylor, Dr. M. K.	Brooklyn.	Michigan.
Thickstun, T.	Meadville	Pennsylvania.
Thompson, Zadock	Burlington	Vermont.
Tingley, Prof. Jas	Greencastle	Indiana.
Tuomey, Prof. M.	Tuscaloosa	Alabama.
Turner, David.	Richmond.	Virginia.
Tutwiler, H.	Green Springs.	Alabama.
Underwood, D.	Castleton	Vermont.
Van Kleek, Rev. R. D.	Flatbush,	New York.
Waddell, Wm. H	Grenada	Mississippi.
Walker, Miss Octavia C.	Cooper.	Michigan.
Walker, J. P	Dover	Delaware.
Webster, Prof. N. B.	Portsmouth	New Hampshire.
Weir, A. D.	Freeport	Pennsylvania.
Weiser, R.	Andersville.	Pennsylvania.
West, Edmund.	Huron.	Ohio.
Whelpley, Dr. Thos.	Brest	Michigan.
Whitehead, W. A.	Newark.	New Jersey.
Willard, J. F.	Janesville	Wisconsin.
Williams, P. O.	Gouverneur.	New York.
Williams, Prof. W. D.	Madison	Georgia.
Wilson, Prof. W. D.	Geneva.	New York.
Wilson, W. W.	Pittsburg	Pennsylvania.
Winchell, A.	Ann Arbor	Michigan.
Winkler, Carl.	Milwaukie	Wisconsin.
Woodruff, Lum	Ann Arbor	Michigan.
Woodward, C. S.	Beaver Brook.	New York.
Yale, Walter D.	Houseville	New York.
Young, Albert A.	Hanover	New Hampshire.
Young, J. A.	Camden.	South Carolina.
Young, Mrs. Lawrence.	Springdale	Kentucky.
Young, Prof. Ira	Hanover	New Hampshire.

REPORT OF THE SECRETARY.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: The year which has elapsed since the last meeting of the Board of Regents has been marked by events which must have a decided influence on the future history of the establishment intrusted to your care. The plan of organization adopted, and the operations in accordance with it, have been widely discussed by the public. The subject has also been brought before Congress, and referred to a special committee of the House of Representatives, and to the Judiciary Committee of the Senate. The committee of the House had not time, before the close of the session, to visit the Institution, or to make such an examination of the management and the condition of its affairs as the importance of the matter referred to them would seem to demand. The members were divided in opinion as to the question of further legislation, and no action was taken upon the reports which they presented. The Judiciary Committee of the Senate reported on the subject, and unanimously approved the acts of the Regents in construing the law of Congress, in interpreting the will of Smithson, and in what they had done in the way of increasing and diffusing knowledge among men.

The discussions that have taken place in the journals of the day in regard to the policy pursued by the Institution, together with the printing of an extra number of copies of the Regents' report to Congress, have given the public generally an opportunity of becoming more fully acquainted than heretofore with the character of the trust, and the manner in which it has been administered. From the number of letters received during the past year, containing spontaneous expressions of opinion relative to the course pursued by the Regents, there can be no doubt that the policy which has been adopted is the one most in accordance with the views of a majority of the intelligent part of the community.

It is not contended that the plan of organization is in all respects what could be wished; on the contrary, it is believed that more of the income is devoted to local objects—in the support of a large building and the expensive establishment necessarily connected with it—than is entirely consistent with a proper interpretation of the will of Smithson. But in establishing an institution in which various opinions were to be regarded, the question was not, what, in the abstract, was the best system, but the best which, under the circumstances, could be adopted. It can hardly be expected that any plan, however faithfully and cautiously pursued, will give general, not to say universal, satisfaction. In the faithful discharge of their duty, the directors of the Institution are liable, frequently, to make decisions which conflict

with what is deemed, the interests of individuals; and when propositions intended only for personal advantage are rejected, a hostile feeling is sometimes engendered, which finds vent in misrepresentation and public attacks. After due caution has been observed in order to give no just cause of complaint, such attacks should be disregarded. The Regents will, doubtless, adhere to the line of policy which has been adopted; turn neither to the right nor to the left to catch an apparently favorable breath of popular applause, and continue to *lead*, rather than *follow*, public opinion. The directors of the establishment, whose duty it is to make all that concerns it their special study, ought to be better acquainted with the intentions of the donor, and the results produced by the expenditure of the income of his bequest, than those who have no responsibility of this kind to induce that attention to its affairs which could alone qualify them to become proper advisers as to its operations.

Since the last meeting of the Board, the Institution has not only sustained, but has extended the reputation it had previously acquired. The number of applications on favorable terms, even in a commercial point of view, which have been made from abroad for the Smithsonian publications, has very much increased, and the number of volumes received in exchange has exceeded that of any previous year. The inquiries which have been made of the Institution for information in regard to different branches of knowledge, the references to it for the decision of important questions, and the applications for assistance in the prosecution of original research, indicate an extending field of usefulness open to its cultivation. Indeed, so many objects of the highest importance are presented, that much difficulty would be experienced in the selection of those which should first receive attention, if the directors were not governed by fixed rules. The tendency to expand the operations of the Institution beyond its means, enforces the necessity of constant vigilance and forethought. While much may be done in the way of advancing knowledge by the judicious application of a small fund, it is surprising that so much is expected to be accomplished by an income so limited as that of this bequest, and that propositions should frequently be made to the Regents by intelligent persons to embark in enterprises which would involve the expenditure of the whole annual interest on a single object.

The building is at length completed, and its several apartments are now in a condition to be applied to the uses of the Institution. As various changes have been made in the original plan, the following brief description may not be inappropriate at this time. It consists of a main edifice, two wings, two connecting ranges, four large projecting towers, and several smaller ones. Its extreme length from east to west is 447 feet, with a breadth varying from 49 feet to 160 feet. The interior of the east wing is separated into two stories, the upper of which is divided into a suite of rooms for the accommodation of the family of the Secretary; the lower story principally comprises a large single room, at present appropriated to the storage of publications and the reception and distribution of books connected with the system of exchange. The upper story of the eastern con-

necting range is divided into a number of small apartments devoted to the operations in natural history, and the lower story is fitted up as a working laboratory.

The interior of the main edifice is 200 feet long by 50 feet wide, and consists of two stories and a basement. The upper story is divided into a lecture-room capable of holding 2,000 persons; and into two additional rooms, one on either side, each fifty feet square, one of which is appropriated to a museum of apparatus, and the other, at present, to a gallery of art. Both are occasionally used as minor lecture-rooms and for the meetings of scientific, educational, or industrial associations. The lower story of the main building consists of one large hall to be appropriated to a museum or a 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. The basement of this portion of the building is used as a lumber-room and as a receptacle for fuel.

The west wing is at present occupied as a library, and is sufficiently large to accommodate all the books which will probably be received during the next ten years. The west connecting range is appropriated to a reading-room.

The principal towers are divided into stories, and thus furnish a large number of rooms of different sizes, which will all come into use in the varied operations of the Institution. A large room in the main south tower is appropriated to the meetings of the "Establishment" and the Board of Regents; three rooms in one range, in the main front towers, are used as offices; and two rooms below, in the same towers, are occupied by one of the assistants and the janitor; other rooms in the towers are used for drawing, engraving, and work-shops. There are in the whole building, of all sizes, ninety different apartments; of these eight are of a large size, and are intended for public exhibitions.

The delay in finishing the building has not only been attended with advantage in husbanding the funds, but also in allowing a more complete adaptation of the interior to the purposes of the Institution. It is surely better, in the construction of such an edifice, to imitate the example of the mollusc, who, in fashioning his shell, adapts it to the form and dimensions of his body, rather than that of another animal who forces himself into a house intended for a different occupant. The first point to be settled, in commencing a building, is the uses to which it is to be applied. This, however, could not be definitely ascertained at the beginning of the Institution, and hence the next wisest step to that of not commencing to build immediately, was to defer the completion of the structure until the plan of operations and the wants of the establishment were more precisely known.

From the report of the Building Committee it will appear that about $6,000 remain to be paid upon the contracts, which amount will be met by the interest of the extra fund during the present year. The whole amount expended on the building, grounds, and objects connected with them, is $318,727 01. This exceeds considerably the original estimate, and the limit which was at first adopted by the Regents.

The excess has been principally occasioned by substituting fire-proof

materials for the interior of the main building, instead of wood and plaster, which were originally intended.

It is to be regretted that a design so costly was adopted; but the law of Congress evidently contemplated an expensive building, and placed no restriction on the Regents as to cost or plan, except the preservation of the principal of the bequest.

From the report of the Executive Committee it will be seen that not only has this restriction been observed, but that, notwithstanding the enhanced expenditure, a considerable augmentation of the fund has been effected. The original $515,000, received from the bequest of Smithson, is still in the treasury of the United States; and, after the present debt on the building shall have been discharged, there will remain in the hands of the treasurer the sum of $125,000 of unexpended interest. Though this is a favorable condition of the finances, yet caution in the expenditure is still imperatively required. We should not forget that the ordinary expenses of the Institution have constantly increased; and that, whilst the nominal income has remained the same, the value of money has depreciated; and, consequently, the capability of the original bequest to produce results has been abridged in a corresponding proportion. Besides, when the building is entirely occupied, the expense of warming, attendance, &c., must necessarily be much increased beyond its present amount. The repairs, on account of the peculiar style of architecture adopted, will ever be a heavy item of expenditure. The several pinnacles, buttresses, and intersecting roofs, all afford points of peculiar exposure to the injuries of the weather. In this connexion, I cannot help again expressing the hope that Congress will, in due time, relieve the Institution from the support of this building, and that it will ultimately appropriate at least the greater part of it to a national museum, for the general accommodation of all the specimens of natural history and of art, which are now accumulating in the Capital of the nation. The two wings and connecting ranges would be quite sufficient for all the operations of the Institution, and a large portion of the funds now absorbed in the incidental expenses, which have been mentioned, could be devoted to the more legitimate objects of the bequest.

It was mentioned in a previous report that the rooms of the upper story of the building were particularly arranged with a view to accommodate the meetings of literary, scientific, and other associations which might assemble at the seat of government. During the past year the following societies have availed themselves of the facilities thus afforded, viz: the United States Agricultural Society, the Metropolitan Mechanics' Institute, a musical convention of the choirs in this city and of persons invited from a distance, also a second convention under the auspices of the Philharmonic Society of Washington. Besides these, the Teachers' Association of the District of Columbia has held its monthly meetings in this building, and the rooms have been frequently occupied during a single evening for public purposes. The use of the lecture-room is granted when the object for which it is asked is of general public utility, and not of a party or sectarian character, or intended to promote merely individual interests.

Since the death of the lamented Downing, but little has been done

to complete the general plan of the improvement of the mall proposed by him and adopted by Congress. An annual appropriation, however, has been made for keeping in order the lot on which the Smithsonian building is situated, and it is hoped that in due time the whole reservation from the Capitol to the Washington Monument will, in accordance with the original design, be converted into an extended park.

The Smithsonian building having been completed, the refuse material will be removed from the south part of the lot, and the whole grounds around the institution will then be in a condition for permanent improvement. It is to be regretted that Congress has not made an appropriation to carry out the suggestion of Dr. Torrey, and other botanists, of establishing here an arboretum to exhibit the various ornamental trees of indigenous growth in this country. The climate of Washington is favorable to the growth of a very large number of the products of our forests, and an exhibition of this kind would serve to render better known our botanical wealth, and to improve the public taste. The preservation and cultivation of our native trees are objects of national importance.

A subscription has been collected by the members of the American Pomological Society for the erection of a monument to the memory of Downing, and the President has given his consent to the placing of this in the same lot with the Smithsonian Institution. The monument will be erected in the course of the present year, and will serve to perpetuate the memory of a public benefactor, as well as to embellish the grounds.

Publications.—Since the last meeting of the Board of Regents, the seventh volume of the Smithsonian Contributions to Knowledge has been printed and distributed. Owing to certain changes, which were considered desirable in some of the memoirs mentioned in the last report, they were not ready in time for the press, and this volume was consequently made up without them. It therefore does not contain as many pages of printed matter as some of the previous volumes. It has, however, a larger number of plates, and consequently the expense of its publication has been equal to that of any of the preceding ones.

1. Among the papers mentioned in the last report was one by Mr. S. F. Haven, librarian of the American Antiquarian Society, on the progress of information and opinion respecting the archæology of the United States. The printing of this paper, which is now nearly completed, was delayed for the purpose of enabling the author to extend it in some particulars, and to include in it a more definite account of some branches of ethnological investigation than was at first contemplated. It will be recollected that the object of this paper is, first, to present the speculative opinions relative to American antiquities, which preceded any systematic or scientific investigation, and to exhibit the various hypotheses advanced, as to their origin, based upon hints from sacred or profane history; secondly, to follow the steps of inquiry, nearly in the order of time, and to present a summary of facts supposed to be developed, and views entertained at different stages of research and discovery. When the author, in pursuing his subject, arrived at the consideration of the period when philological and physiological deduc-

tions, from reliable information, were specially and scientifically brought to bear upon this investigation, it seemed necessary to enlarge the original plan, and to exhibit, concisely, the considerations involved in the discussions, the course they had taken in this country, and the conclusions to which different writers in these departments of research had been led.

The last chapter will present a sketch of what appears to be the actual information now possessed respecting the vestiges of antiquity in the United States, and will include the consideration of the following points:

1st. To what places of the American continent the known courses of the winds and currents might casually bring the vessels of ancient navigators.

2d. The evidences of foreign communication said to be observable at those places.

3d. The other known means of access from foreign countries.

4th. The topography of ancient remains in the United States.

5th. The external character of those remains.

6th. Their local peculiarities.

7th. The character of the articles taken from them, and supposed to be of contemporaneous origin.

8th. The inscriptions, medals, and other remains, supposed to indicate the use of letters or hieroglyphic symbols.

This paper, as usual, will be issued, at first, separately, and afterwards published as a part of the eighth volume of Contributions.

2. The paper mentioned in the last report, on the Tangencies of Circles and Spheres, by Major Alvord, of the United States army, has been printed, and is now ready for distribution. It is due to Professors Church and Gibbes, to whom the memoir was submitted, to mention that they have given it critical examination, have suggested several improvements, which have been adopted by the author, and that, in his absence on official duty in Oregon, they have read the proof-sheets, and corrected the plates and text—a service of no small moment in the publication of an abstruse mathematical paper, in which extreme precision, if not absolute accuracy of typography, is required.

3. The paper on the Aurora Borealis, by Professor Olmsted, described in the last report, has also received some emendations, and is now in the press. The valuable collection of notices of the appearances of the aurora in northern latitudes, by Peter Force, Esq., of Washington, is also in the hands of the printer, and will form an appendix to the eighth volume.

4. A corrected edition of the first part of the tables for facilitating the investigation of physical problems, mentioned in the fifth and sixth reports, has been prepared, and, with the second part of the same series, is now in the press. No publications of the Institution have been called for more frequently than these tables. They have been introduced into Great Britain, and have supplied a want which has long been felt by the practical cultivator of physical science in that country, as well as our own.

Each set of tables has a distinct title and paging, and may be

separately stitched and distributed in a pamphlet form, or bound together in a single octavo volume. The following is the list of the tables: 1. Comparison of the thermometrical scales; 2. A series of hygrometrical tables; 3. Tables for comparing the quantities of rain; 4. A series of tables for comparison of different barometrical scales, &c.; 5. Tables for computing differences of level by means of the barometer; 6. To ascertain elevations by the boiling-point of water; 7. For the conversion of different measures of length.

A full descriptive list will be found in the appendix.

In connexion with the publication of these tables, I may allude to the fact which is constantly to be regretted, that, while the characters which indicate the numerals of ordinary and scientific computation are the same in all civilized countries, there should exist, in this age of the world, such a diversity in the standards and divisions of measures. The present appears to be an auspicious moment for attempting to introduce a uniform system of weights and measures. This would probably present no great difficulty in the case between Great Britain and this country, and since England and France are now allied in a common cause, they might both be induced to agree upon a general standard; and if this were adopted by all who speak the English and French languages, it would soon become common to every part of the civilized world.

5. Another paper submitted for publication is on a special branch of natural history, called Oology. The design of this memoir is to give, by means of colored engravings, correct representations of the eggs of the birds of North America, so far as they have been ascertained, and to accompany each figure with an account of whatever may be known as to the mode of breeding, the construction of the nests, and the geographical distribution of the species during the hatching season. It is believed that this paper will supply a deficiency in the natural history of North America. There is no separate treatise on its oology, nor do any of the works on American ornithology furnish reliable descriptions under this head, except in regard to a few of the more common birds. All our ornithologists, says the author, Audubon not excepted, have given their attention almost exclusively to the birds, and have omitted to notice the peculiarities of their propagation. The reason for this may readily be found in the difficulty attending the investigation, which is to be appreciated only by those who have sought to make a study of this branch of natural history. The author has devoted to this subject all the leisure he could spare during twenty years, and each year he has been able to add new contributions to the stock of knowledge, as well as illustrations and specimens to the common store, until he is now enabled to describe and figure at least four-fifths of the oology of this continent.

In the commencement of the operations of the Institution, the Regents might have hesitated to sanction the publication of a paper on a subject which at first sight would appear to be so far removed from practical application. But it is believed that since that period, more just views of the importance of such subjects have become prevalent, and that the Smithsonian publications themselves have done good service in diffusing more liberal sentiments. Indeed, it is an import-

ant part of the duty of this Institution to encourage special lines of research into every department of the varied domain of nature. Though it might be a perversion of intellect for a large number of persons in the same country to occupy themselves in any one pursuit of this kind, when so much on every hand is required to be done, yet it is highly meritorious in any individual to devote himself systematically, industriously, and continuously, for years, to the elucidation of a single subject. He may be said to resemble in this respect the explorer of an inhospitable region, who enables the world to see through his eyes the objects of wonder and interest which would otherwise be forever withdrawn from human knowledge. Let censure or ridicule fall elsewhere—on those whose lives are passed without labor and without object; but let praise and honor be bestowed on him who seeks with unwearied patience to develop the order, harmony, and beauty of even the smallest part of God's creation. A life devoted exclusively to the study of a single insect, is not spent in vain. No animal, however insignificant, is isolated; it forms a part of the great system of nature, and is governed by the same general laws which control the most prominent beings of the organic world.

It is proposed to publish this paper in a number of parts, commencing with the oology of the birds of prey. This is one of the most difficult of all the families to study with precision, on account of the retiring habits of the birds and their almost inaccessible breeding places.

6. The next paper is on the relative intensity of the light and heat of the sun upon the different latitudes of the earth, by L. W. Meech, Esq. This memoir, which was submitted for examination to Prof. Peirce and Dr. B. A. Gould, of Cambridge, presents a thorough mathematical investigation of the only known astronomical element of meteorology. It gives a distinct, precise, and condensed view of this element; enables the practical meteorologist to compare it with the results of observation; to eliminate its influence and obtain the residual phenomena in a separated form and better fitted for independent investigation. It determines, from the apparent course of the sun, the relative number of heating and illuminating rays which fall upon any part of the earth's surface. The rays of light and heat from the sun to the earth, though imperceptible in their passage through free space, and manifest only by their results at the surface of the globe, evidently constitute a primary element of meteorology. The subsequent effects, which are measured by the thermometer and designated by the word *temperature*, are secondary, and modified by a variety of proximate causes. In accordance with this distinction, the numerous researches in this field may be divided into two classes, namely, those which relate to the number of rays falling on a given place, and those which relate to the temperature produced by these rays under different conditions of surface, &c. To the former of these belongs the investigation of Halley, given in the Philosophical Transactions for 1693. By regarding heat as of the nature of force and resolving it into a horizontal and a vertical component, he drew the proper distinction between the number of rays and their heating effect or "impulse," which is expressed in the well known law, that the sun's intensity at

any time is proportional to the sine of the sun's altitude above the horizon. The subject was also investigated by Euler in 1739, in the Petersburg Commentaries, with some improvements upon the method of Halley, but owing to the introduction of false hypotheses, it was not brought to a successful conclusion. More recently, Fourrier and Poisson have discussed the problems of terrestrial heat at great length, but in so general a way as to leave very much yet to be accomplished.

The present memoir, avoiding hypotheses, proceeds entirely in accordance with the principle that the intensity of the heat and light radiated from the sun to the earth, is inversely proportional to the square of the distance. By strict adherence to this primary law, the principles of the astronomical branch of meteorology are deduced in a connected series with geometrical precision, while at the same time an account is taken of all the modifying circumstances of which the effects are definitely known, such as the geographic latitude, the changes of the sun's distance from the earth, the changes of the sun's altitude or oblique direction of the solar beams, and changes in the length of the day.

Among the more interesting results thus obtained are the simple expressions for annual intensity and the duration of sunlight and twilight, and a more full delineation of the peculiar increase of summer heat around the poles, first pointed out by Halley.

The secular changes of solar heat, or those which relate to long periods, are also analyzed in accordance with the received variations of astronomical elements, particularly those given by Leverrier, and extended to very remote epochs. This part of the investigation is intimately connected with the geology of the globe, and the question as to the amelioration of the climate of America since the period of our colonial history. The paper is accompanied by a number of graphical illustrations, which, besides exhibiting the general results, show the reflex agency of the earth and its atmosphere in modifying the direct heat of the sun, and the progressive change of climates, and the seasons of the year. A small appropriation was made to defray the expense of the arithmetical calculations necessary for deducing the numerical values from the general formula.

7. In a previous report it was stated that a small appropriation had been made to defray, in part, the expense of some special geological explorations, under the direction of Professor E. Hitchcock, of Amherst College, Massachusetts. The papers containing the result of these investigations have been presented to the Institution for publication. They all relate to surface geology, or the geological changes which have taken place on the earth's surface since the tertiary period.

The first paper treats of the unconsolidated terraces, beaches, submarine ridges, &c., that have been formed along the shores of the ocean, lakes, and rivers, since the last submergence of the continents. The author has given the heights of a great number of these above the ocean, and the rivers, and a map of those in the valley of the Connecticut river. The evidence they afford of a submergence of this continent, at least, and a part of Europe, since the Drift Period, is regarded by the author as one of his most important conclusions. But

many others, however, are presented, which will tend to modify the opinions entertained of the superficial deposits of the globe.

The second paper is on the erosions of the surface of the earth, especially by rivers. Of this phenomenon numerous examples are given, and those described minutely which have fallen under the author's own observations. Some of the conclusions to which he has been conducted are new and unexpected. He has, for instance, pointed out several traces of old river-beds, now filled up and abandoned, through which, in his opinion, the streams ran on a former continent.

The third paper would appear to establish the fact that glaciers once existed on some of the mountains of New England, in distinction from the drift agency, which he regards as chiefly the result of icebergs and oceanic currents. This paper is accompanied by a map of the ancient glaciers, so that geologists can examine for themselves the data from which the deductions are made.

These investigations, says the author, "are an humble attempt to penetrate a little distance into the obscurities of surface geology, and to exhibit changes which seem to have been more overlooked than any other which the earth has undergone." Whatever may be the opinions entertained of the conclusions of the author, the facts which he has collected must ever be of importance.

On account of the colored maps which are necessary to illustrate these papers, their expense will be considerable, and we shall be obliged, perhaps, to defer their publication until towards the close of the present year.

It is a subject of congratulation, and an evidence of the advance of liberal sentiments in regard to the importance of abstract science in our country, that within the last few years liberal donations have been made for the publication of original research and the promotion of original scientific investigations. In addition to the $100,000 bequeathed some years since to the Harvard Observatory, the same establishment has lately received from the Hon. Josiah Quincy the sum of $10,000 for the publication of its observations; and $10,000 has been bequeathed by Mr. Appleton for the publication of original memoirs in the Transactions of the American Academy. A wealthy lady of the city of Albany has just reared a monument to the memory of her husband in the establishment of an observatory, which, we trust, will be more enduring than any merely material edifice, however permanent and unalterable may be its character. Discoveries will undoubtedly be made by means of this enlightened bequest, which will indelibly associate the name of Dudley with the future history of astronomy. The love of posthumous fame is a natural and laudable desire of the human mind. It is an instinct, as it were, of immortality, which should be fostered and kept alive by example as one of the most powerful inducements to enlightened benevolence. And what prouder monument could be coveted than that which shall associate a name with the discovery of truths, the knowledge of which will be as widely extended and as continuous in duration as civilization itself? Smithson was ambitious of this distinction, and has presented with rare sagacity, to all who have the means of gratifying the same feeling, a

noble example. In connexion with the same subject, I may refer to the unexampled provision which has been made by subscription for the publication of the extended researches of Prof. Agassiz. The results of these researches are to be comprised in ten quarto volumes, at a subscription price of $120. The whole number of subscribers already obtained is three thousand, which will produce $360,000. The Smithsonian Institution had commenced the preparation of the plates of several memoirs by Prof. Agassiz, which will now be probably merged in this work; and thus, though it may lose the honor of a more permanent association of the name of this celebrated individual with its own publications, yet a portion of its funds will thus be set free for the publication of the researches of less fortunate though meritorious laborers in the field of knowledge. The Institution, however, will have largely contributed from its museum to the materials which will be required in the preparation of this great work, and will thus be still connected with this important enterprise.

Exchanges.—The system of scientific and literary exchanges, of which an account has been given in the previous reports, has become more widely known and its advantages more generally appreciated. Nearly all the exchanges of scientific works between societies and individuals in this country and abroad are now made through the agency of this Institution. The whole number of articles transmitted during the year 1855 was 8,585. The whole number of separate articles received during the same time cannot be stated, as those addressed to particular persons or societies were enclosed in packages which were not opened. The articles received in behalf of the Institution amounted to 4,500, and the number of packages for other parties to 1,445. The latter, in almost every case, contained several different works, which would swell the amount received to a larger number than that which was sent. The associations in this country which have availed themselves of the facilities of the system comprise nearly all those that publish Transactions. Among these are many of the agricultural societies of the western States. In a number of cases societies and individuals have transmitted sets of their works, to be distributed by the Institution to such associations as it might deem best entitled to receive them.

The Smithsonian agency is not confined to the transmission of works from the United States, but is extended to those from Canada, South and Central America, and in its foreign relations embraces every part of the civilized world. It is a ground of just congratulation to the Regents, that the Institution, by means of this part of the plan of its organization, is able to do so much towards the advance of knowledge. It brings into friendly correspondence cultivators of original research the most widely separated, and emphatically realizes the idea of Smithson himself, that "the man of science is of no country;" that "the world is his country, and all mankind his countrymen."

The system of exchange has found favor with foreign governments, and the Smithsonian packages are now admitted into all ports to which they are sent, without detention, and free of duty. It has also been highly favored by the liberal aid of companies and individuals in this

country. The mail steamship line to California via Panama conveys our packages free of cost to the Pacific coast. The line of steamers to Bremen has also adopted a like liberal policy, and Messrs. Oelrichs & Lurman, of Baltimore, have indicated their estimation of the value of the system, by making no charge whatsoever for transmitting a large number of boxes to Germany, and in receiving and forwarding others from that country.

In connexion with the subject of exchanges, it becomes my duty to announce the loss which the Institution has experienced in the death of one of its warmest friends and most active agents, Dr. J. G. Flügel, of Leipsic. After a residence of several years in this country he returned to Germany as United States consul, in which capacity he was unremitting in his efforts to render service to American travellers, and, by his untiring industry and zeal in behalf of the Institution, contributed more than any other person to make it known through northern and central Europe. His son, Dr. Felix Flügel, has been appointed his successor, and has evinced a desire and given evidence of his ability to carry on the system with promptness and efficiency. The agent of the Institution in London is Mr. Henry Stevens, and in Paris Mr. Hector Bossange; and to these gentlemen the thanks of the Regents are due for important services in the distribution and reception of packages without charge.

Correspondence.—The correspondence during the last year has been more extended than that of any preceding period. The character of the Institution becoming more widely known, the number of applications for information relative to particular branches of knowledge has been increased. The correspondence relates to the exchanges, the collections, the publications, the communication with authors and the members of commissions to which memoirs are submitted, answers to questions on different branches of knowledge, and reports as to the character of specimens of natural history, geology, &c.; also explanations of the character of the Institution, the distribution of its publications, its system of meteorology, &c.

The whole number of pages copied into letter-books in 1855 is about 4,000.

Besides this correspondence, there have been sent off from the Institution upwards of 5,000 acknowledgments of books and other articles presented to the Institution, and 6,000 circulars, asking for information on special points, such as natural history, meteorology, physical geography, statistics of libraries and colleges, &c.

Many of the communications are interesting additions to knowledge, though they are scarcely of a character to warrant their publication in the quarto series of Contributions; and it is now proposed to append some of these to the annual report to Congress to illustrate the operations of the Institution, as well as to furnish information on subjects of interest to the public. The meteorological system gives rise to an extensive correspondence, and maintains a lively sympathy between the institution and a large number of intelligent individuals. During the past year, as usual, many crude speculations on scientific and philosophical subjects have been presented for critical examina-

tion. To these, in all cases, respectful answers have been returned, and an endeavor has been made to impress upon the correspondent the distinction between fanciful speculation and definite scientific investigation.

Education.—The plan of organization of this Institution does not include the application of any of its funds directly to educational purposes. Were the whole Smithsonian income applied to this one object, but little, comparatively, of importance could be effected, and that little would scarcely be in accordance with the liberal intention of the testator, as expressed in his will, by the terms "the increase and diffusion of knowledge among men." Still, the theory and art of education are susceptible of improvement, as well as of a wider application; and therefore, though the Institution may not attempt to do anything itself in the way of elementary instruction, it may, in accordance with its plan of operations, assist in diffusing a knowledge of the progress of the art of teaching, and of its application in this country.

At a meeting of the American Association for the Advancement of Education, held in this building in December, 1854, a committee was appointed, which called the attention of the Institution to the importance of aiding in preparing and publishing a history of education in the several States of the Union, the object of which would be to diffuse a knowledge of what has been done in each section of the country among all the others, and thus to render the separate experience of each beneficial to the whole. After consultation with the members of the Executive Committee, then in the city, it was concluded to devote $350 to this purpose. This sum has accordingly been advanced to the Hon. Henry Barnard, of Connecticut, who has collected and digested for publication the materials for a work of this kind.

The subject will be presented under the following heads:

1. Survey of the principal agencies which determine the education of a people, with an explanation of the American nomenclature of schools and education.
2. A brief sketch of the action of the general government in the matter of education and schools.
3. Legislation of each State respecting education.
4. Condition of education in each State, according to the census returns of 1850, and other reliable sources of information.
5. Educational funds—State, municipal, and institutional.
6. Educational buildings: remarks on their general condition, with illustrations of a few of the best specimens of each class of buildings.
7. Catalogue of documents relating to the educational systems and institutions in each State.
8. Statistical tables, with a summary of educational agencies, such as the press, ecclesiastical organizations, facilities of locomotion, &c.
9. A brief statement of the educational systems and statistics of the most civilized countries of Europe.

The work will either be published as a separate report on education, or may be given in a series of numbers of the American Journal of Education, extra copies of which will be obtained for distribution.

It is believed that this exposition of the subject will supply a deficiency which has long been felt, and be of much service in advancing the important cause to which it relates.

Laboratory, Researches, &c.—The law of Congress incorporating the Institution directed the establishment of a laboratory, and, in accordance with this, a commodious room has been fitted up with the necessary appliances for original research in chemistry and other branches of physical science.

During the past year a number of different researches have been prosecuted in this apartment.

1. A continuation of those mentioned in the last report on building material.
2. A series relating to combustion, and some points on meteorology.
3. On the flow of air through tubes of various forms.
4. On the application of some newly-discovered substances to practical purposes in the arts.
5. The examination of the minerals of the Pacific railroad and other expeditions.

Though the funds of the Institution will not permit the constant employment of a practical chemist, yet we are enabled to do something towards the support of a person in this line, by referring to him the articles of a commercial value which are submitted to us for examination, and for which the cost of analysis is paid by the parties seeking the information.

A young chemist, who has spent three years in Germany, has now the use of the laboratory, and is prepared to make any analyses which may be required. For the facilities afforded him he is to keep the apparatus in working order, and to make such examinations of specimens as may not require much labor.

In one of the previous reports it was mentioned that a set of instruments for observing the several elements of terrestrial magnetism was lent to Dr. Kane for use in his Arctic explorations, and I am happy to inform the Board that these instruments have done good service to the cause of science in the hands of this intrepid explorer and his assistants, and that they have been returned in good condition. They will be again intrusted to other persons for observations in different parts of this country.

Meteorology.—Since the last meeting of the Board an arrangement has been made with the Commissioner of Patents by which the system of meteorology, established under the direction of the Institution, will be extended, and the results published more fully than the Smithsonian income would allow. A new set of blank forms has been prepared by myself, and widely distributed under the frank of the Patent Office. An appropriation has also been made for the purchase of a large number of rain-gages, to be distributed to different parts of the country, for the purpose of ascertaining more definitely with compared instruments the actual amount of rain which falls in the different sections of our extended domain. A series of experiments has been made with regard to the different form of gages, and a very

simple one, which can be manufactured at a small expense, is easy of application, and can be readily transported by mail, has been adopted. Mr. Jas. Green, of New York, has continued to manufacture standard instruments in accordance with the plan adopted by the Institution, and to supply these at a reasonable price to observers. He preserves an accurate record of the comparison of each instrument with the standards furnished by the Institution, and in this way good service is rendered to the advance of this branch of knowledge by the general introduction of compared and reliable instruments. The system is constantly improving in precision and extent.

Complaints have been made that but few of the materials collected by the Institution have yet been published. The answer to these, however, is readily given in the fact that so much of the income up to this time has been devoted to the building, and so many demands have been made upon the Smithsonian funds for objects requiring more immediate attention, that little could be done in this line; and, besides, it is more important that the information should be reliable than that it should be quickly published. The value of observations of this character increases in a higher ratio than the time of their continuance, and, therefore, what may be lost by delay is more than compensated by the precision and value of the results.

The reduction of the meteorological observations has been continued by Professor Coffin during the past year. He has completed the discussion of all the records for 1854, and those of 1855 as far as they have been sent in. The publication of these, however, in full, will require a volume which, we trust, will be printed at the expense of the general government, as an appendix to the Agricultural Report of the Patent Office.

Important additions have lately been made to the physical geography of the western portions of the United States, under the direction of the Secretary of War, by the officers of the army engaged in the explorations of the several routes for a railway to the Pacific. A series of exact barometrical sections has been measured from the Mississippi river to the Pacific ocean. The elevations of the extended plain which constitutes the base of the Rocky mountains and of the parallel ridges have been determined. Temporary meteorological observations have also been made, which afford approximate data relative to the climate of this region.

The elevation and direction of the ridges which separate the valley of the Mississippi from the Pacific ocean have a controlling influence on the climate, particularly on the precipitation of the North American continent, and especially distinguish the storms of the Pacific coast from those of the Atlantic States.

The additions which have been made to the physical geography and natural history of this continent under the enlightened policy of the Secretary of War, will be received with great interest by the scientific men of Europe.

In studying the general physical phenomena of the globe, the western half of the North American continent, in comparison with other parts of the world, has been almost a blank. It is hoped, however, that the spirit of inquiry that has been awakened and the enterprises

which have been commenced, and thus far successfully prosecuted in this line, will be continued, and will supply the desiderata which have so long been felt. If all the military posts, or a selection which might be made from them, were furnished with a full set of instruments, and the observations made with due precision, results of the highest interest to the man of science, as well as to the agriculturist, the physician, and the engineer, would be obtained.

As first approximations the simple observations at the different posts, which have thus far been published, are acceptable additions to knowledge; but whatever is worth doing at the expense and under the direction of the general government, ought to be as well done as the state of science and the circumstances under which the work is commenced will admit.

A series of continued observations at a few posts, made at each hour during the twenty-four, similar to those carried on under the direction of Major Mordecai, at the Frankford arsenal, would afford materials of much interest for determining in the interior of the continent the hours of the day most suitable to be chosen for ascertaining the mean temperature, and for reducing the observations made at different times to the same hours, as well as for settling the time of occurrence of the daily periodical changes of the atmosphere.

Besides the collection of meteorological materials relative to the climate of the United States, the Institution has in its possession an extensive series of observations made in Texas and Mexico by Dr. Berlandier. These were placed at our disposal by Lieutenant Couch, who was favorably mentioned in the last report as having made a valuable exploration a few years ago in the southern part of our continent. Portions of this material will be published, from time to time, as an appendix to the Smithsonian Contributions.

I am happy to state to the Board, that the Provincial Parliament has made provision for the establishment of a system of meteorology in Canada, which will co-operate with that of the Institution. The act is in the following words:

"Whereas it is desirable at all seminaries and places of education to direct attention to natural phenomena, and to encourage habits of observation; and whereas a better knowledge of the climate and meteorology of Canada will be serviceable to agricultural and other pursuits, and be of value to scientific inquirers; be it therefore enacted, that it shall be part of the duty of every county grammar school to make the requisite observations for keeping, and to keep a meteorological journal, embracing such observations, and kept according to such form as shall from time to time be directed by the council of public instruction; and all such journals, or abstracts of them, shall be presented annually by the chief superintendent of schools to the governor-general, with his annual report.

"Every county grammar school shall be provided, at the expense of the county, with the following instruments: One barometer, one thermometer for the temperature of the air, one thermometer for evaporation, one rain-gage, one wind-vane."

The Library.—More has been accomplished in the library during

the past year than at any previous period. The books have been provisionally arranged according to subjects, and considerable progress made in a full catalogue as well as in an index to the chronological record of the daily reception of books as they are placed in the library. The first part of a descriptive catalogue of the works received in exchange has been published, and the second part is now in process of preparation. An extra number of the first part has been struck off, and copies have been sent in the form of an appendix to the seventh volume of Smithsonian Contributions to Knowledge, to all foreign societies, in order that our deficiencies may be made known, and an appeal made to our contributors for their supply. This list will also be of much importance to persons engaged in original research in this country, since it will give them, in a separate catalogue, a knowledge of the rich collection of Transactions and proceedings of literary and scientific societies in the possession of the Institution.

The value of a library is not to be estimated by the *number* of volumes it contains, but by the character of the books of which it is composed. It is the present intention of the Regents to render the Smithsonian library the most extensive and perfect collection of Transactions and scientific works in this country, and this it will be enabled to accomplish by means of its exchanges, which will furnish it with all the current journals and publications of societies, while the separate series may be completed in due time as opportunity and means may offer. The Institution has already more complete sets of Transactions of learned societies than are to be found in the oldest libraries in the United States, and on this point we speak on the authority of one of the first bibliographers of the day. This plan is in strict accordance with the general policy of the Institution, viz: to spend its funds on objects which cannot as well be accomplished by other means, and has commended itself to those who are well able to appreciate its merits, and who are acquainted with the multiplicity of demands made upon the limited income of the Smithsonian fund. In a letter, after a visit to Washington, the bibliographer before alluded to remarks: "My previous opinions as to the judiciousness of the system pursued by the Smithsonian Institution, in every respect, were more than confirmed. I hope you will not change in the least. Your exchanges will give you the most important of all the modern scientific publications, and the older ones can be added as you find them necessary. The library, I think, should be confined strictly to works of science."

A thorough examination has been made of the series of journals and transactions of societies; deficiencies have been noted, and, as far as possible, supplied, and the whole placed in the hands of the binder. This was considered indispensable for their preservation and use. The separate parts are in danger of being lost or injured so long as they remain in a pamphlet form. During the past year $2,043 have been expended in the binding of 3,668 volumes. The entire west wing of the building has been appropriated to the library, and three sides of this large apartment are now occupied with books. By placing two rows of cases, each of a double story, along the middle of the room, the amount of shelf room may be tripled, and space may thus be obtained sufficient for the wants of the library for a number of years.

It has before been observed that the Smithsonian library is intended to be a special one, as complete as possible in Transactions and all works of science. There is now in the city of Washington the large miscellaneous library of Congress and a city library of ten thousand volumes. Besides these, are the libraries of Georgetown College and of the several executive departments, and the invaluable collection of works pertaining to America, belonging to Peter Force, esq. The latter, with commendable liberality on the part of its enlightened owner, is open to the use of all who are engaged in research with reference to the speciality to which it pertains; and we trust that means will be provided by the general government to secure this collection in case of its ever being exposed to the danger of dispersion. Washington is, therefore, better supplied with miscellaneous books than any other city of the same size in the Union, and it can scarcely be considered necessary, or even just, to expend any portion of the income of the small fund intended for the good of mankind generally, in duplicating collections already to be found in the same city. Indeed it would be well if in every city of this country arrangements could be made by which each library should aim to be as complete as possible in certain branches; and we are pleased to learn that this policy has been adopted in the formation of the Astor library, the superintendent of which, in purchasing the rare books which it contains, having given a preference to such as were not to be found in any other collection in the city of New York.

To assist in rendering available the several libraries of the country, it has from the first been an object of the Institution to collect a complete set of their catalogues, and it is believed it now possesses a more extensive collection of this kind than is to be found elsewhere. Any person desiring to ascertain where a book may be obtained, can in most cases acquire the knowledge desired by addressing the Secretary of the Smithsonian Institution. At the last session of Congress an act was passed authorizing the transmission free of postage of articles entered for copyright. The effect of this law has been to diminish considerably the expense to which the Institution had been subjected in receiving books of this kind. Still there is a class of books on which postage is charged, namely, all those we receive in exchange through the mail for our own publications, including the laws and legislative documents of the several States. On the whole, the law relative to the deposite of works intended for copyright has thus far been of no real benefit; for the expense of clerk-hire, certificates, and shelf-room, would far exceed the value of all the books received in this way. While-school books, works intended for children, and the lighter and more worthless publications of the day, are forwarded to us, the larger and more valuable productions of the American press are often withheld. The principal office of these books has been to swell the number of volumes contained in the library, and in some respects to satisfy those who desire a large number of books rather than a choice collection. The process of cataloguing the library of Congress, in accordance with the plan proposed by this Institution, has been carried on under the direction of Professor Jillson, of Columbian College. The number of titles prepared is 15,885, with

7,949 cross-references—the whole number of volumes catalogued being 32,986. This number, according to Professor Jillson's report, embraces all the volumes which were in the library at the time the catalogue was commenced, with the exception of the law department, the bound volumes of tracts, and some incomplete works. It also includes the additions made in the general library to chapters 1st, 2d, 3d, and 4th, previous to April, 1855, the additions to the different chapters previous to the time they were catalogued, and at least one-half of the additions made during the past year. The whole amount expended on the preparation of the 15,885 titles is $4,971 07, and that of stereotyping about 4,000 titles, $2,974 91. This is exclusive of the expense incurred by the Institution in making the experiments on the stereotyping process, and the cost of the press, type, general apparatus, fixtures, &c.

The appropriation made by Congress has been exhausted, excepting $54 02.

Museum.—The specimens of natural history which have been received during the past year have been very numerous and of great value, the number of distinct contributors amounting to 130. As in former years, the most valuable additions have been received from the officers engaged in the various scientific expeditions of the government. An illustration of the extent of our receipts during the year is exhibited in the fact, that the specimens of mammals alone amount to 2,500.

The following is a general summary of the present state of the collections: The number of jars containing specimens of mammals in alcohol is 350: of birds, 39; of reptiles, 3,344; of fishes, 4,000; of invertebrates, 1,158; of miscellaneous, 28; making a total of 9,171 jars. Most of these contain a number of specimens; and there are about 30 barrels and cans filled with other specimens, which have not yet been assorted. There are also 1,200 prepared mammals, 4,425 birds, and 2,050 skulls and skeletons generally.

It is no part of the plan of the Institution to form a museum merely to attract the attention and gratify the curiosity of the casual visitor to the Smithsonian building, but it is the design to form complete collections in certain branches, which may serve to facilitate the study and increase the knowledge of natural history and geology.

Though the statement may excite surprise, yet I may assert, on the authority of Professor Baird, corroborated by the opinion of others well qualified to judge, that no collection of animals in the United States, nor, indeed, in the world, can even now pretend to rival the richness of the museum of the Smithsonian Institution in specimens which tend to illustrate the natural history of the continent of North America.

Not only have representatives of animals of every part of the country been obtained, to illustrate the entire American fauna, but also specimens of the same animal, from different parts, have been procured, in order to determine the geographical distribution of a species.

Of the vertebrate animals, there is scarcely a known species not already in the collection, while of those which have not yet been criti-

cally studied, there are probably a large number which have never been scientifically described.

These specimens have not, up to this time, been exhibited to the public, for want of suitable cases, in the large room, to properly display them; but they are accessible to those who are pursuing original investigations, during nearly the whole year. They have almost constantly been used for this purpose, by a succession of individuals engaged in the preparation of reports for the government, or the study of particular branches of natural history.

It is a part of the plan to give encouragement and assistance to original investigations, and persons who visit Washington for the purpose of studying the collection are furnished with all the facilities which the Institution can afford, and these, in the specimens, instruments, and the ample library of reference, are already such with regard to certain branches as cannot elsewhere be obtained.

The use of the specimens is not confined to persons who visit Washington, but, in accordance with the general policy of the Institution, they are sent to individuals who are engaged in the study of particular classes of animals, and with this view a large number of duplicates are in almost every case obtained. A considerable portion of the materials of the great work now in preparation by Agassiz will be derived from this Institution, and it is considered an important part of the duty of the directors to induce persons to undertake the study of special branches of natural history, and to afford them the means of its successful prosecution. For example, one of the researches of Dr. Leidy has been thus undertaken; and Dr. Jeffries Wyman, of Cambridge, is now engaged in the study of the peculiar character of the batrachian animals, and of the anatomical structure of the undeveloped organ of sight of the blind fish of the mammoth cave, and he has been supplied, for this purpose, with a large number of specimens of each of these animals by the Institution. In most cases of this kind the results of these investigations are published in the Smithsonian Contributions; though this is not strictly required, it being considered sufficient that full credit be given for all that has been contributed at the expense of the Institution.

The labor necessarily expended in unpacking, assorting, and labelling the specimens has been very great; and when to this is added the constant care required for the preservation of so many objects of a perishable character, the cost of the maintenance of an extended museum must be evident.

A large number of the specimens now in the museum have been procured by the several expeditions under the general government; and as in but few cases an appropriation has been made for their preservation, the expense of this has fallen on the Institution.

For a detailed account of the present condition of the collections, and the operations in the museum during the past year, I must refer to Professor Baird's report, herewith transmitted. Besides the researches mentioned, a number of explorations in natural history have been undertaken. The most important of these is that of California, by Mr. E. Samuels, under the patronage of this Institution and the Boston Society of Natural History. He expects to remain on the

Pacific coast about a year, and will doubtless secure numerous specimens in all departments of natural history, and will devote himself to completing such collections as are imperfectly represented by the results of the various Pacific railway surveys. Mr. Samuels is also charged, on the part of the Commissioner of Patents, with collecting specimens of seeds of the trees, shrubs, and grains of the country. A division of the expense, and the liberality of the Panama line, have enabled this exploration to be instituted at a small cost to each of the parties interested.

A small appropriation has also been made to assist in forming a complete collection of specimens to illustrate the zoology of Illinois, under the direction of Mr. R. Kennicott.

Another exploration was made in the northern part of the State of New York, during the past season, by Professor Baird.

The collections which have resulted from these expeditions, together with those from the Mexican boundary commission, and the several railway surveys, will furnish important additions to the natural history of the North American continent.

Lectures.—The interest in the lectures still continues, and the large lecture-room during the past winter has frequently been filled to overflowing by an attentive and intelligent audience. The plan has been adopted to give courses of lectures on special subjects, interspersed occasionally with single lectures, principally of a literary character. Courses of lectures on a single subject, it is believed, serve to convey more valuable and permanent instruction than a number of separate lectures on different subjects. To impress a general truth upon the mind, requires frequent repetition and a variety of illustrations, and hence but little impression can be made with reference to any subject involving scientific principles by a single discourse; and the lecturer who appears but once, too often attempts to interest his audience by the enunciation of vague generalizations or by mere rhetorical display.

This is, however, not always the case, since, for example, a single lecture may be given on the history of a discovery, or a brief analysis of the life of a distinguished individual.

As a general rule, therefore, we consider a number of single lectures by different persons, as of less value than a series on one subject by the same person. The latter requires a more profound acquaintance with the subject, and a greater amount of previous preparation. There are many persons who might be able to give a single popular lecture on some branch of knowledge, who would fail in attempting an extended course.

The following is a list of the lectures which were delivered during the winters of 1854–'55 and 1855–'56.*

1854–'55.—One lecture by Prof. ELIAS LOOMIS, of New York: "The zone of small planets between Mars and Jupiter."

* In order to complete the list for the winter of 1855–'56, the lectures delivered after the date of the report have been added.

One lecture by Dr. D. BRAINARD, of Chicago, Illinois, "On the nature and cure of the bite of serpents, and the wounds of poisoned arrows."

Four lectures by Hon. GEO. P. MARSH:

1st. "Constantinople and the Bosphorus."

2d. Do. do. do.

3d. "The Camel."

4th. "Environs of Constantinople.—Political and military importance of the position of that Capital.—The reform system in Turkey."

One lecture by Dr. ROBT. BAIRD: "History of the war between Russia and Turkey, with notices of those countries."

Nine lectures by Prof. ASA GRAY, of Cambridge, Massachusetts, "On Vegetation:"

1. "Development from the seed and from buds, root, stem, and leaves.

2. Aerial, ephiphytic, and parasitic vegetation.

3. Morphology of branches.—Subterranean vegetation.—Adaptation of bulb-bearing plants and the like to regions subject to a season of drought; of forests and the like to regions of equable distribution of rain.—Anatomy and action of leaves.

4. How plants grow.—Anatomical structure.—Development from the cell.—Gradation from plants of one cell to the completed type of vegetation.

5. Wood.—The tree.—Life and duration of plants.—The individual in its various senses.—The tree a community as well as an individual.

6. How plants multiply in numbers.—The flower.

7. Fruit and seed.—Fertilization and the formation of the embryo.—Reproduction in flowerless plants.

8. Movements and directions assumed by plants generally.—The relations of vegetation to the sun.

9. Relations of vegetation to the sun continued.—The plant considered as the producer of food and a medium of force."

One lecture by Rev. J. S. FLETCHER, on "Brazil."

Two lectures by Hon. HENRY BARNARD, of Connecticut: "Recent educational movements in Great Britain."

Two lectures by Rev. E. A. WASHBURNE:

1. "Confucius, or the Chinese mind."

2. "The Chinese war."

Two lectures by Prof. JOSEPH LOVERING, of Cambridge, Massachusetts: "The progress of electricity."

One lecture by OLIVER P. BALDWIN, esq., of Richmond, Va.: "National characteristics."

One lecture by Dr. W. F. CHANNING, of Boston: "The American fire alarm telegraph."

Three lectures by ROBERT RUSSELL, esq., of Scotland, on "Meteorology."

1855–'56.—Three lectures by Prof. E. S. SNELL, of Amherst College, Massachusetts, on "Architecture;" and one lecture on "Planetary motion and disturbances."

Six lectures by Prof. O. M. MITCHELL, of Cincinnati, Ohio, on "Astronomy."

One lecture by JOHN C. DEVEREUX, esq., of New York, on "The popular influences of architecture."

Six lectures by Prof. GEORGE J. CHACE, of Brown University, Providence, Rhode Island, on "Chemistry applied to the arts."

One lecture by Prof. C. C. FELTON, of Cambridge, Massachusetts, on "Greece."

Five lectures by Rev. JOHN LORD, of Connecticut, on the "Grandeur and fall of the French Bourbon monarchy."

From the foregoing statements, I trust it will be evident that the Institution is realizing the reasonable expectations of its friends; that its funds are in a prosperous condition, and that, so long as the present policy is maintained, it will continue to promote the advance of knowledge, and thus carry out the cherished object of its founder.

Respectfully submitted:

JOSEPH HENRY, *Secretary.*

JANUARY, 1856.

APPENDIX TO THE REPORT OF THE SECRETARY.

DECEMBER 31, 1855.

SIR: I beg leave to present herewith a report for the year 1855, of operations in such departments of the Smithsonian Institution as have been intrusted by you to my care.

Respectfully submitted:

SPENCER F. BAIRD,
Assistant Secretary Smithsonian Institution.

JOSEPH HENRY, LL. D.,
Secretary Smithsonian Institution.

I.—PUBLICATIONS.

The seventh volume of Smithsonian Contributions to Knowledge was issued in July last and promptly distributed.

The octavo publications during the year have been confined to the ninth annual report, of 464 pages.

The eighth volume of Smithsonian Contributions is in an active state of forwardness, and will soon be ready for delivery.

II.—EXCHANGES.

a—Foreign Exchanges.

Owing to unavoidable delay in printing the seventh volume, the packages for foreign distribution could not be made up until the middle of July. By the end of the month, however, they were all sent off, and by October had safely reached the hands of the agents of distribution. As in past years, most of the active scientific and literary institutions of America embraced the opportunity to transmit their exchanges.

The returns during 1855 have been very valuable, considerably exceeding those of any previous year, excepting so far as relates to maps and charts. Even here, however, the decrease is more apparent than real, as several extensive series have been received, bound into volumes instead of being in loose sheets, as is frequently the case. The particulars of these returns are presented in the following tables:

A.

Table exhibiting the number of pieces received in exchange during 1855.

Volumes—folio		87	
"	quarto	233	
"	octavo	717	
			1,037

Parts of volumes and pamphlets—folio...	41	
" " " " quarto.	239	
" " " " octavo.	1,427	
		1,707
Maps and engravings		26
Total		2,770

By comparison with the table of last year, it will be seen that there has been an increase in the receipts, by 111 volumes and 239 parts of volumes and pamphlets.

The number of donations for 1855 amounts to 1,779; that for 1854 to 806.

The list of receipts for other parties during the year exhibits a large increase over that of 1854, both in the number of packages and of addresses. Thus—

In 1855 were received	1,445	packages to	44 addresses.
In 1854 were received	987	packages to	36 addresses.
Difference	458		8

The Institution is indebted for aid in expediting its parcels to Mr. Zimmerman, consul-general of the Netherlands; to Dr. Henry Wheatland, of Salem; to Lieutenant J. M. Gilliss, U. S. Navy; to the American Board of Commissioners for Foreign Missions, and to the Board of Missions of the Presbyterian church.

The following tables exhibit the chief statistics respecting the foreign exchanges for the year. To table B should be added two boxes of books sent in December to Chile, and one to London, consisting chiefly of copies of the report on Chile, made by Lieutenant Gilliss.

B.

Table showing the amount of printed matter sent abroad by the Smithsonian Institution in July, 1855.

	Addresses of principal packages.	Addresses of sub-packages enclosed.	Total of distinct addresses.	No. of principal packages to principal addresses.	No. of sub-packages enclosed to sub-addresses.	Total of distinct packages to different addresses.	No. of pieces enclosed in principal packages.*	No. of pieces enclosed in sub-packages.*	Estimated addition, where several works enclosed in one piece.	Total of volumes and pieces.	Number of boxes.	Capacity, in cubic feet.	Weight.
Distributed by Dr. Felix Flügel, Leipsic.													
Sweden	9	9	....	17	50	.....	114	69	50	.....	....	....	.....
Norway	4	13	....	8	15	.....	43	91	15	.....	....	....	.....
Denmark	7	12	....	14	33	.....	82	110	33	.....	....	....	.....
Russia	20	15	....	48	104	.....	250	115	104	.....	....	....	.....
Holland	14	12	...	27	81	.....	174	77	81	....	....	....	.....
Germany	123	152	....	301	485	.....	1,283	945	485	.....	....	....	.....
Switzerland	17	19	....	31	70	.....	176	106	70	.....	....	....	.....
Belgium	9	6	....	18	63	.....	129	39	63	.....	....	....	.....
Total	203	238	441	464	901	1,365	2,251	1,562	901	4,714	18	188	5,361
Distributed by Hector Bossange, Paris.													
France	60	35	....	71	45	.....	862	120	45	.....	....	....	.....
Italy	27	23	....	41	28	.....	340	40	28	.....	....	....	.....
Total	87	58	145	112	73	185	1,202	160	73	1,435	6	76	2,185
Distributed by the Royal Society and Henry Stevens, London.													
Spain	3	3	....	6	3	.....	48	7	.....	.....	....	....	.....
Portugal	2	....	....	3	.....	.....	20	.....	.....	.....	....	....	.....
Great Britain and Ireland	95	148	....	200	490	.....	1,022	701	.....	.....	....	....	.....
Total	100	151	251	209	493	702	1,090	708	442	2,240	5	74	2,285
Distributed in other parts of the world	28	10	38	40	10	50	196	10	.....	206	4	20	650
Grand total	418	457	875	825	1,477	2,302	4,739	2,430	1,416	8,585	33	358	10,481

* Addressed packages from other institutions count only as one each, although containing sometimes as many as a dozen pieces.

C.

Table of packages received in 1855 *from American institutions for distribution abroad.*

Boston—	
American Academy of Arts and Sciences	146
Natural History Society	49
Cambridge—	
Observatory Harvard College	124
Botanic Garden	16
New Haven—	
American Journal Science	40
Albany—	
New York State Library	5
New York State Agricultural Society	1
New York—	
American Geographical and Statistical Society	150
Philadelphia—	
American Philosophical Society	28
Philadelphia Academy of Natural Sciences	91
Philadelphia College of Pharmacy	1
Pennsylvania Institute for Blind	48
Historical Society of Pennsylvania	1
Washington—	
Secretary of War	6
United States Patent Office	200
Bureau of Ordnance and Hydrography	78
United States Naval Astronomical Expedition	20
Columbus, Ohio—	
Ohio State Board of Agriculture	126
Detroit—	
Michigan State Agricultural Society	47
New Orleans—	
New Orleans Academy of Natural Sciences	200
San Francisco—	
California Academy of Natural Sciences	46
Geological Survey of California	128
Santiago, Chile—	
University of Chile	147
Observatory of Santiago	34
Various individuals	980
Total	2,712

D.

Table of packages received from Europe for distribution to various societies in America.

Canada—	
Various institutions	7
Boston—	
American Academy of Arts and Sciences	74
Natural History Society	20
Bowditch Library	13
Cambridge—	
Observatory	26
Botanic Garden	41
Harvard University	39
Astronomical Journal	28
American Association for Advancement of Science	6
Worcester—	
American Antiquarian Society	6
New Haven—	
American Journal of Science	36
American Oriental Society	7
Providence—	
Brown University	10
Albany—	
Albany Institute	17
New York State Library	27
State Agricultural Society	1
New York—	
Lyceum of Natural History	23
American Ethnological Society	1
Geographical and Statistical Society	5
American Institute	13
Astor Library	15
West Point—	
United States Military Academy	2
Philadelphia—	
American Philosophical Society	72
Academy of Natural Sciences	45
Franklin Institute	17
Geological Survey of Pennsylvania	3
Washington—	
President of the United States	1
United States Patent Office	23
Congress Library	15
United States and Mexican Boundary Survey	1
United States Coast Survey	33
National Observatory	38
National Institute	26
Commissioner of Indian Affairs	1
United States Naval Astronomical Expedition	19

Georgetown, D. C.—	
Georgetown College	29
Cincinnati—	
Observatory	12
Columbus—	
Ohio State Agricultural Society	2
Detroit—	
Michigan State Agricultural Society	8
Ann Arbor—	
Observatory	4
Madison—	
Wisconsin State Agricultural Society	26
Colleges in different places	117
Various State Libraries	28
Miscellaneous societies and individuals	508
Total	1,445

By reference to the preceding tables, it will be seen that the Institution acts as agent not only for parties in the United States and Canada, but also for the University and Observatory of Chile.

The facilities for conducting the Smithsonian exchanges have been greatly increased by the liberal act of the mail line of steamships to California *via* Panama, in carrying, without charge, its parcels for the west coast of America. The line of steamers to Bremen has also granted the same privilege. Messrs. Oelrichs & Lurman, of Baltimore, as in previous years, have marked their sense of the value of the operations of the Institution by making no charge whatever for their agency in shipping from Baltimore the large number of boxes sent to Bremen, and in receiving and forwarding others from that port.

b—Domestic Exchanges.

The copies of volume VII of Smithsonian Contributions were distributed promptly through the following agents, whose services, as heretofore, have been given without charge: Dr. T. M. Brewer, Boston; George T. Putnam & Co., New York; J. B. Lippincott & Co., Philadelphia; John Russell, Charleston; B. M. Norman, New Orleans; Dr. George Engelmann, St. Louis; H. W. Derby, Cincinnati; and Jewett, Proctor & Worthington, Cleveland.

Nearly all the parties to whom copies were addressed have already returned acknowledgments to the Institution.

A few copies of volumes IV and V of the History, Condition, and Prospects of the Indian Tribes of the United States have been distributed in behalf of the Commissioner of Indian Affairs.

III.—MUSEUM.

A—*Increase of the Museum.*

The year 1854 was a marked one in the history of the Institution, on account of the magnitude and intrinsic value of the collections re-

ceived. These were mainly from the survey for marking the boundary between the United States and Mexico, and those for a practical railroad route to the Pacific, from the North Pacific exploring expedition under Captain Ringgold, and the expedition to the Parana and its tributaries under Captain Page, from the exploration of the coast of California by Lieutenant Trowbridge, and many others, enumerated in detail in the last report. It was supposed that, with the return of most of these expeditions, and the diminution in extent of the field of labor, the receipts during the year 1855 would show a considerable falling off. This, however, has by no means been the case; on the contrary, the additions have not only been greater in number, but of even greater interest, many new regions having been almost exhausted of their scientific novelties. The following table will illustrate the difference in the receipts for the two years:

	1854.	1855.
Number of kegs and barrels received	35	26
Do. cans	26	18
Do. jars	175	187
Do. boxes	94	148
Do. bales	—	7
Do. packages	32	79
Do. cabinets	—	2
Total of pieces	362	467
Distinct donations	130	229

The entire number of different contributors during 1855 has exceeded 130. There has been a considerable decrease in 1855 in the number of fishes and reptiles received, owing to the fact that full collections have been made in previous years at many points, which thus became exhausted as far as contributions of desirable specimens were concerned. In the department of mammals, however, the increase over previous years has been very marked, in consequence of a circular which you issued early in the year calling attention to the subject. The number of specimens received, preserved either in alcohol or as dry skins, amounted nearly to 2,500, an aggregate which few museums in the world can probably give, as received in the same space of time.

As in 1854, the most important of the collections received, whether their extent or novelty be considered, were made and sent home by the government exploring expeditions, as follows:

a—THE MEXICAN BOUNDARY LINE.

Survey of the boundary between the United States and Mexico—Major W. H. Emory, U. S. A., commissioner.—In the last annual report, attention was called to the fact that the active survey of this line had been resumed, for the purpose of accurately marking the new portion of the United States boundary, acquired by the Gadsden treaty. The party of the Commissioner left Washington in September for the field of

operation, and got back to San Antonio in one year, after running a boundary line of seven hundred miles in length. Operations were commenced simultaneously at both extremities of the line, Major Emory himself taking charge of the eastern end, and intrusting the western to Lieutenant Michler.

As in all previous surveys of the Mexican boundary line, much attention was paid to the collection of facts and specimens illustrating the Natural History of the region traversed, and very full series of the animals, plants, minerals, and fossils, were secured by the gentlemen specially charged with this duty—namely, Dr. C. B. Kennerly, surgeon of the expedition; Captain E. K. Smith, commander of the escort; and Arthur Schott, esq., assistant to Lieutenant Michler.

The collections thus made, at the close of the field labors of the Boundary Survey, were in no respect inferior to the preceding ones, and formed an appropriate winding up of the natural-history operations of a great work. The pioneer of all those government explorations which have yielded such important fruits to natural science, traversing hundreds of miles previously unvisited by the naturalist, and provided with a scientific outfit devised expressly for it, and well-tested previously to its adoption by other parties, the Mexican Boundary Survey has imperishably identified itself with the history of the progress of science in the collecting of perhaps a larger number of new species of North American animals and plants than any one party ever gathered before, or will again.

b.—REGIONS WEST OF THE MISSOURI.

Exploration of northern route for Pacific railroad, under Governor I. I. Stevens.—The rich results of explorations along this line have already been adverted to. The naturalists of the expedition—Dr. George Suckley and Dr. J. G. Cooper—after the expiration of their connection with the survey in 1854, continued making collections of facts and specimens at their own expense, and added much to their previous acquisitions. The numerous specimens gathered by Dr. Cooper, principally at Shoalwater bay and near San Francisco, have not yet been all received: those of Dr. Suckley, made at the Dalles, Fort Steilacoom, and in various portions of Oregon, have arrived, and are of the first importance. They are especially rich in mammalia, and will again be referred to.

Exploration of California by Lieut. Williamson.—Lieut. Williamson, after completing the report of his survey of 1853, was sent out again in May last to examine the region along the Cascade range of mountains in California and Oregon, for the purpose of discovering, if possible, a practicable pass through these rugged mountains. His labors were completed in November, and in December Dr. J. S. Newberry, geologist and naturalist of the party, arrived in Washington with the rich fruits of his labors, consisting of full collections in all departments of natural history. In mammals this collection is especially ample, containing among others many of the larger species, as bears, deer, &c., not previously secured by any expedition. Facts of

the greatest interest in the geographical distribution of many forms were obtained, especially in determining the existence west of the Cascade mountains of the genera *Coregonus*, *Siredon* and *Scaphiopus*.

Dr. Newberry brought with him a donation to the Institution by Dr. W. O. Ayres, of San Francisco, of a series of types of his new species of California fishes, which will prove of very great value for comparison.

The exploration under Lieut. J. G. Parke in California has also returned to Washington with important collections, mainly in geology and botany, made by Dr. Antisell. The expedition under Capt. Pope, for the purpose of testing the question of artesian boring on the plains, is still in the field, where Capt. Pope is engaged in continuing the natural history explorations commenced by him in previous expeditions. No specimens have, however, been received from him during the year.

Survey in Texas of Capt. R. B. Marcy.—The collections made by Dr. Shumard during this survey, referred to in 1854, were not received until the present year, having been detained for many months at Fort Smith by low water in the Arkansas. They consist of many interesting specimens of vertebrates, insects, and plants, with full series of the minerals and fossils of that region.

Collections made by Dr. Anderson, U. S. A., at Fort McKavit, Texas, have served to illustrate still further the zoölogy of this State.

Lieut. W. P. Trowbridge.—The researches of Lieut. W. P. Trowbridge, U. S. Engineers, superintendent on the Pacific coast of the tidal stations of the U. S. Coast Survey, have been vigorously continued since last year, as shown by the record of his donations, consisting of many specimens of vertebrates and invertebrates from different points, as Cape Flattery, Astoria, San Francisco, the Farallones, and San Diego. No one explorer, unaided by government resources, has done so much in the way of collections in American zoölogy as Lieut. Trowbridge accomplished by his own personal labor, assisted by Messrs. James Wayne, T. A. Szabo, and Andrew Cassidy, tidal observers under his command. It is thus that the operations of the Coast Survey, under the liberal countenance of its chief, have tended to advance the knowledge of the natural history of our coast to a degree only second to that of its physical features.

To Richard D. Cutts, esq., in charge of a surveying party of the Coast Survey, the Institution is indebted for specimens of the mammals, birds, reptiles, and fishes of California, of rare excellence of preservation and scientific interest.

Another exploration made by a party of the U. S. Coast Survey was conducted by Mr. Gustavus Würdemann, in continuation of former efforts of similar character on the coasts of Louisiana and Texas. Mr. Würdemann's operations were carried on at Indian river, Florida, on the St. John, and on the coasts of Georgia and South Carolina, at which places he gathered many interesting specimens of animals.

Dr. J. F. Hammond, U. S. A., stationed at Fort Reading, sent in some valuable collections from that part of California. Specimens

from Fort Yuma were presented by Major G. S. Thomas, Lieut. Patterson, and Dr. R. P. Abbott, of the U. S. army.

Geological Survey of Oregon.—A large number of boxes of minerals and fossils have been received from Dr. J. Evans, now occupied in the geological survey of Oregon. To these were added a number of specimens of the mammals and birds of Oregon, as well as some still more valuable from the region of the Upper Missouri.

Explorations on the Missouri.—The explorations on the Upper Missouri and Yellowstone, by Dr. F. V. Hayden, in connexion with Col. Vaughan, Indian agent, Mr. Alex. Culbertson, and Mr. Chouteau, continue to yield results of much importance. Large collections of fossils, minerals, mammals, birds, insects, and plants, have been made and sent in.

Dr. Hayden has revisited the Mauvaises Terres of White river during the year, and procured some forms of fossil mammals not previously discovered. The Mauvaises Terres of the Blackfeet country have also furnished him a rich harvest. His geological collections now amount to nearly six tons in weight.

The expedition of United States troops under Gen. Harney against the Sioux has also resulted in the collecting of many specimens of fossil mammals and reptiles in the Mauvaises Terres. Most of these will probably go to enrich the cabinet of the U. S. Military Academy at West Point.

A valuable series of specimens, made at Fort Benton, on the Upper Missouri, by Mr. Harvey, was received during the summer, and serves to complete the collections in the same vicinity by Dr. Geo. Suckley.

Exploration of Mr. Samuels.—The exploration of California by Mr. E. Samuels, under the patronage of the Smithsonian Institution, the Boston Society of Natural History, and the United States mail line to California—consisting of the United States Mail Steamship Company, (M. O. Roberts, esq., president,) the Panama Railroad Company, (David Headly, president,) and the Pacific Steamship Company, (Mr. Aspinwall, president)—promises to do much towards the development of the natural history of that State. Mr. Samuels left New York on the 5th of November, and by last advices had arrived in San Francisco. He expects to remain in California about a year, and will secure numerous specimens in all departments of natural history, devoting particular attention to completing such collections as are imperfectly represented in the results of the various Pacific railroad surveys. The above-mentioned companies have, in the most liberal spirit, granted free passage to Mr. Samuels and his collections, besides adding other facilities, thereby reducing materially the expenses of the work.

The California Express Company of Messrs. Wells, Fargo, & Co., and J. M. Freeman & Co., at the suggestion of officers of the Panama line, have instructed their agents in California to render Mr. Samuels all the aid in their power.

In addition to his other collections, Mr. Samuels is specially charged by the Commissioner of Patents with securing seeds of the trees and shrubs of California for distribution throughout the country.

c—REGIONS EAST OF THE MISSOURI.

In anticipation of the great fair in Chicago of the Illinois State Agricultural Society, it was proposed to secure and exhibit full collections of the natural history of the State on that occasion. Accordingly, Mr. Robert Kennicott was selected by the society to travel throughout Illinois, especially along the lines of the Illinois Central railroad, and not only to make collections himself, but to instruct the employés of the railroad company and others, so as to enable them to assist in the work. Aided by a small appropriation by the Institution, in addition to the facilities furnished by the society and the railroad company, Mr. Kennicott collected in a few months the finest cabinet of Illinois specimens ever brought together. This collection constituted one of the most striking features of the fair, and after the latter was closed was in great part forwarded to the Smithsonian Institution. It is much to be regretted that a very large and valuable collection of living reptiles of Illinois, transmitted by Mr. Kennicott, should have been destroyed through a misunderstanding with the express company. To Mr. Kennicott is due the praise of having been the first to enter on a systematic zoölogical exploration of Illinois. Thanks to his efforts, we have few States better, or even so well, represented in our cabinet. In this labor he has been worthily seconded in the more southern portions of the State by Mr. William J. Shaw,* from whom many valuable collections, especially of insects, have already been received.

In company with William A. Henry, esq., I visited the wild regions of northern New York, for the purpose of studying the habits, and collecting specimens, of the mammals inhabiting it. With the assistance of Mr. M. Baker, of Saranac Lake, we succeeded very well in accomplishing our object.

Mr. Henry and myself also visited the region along the St. Lawrence, and made some interesting collections, aided by Mr. E. A. Dayton, of Madrid, and Mr. W. E. Guest, of Ogdensburg.

d—MEXICO.

Two very important additions to our collection of specimens, illustrating the natural history of Mexico, have been received during the year. The first consists of a series of types of Mexican serpents as described in the Erpetologie generale of Messrs. Duméril and Bitoron, and presented by the Jardin des Plantes, of Paris, through the agency of the Messrs. Duméril. The other collection was forwarded by John Potts, esq., and contains specimens of reptiles, fishes, birds, and mammals, made in central and northern Mexico, and all in the highest state of preservation. Some of the specimens were received by Mr. Potts for the Institution from Mr. Schleiden. Additional collections from Mexico are earnestly desired, as serving to determine more accurately the nature and geographical distribution of North American

* Since writing the above, intelligence has been received of the death of Mr. Shaw.

animals. Thanks to the disinterested zeal of Mr. D. N. Couch, formerly of the United States army, we already possess, in the rich collections made by himself and Dr. Berlandier, very full series from many provinces of northern Mexico, as Tamaulipas, Coahuila, New Leon, Durango, &c. The fruits of the travels of Dr. Thos. Webb, in the more western portions of northern Mexico, are also of very great value. The vicinity of the city of Mexico is probably the point where the Mexican specimens of most interest are to be derived.

e—SOUTH AMERICA AND THE REST OF THE WORLD.

Survey of North Pacific and China seas, under Commander John Rodgers, United States Navy.—The collections made by this naval exploring expedition, while first in charge of Captain Ringgold, and subsequently of Captain Rodgers during 1854 and part of 1855, have been received in good order, and consist of many boxes and kegs of specimens in zoölogy and botany, collected chiefly by Messrs. Wm. Stimpson and Charles Wright, naturalists to the survey. These specimens are principally from the South Pacific and the China seas. Collections of very great interest were made during the past spring and summer about Japan, Kamschatka, and in and along Behring's straits, and subsequently on the coast of California.

The Japan Expedition, under Commodore Perry, was also the means of adding some fine collections of birds, reptiles, and shells to the zoölogical treasures of the country.

From Dr. James Morrow, agriculturist to the expedition, has been received a number of jars filled with reptiles and fishes of Japan, embracing several novelties in science.

Exploration of the Parana, under Captain T. J. Page, United States Navy.—This expedition has continued its important agency in developing the natural history resources of Paraguay, by sending home many specimens of the mammals, birds, reptiles, fishes, invertebrates, plants, minerals, &c. These, with previous collections from the same source, constitute the most important series of South American animals, especially of the reptiles and fishes, ever brought to the United States.

Arctic Expedition of Dr. Kane, United States Navy.—During the recent voyage of Dr. Kane along the west coast of Greenland, many collections in natural history were obtained. It became unfortunately necessary to abandon them, however, after the vessel became frozen up, and the party was obliged to return in sledges.

f—GENERAL STATEMENTS OF ADDITIONS.

I shall now proceed to discuss briefly the more important contributions to the museum during the past year, referring for particulars to the general list of donations.

Mammals.—The most marked increase during the year has been in

the collection of mammals, of which about 2,500 specimens were received. Much the larger number of these, as might be expected, consisted of very small species, as of *Arvicola, Sorex, Hesperomys*, &c., although many of the larger kinds, as bears, deer, wolves, foxes, &c., are included. Most of the specimens were preserved entire in alcohol, affording means of anatomical as well as zoölogical research. About eight hundred skins have been registered as received or prepared in the Institution. The additions to this department have been from all parts of the world, including an interesting collection of English species from Sir W. Jardine.

One of the most important contributions to the geographical collections of the institution has been the series of mammals of eastern Massachusetts, received from Mr. J. W. P. Jenks, of Middleboro. Large numbers of all the species from about Middleboro have been collected and forwarded by Mr. Jenks, amounting to over eight hundred specimens, and with the result of adding several species to those known to inhabit the State.

Another collection of mammals of nearly equal extent, but of less variety of species, was made in Clarke county, Virginia, at the instance of Dr. Kennerly, by Mr. John A. Kniesley. This also contains some rare species. Others were received from Mr. Bridges, in North Carolina. The Rev. M. A. Curtis, of South Carolina, aided by his sons, has also furnished the largest number of mammals, both specimens and species, ever received from the southern States.

Birds.—Of birds, several thousand specimens have been received; the most important from the west coast of America. The principal extra limital collections were from the expeditions of Captain Ringgold, Captain Rodgers, Commodore Perry, Captain Page, and Lieut. Gilliss. Mr. Naffer presented some very rare species from the Philippine Islands; and Dr. Tolmie a series of skulls of birds of the Pacific ocean, as penguins, cormorants, &c.

Reptiles.—Many interesting collections of reptiles have been received from different portions of North America and Mexico, as well as from other parts of the world. Among the species collected in Japan by Commodore Perry is a specimen of the *Plestiodon*, supposed by authors to be identical with a North American lizard, (*P. quinquilineatus.*) The collection of types of Mexican species from the Jardin des Plantes has already been referred to.

Fishes.—The number of fishes received has been less than in previous years, although by no means deficient in interest. Those from west of the Rocky mountains were mostly made by the government expeditions, as also by Lieutenant Trowbridge, Dr. Ayres, Dr. J. F. Hammond, Dr. Cooper, Dr. Suckley, Mr. Cutts, &c. The most important of the eastern were a collection from the Tortugas, made by Lieutenant H. G. Wright, U. S. Navy, assisted by Dr. Whitehurst, and one from the Maumee river, by Mr. George Clark. Some Cuban fishes were presented by Professor F. Poey, of Havana, and some South American, by Thomas Rainey, esq., United States consul.

Invertebrates.—The principal addition to the series of invertebrata, not yet mentioned, consists of two large cabinets, containing the valuable and extensive collection of shells belonging to General Totten, and deposited by him. Such a collection has been much needed in the Institution for purposes of comparison.

Plants.—A series of the plants of the Berlandier collection, selected by Dr. Gray, was presented by Dr. Short, of Louisville. By special request of Lieutenant Couch, Mr. Ervendberg forwarded a collection from Comal county, Texas, and Dr. Glisan one from Fort Arbuckle. Seeds of a valuable Texan grass were received from Major Carleton.

Fossils and Minerals.—The very valuable collection of minerals and fossils collected in the Lake Superior mining region by Messrs. Foster and Whitney, and illustrating their government report, has been received during the year, and with the other government geological collections, previously secured, furnish rich material for representing the geological features of the country. The Oregon collections of Dr. Evans have been already mentioned.

A collection of Niagara fossils and minerals was received from Thomas Barnett, esq.

Miscellaneous.—A fine specimen of the Australian Boomerang, and other articles, were received from Mr. Carrington Raymond, of New York. From Mr. N. Trübner were obtained two sets of microscopic slides: one containing illustrations of organic tissues and organs; the other constituting a complete system of entomology, in numerous mounted preparations, showing the family characteristics of the principal orders of insects.

Living Animals.—Among the additions to the museum during the past year have been quite a number of living animals, some of them species of great rarity, or else but seldom seen out of their native localities.

These have answered an excellent purpose in serving as models for drawings by the various artists engaged in figuring the collections of the different surveying and exploring expeditions.

Although the institution is, of itself, unable to provide suitable accommodations for the larger mammals and birds, it is fortunate in the zealous co-operation of Dr. Nichols, the superintendent of the United States Insane Asylum, who cheerfully receives any specimens sent him, and gives them every attention which they may require. As a source of harmless amusement and mental diversion to the patients of an insane asylum, a collection of living animals has no equal, and it is much to be desired that the number at the Washington asylum may be materially increased.

The most conspicuous addition to the menagerie of the institution is a huge grizzly bear, (*Ursus ferox,*) received in July. It was caught in 1853, while quite young, by Dr. John Evans, United States geologist, during his overland journey to Oregon, and sent to Mr. Hendricks, in Indiana, by whom, after two years' time, it was forwarded

to Washington. It is now a little more than two and a half years' old, and has already attained a large size, weighing probably five or six hundred pounds.

Dr. Evans has also forwarded, through D. D. Owen, two living wild cats, (*Lynx rufus*,) from the Upper Missouri. One of these died last spring; the other still survives.

A fine specimen of the American antelope (*Antelope americana*) was presented by Dr. W. W. Anderson, of South Carolina, and was, as far as I can learn, the first living one brought to the Atlantic States, although the species is very common on the Western plains. It was taken in the vicinity of Fort McKavit, when quite young, by Dr. W. W. Anderson, U. S. A., together with a Virginia deer, (*Cervus virginianus*,) likewise presented to the Institution. The antelope, unfortunately, died from some unknown cause, some months ago; the deer is still in good health.

Among the small quadrupeds, received alive, of most interest is a specimen of the grey gopher, (*Spermophilus franklinii*,) presented by Robert Kennicott, esq. This species is an inhabitant of the prairies of Illinois, Iowa, and Wisconsin, and probably of Minnesota, and the plains north of it. In some of its habits, it is not dissimilar to the prairie dog, (*Cynomys ludovicianus*.) Several squirrels, (*Tamias americana*, *Sciurus migratorius*, *&c.*,) together with some wild mice and moles, have also been received from various sources. A living racoon has also been received from California.

A pair of young roseate spoonbills, (*Platalea Ajaja*,) caught in Florida, was presented by Mr. Würdemann.

Very large numbers of living serpents, embracing many rare species, have been received from different regions; much the greater number, however, from Illinois, where they were collected by Mr. Kennicott. Others were presented by Mr. Sergeant, Mr. Kirkpatrick, &c. A portion of the specimens from Illinois were sent to the Jardin des Plantes, in charge of Mr. J. H. Richard, but were wantonly thrown over-board during the passage by a young American, to the profound regret of this Institution, and of the administrators of the Paris Museum d'Histoire Naturelle. A second collection, duplicate of the first, sent by Mr. Kennicott, was destroyed by the Express Company, to whose charge it was commited in Chicago. A long time will probably elapse before some of the species can be replaced.

Some interesting species of living frogs, salamanders, &c., have also been received, together with a considerable number of turtles.

In view of the very great number and extent of donations to the museum in 1855, as well as of the limited space allotted to me, it is clearly impossible to mention here in detail any but the most important, and even some of these must be omitted. As an index, however, to the alphabetical list of donations herewith presented, I have prepared the following tables—the first, showing the principal additions by States; in the second, the arrangement is by systematic classification:

I.—Geographical Index to Specimens received.

Washington and Oregon.—Andrews, Cooper, Evans, Tolmie, Suckley.

California.—Abbott, Ayres, Baird, Campbell, Cooper, Cutts, Hammond, Newberry, Patterson, Taylor, Thomas, Trowbridge, Williamson.
Southern Boundary.—United States and Mexican Boundary Commission.
Texas.—Anderson, Carleton, Ervendberg.
Louisiana.—Andrews.
Arkansas and Indian Territory.—Glisan, Marcy, Shumard.
Missouri.—Engelmann, Hilgard, Shumard.
Kansas.—Couch, Hammond.
Nebraska.—Evans, Harvey, Hayden, Vaughan.
Iowa.—Moore, Stevens.
Wisconsin.—Barry, Child, Hoy, Kumlien.
Lake Superior.—Agassiz, Foster, Whitney.
Illinois.—Kennicott, Sergeant, Shaw.
Ohio.—Clark, Kirtland, Kirkpatrick, Lesquereux, Wormley.
Kentucky.—Grant.
Tennessee.—Means.
Alabama.—Pybas.
Mississippi.—Robinson, Spillman.
Florida.—Casey, Whitehurst, Wright, Würdemann.
Georgia.—Leconte, Neisler, Postell.
South Carolina.—Anderson, Barratt, Curtis, Morrow, Ravenel, Weston.
North Carolina.—Bridger, Dewey, Erwin, Fitzgerald.
Virginia.—Goldsboro, Kniesley, McDonald, Palmer, Robertson.
District of Columbia.—Brown, Dougal, Herder, Johnson, Nichols.
Maryland.—Bowers.
Pennsylvania.—Patton.
New York.—Baird, Davis, Dayton, Hall, Howell, Lawrence, Oakley, Ward, Welsh.
Connecticut.—Plumb.
Vermont.—Thompson.
Massachusetts.—Agassiz, Brewer, Jenks, Wyman.
British Provinces.—Barnett, Bell, Dawson, Montreal Natural History Society, Wyman.
Cuba.—Poey.
Mexico.—Jardin des Plantes, Potts.
South America.—Gilliss, Nichols, Page, Rainey.
Europe.—Clark, Easter, Jardine, Karsten, Sturm.
China, Japan, and South Pacific Ocean.—Agassiz, Gulick, Morrow, Ringgold, Rodgers.
East Indies.—Napper.
Australia.—Raymond.

II.—Systematic Index to Specimens received.

Mammals.—Agassiz, Anderson, Ayres, Baird, Barratt, Barry, Brewer, Bridger, Brown, Campbell, Child, Clarke, Cooper, Couch, Curtis, Cutts, Davis, Dawson, Dougal, Engelmann, Evans, Hale, Hammond, Howell, Hoy, Jardine, Jenks, Kennicott, Kniesley, Kirtland, Kumlien, Lawrence, Leconte, Montreal Natural History So-

ciety, Moore, Morrow, Nichols, Shaw, Stevens, Sturm, Suckley, Thompson, Trowbridge, Vaughan & Hayden, Tuley, Welsh, Würdemann, Wyman.

Birds.—Bowers, Couch, Curtis, Cutts, Davis, Fitzgerald, Gulick, Johnson, Kennicott, Napper, Postell, Pybas, Shaw, Sturm, Suckley, Tolmie, Trowbridge, Vaughan & Hayden, Würdemann.

Reptiles.—Abbott, Andrews, Anderson, Baird, Bridger, Curtis, Cutts, Easter, Engelmann, Evans, Fitzgerald, Goldsboro, Hammond, Howell, Jardin des Plantes, Kennicott, Kirkpatrick, Kirtland, Lesquereux, Palmer, Patterson, Postell, Pybas, Sergeant, Shumard, Spillman, Suckley, Trowbridge, Vaughan & Hayden, Ward, Weston, Wormley, Würdemann, Wyman.

Fishes.—Agassiz, Anderson, Baird, Casey, Clark, Cutts, Dayton, Evans, Grant, Hammond, Howell, Kennicott, Means, Poey, Rainey, Shumard, Spillman, Suckley, Trowbridge, Vaughan & Hayden, Weston, Wormley, Wright, Würdemann, Wyman.

Invertebrates.—Barratt, Easter, Engelmann, Hammond, Lewis, Neisler, Ravenel, Shaw, Totten, Trowbridge, Wilson, Wright.

Plants.—Carleton, Eversfield, Glisan, Hilgard, Short.

Fossils and Minerals.—Andrews, Barnet, Dewey, Erwin, Foreman, Karsten, Oakley, Pybas, Ravenel, Spillman, Thomas, Vaughan & Hayden.

Miscellaneous.—Raymond, Ringgold, Trübner.

B—*Work done in the Museum.*

Owing to the very great number of specimens received weekly at the Institution, the labor involved in unpacking, assorting, and labelling, has been very onerous, considerably greater than in 1854. No arrears, however, have been suffered to accumulate, every collection on its arrival being promptly entered on the books of registry, and appropriately ticketed, with date, locality, &c. In this labor, as in previous years, I have been assisted by Dr. Charles Girard.

A considerable amount of taxidermical work has also been performed within the walls of the Institution; several hundreds of skins of mammals and birds, and an equal number of skulls, having been prepared. All such specimens as admitted of it have been regularly catalogued on the books of the museum: the serial numbering of prepared mammals having been advanced, during the year, from 351 to 1,200; of birds, from 4,354 to 4,425; of skeletons and skulls, from 1,276 to 2,050. The entries of mammals and skulls have been brought completely up; those of several collections of birds have, however, been purposely deferred for the present.

All the collections of vertebrata in the Institution (with the exception of the fishes) have, during the year, been re-arranged systematically on shelves or in drawers, so as to bring together all the specimens of each species. Owing to the want of space, this could not be

done previously; the acquisition of several additional rooms has, however, supplied all the accommodations at present necessary. Nothing satisfactory can be done with the collection of fishes, now filling 4,000 jars, until the erection of cases in the main hall shall furnish a suitable place of exhibition.

During the past year my own leisure time has been chiefly employed in working up the mammalia of the collection, and the monographing of the genera has been completed, with the exception of a few families.

Particular attention has been paid to the study of the skulls and skeletons of the species, for which the large collections of the Institution affords unrivalled facilities. C. Girard has also prepared several zoölogical monographs.

C—*Present Condition of the Museum.*

The richness of the museum of the Smithsonian Institution at the present time must be a source of national pride to all who are desirous of seeing at Washington a satisfactory exposition of the natural history of North America. No collection in the United States, nor indeed in the world, can pretend to rival it in this respect. Every part of our continent, from the British line on the north to central Mexico on the south, has abundant representatives here of its peculiar inhabitants, while the collocation of specimens of one species from many different localities furnishes materials towards determinations of geographical distribution of inestimable value. Thus of the known species of North American vertebrata there is scarcely one not already in our possession, while of nondescripts we have scores. Among the mammals alone it is probable that the final result of a critical examination of the specimens will be the addition of over fifty species to the list, given recently by Messrs. Audubon and Bachman, most of them being new to science.

Of North American reptiles but two or three of those described by Holbrook are wanting, while his aggregate has been more than doubled.

The following table will illustrate the statistics of the alcoholic collections at the present time, while the addition of similar data for 1851 will show the increase in four years. Five years is the entire period during which the collections generally of the Institution have been forming; and when it is considered that no purchases whatever have been made, save of an occasional specimen in the city market, it must be admitted that few Institutions, even those under the direct patronage of wealthy governments, can present such results. Nearly every specimen, too, has been collected at the express instance of the Institution.

Table exhibiting the number of jars, with specimens in alcohol, in the Smithsonian Institution December 31, 1855, *compared with December* 31, 1851.

	1851.	1855.
Mammals	36	350
Birds	none	39
Reptiles	554	3,344
Fishes	1,082	4,000
Invertebrates	150	1,158
Miscellaneous	65	280
Total	1,887	9,171

In the above enumeration it should be borne in mind that many of the jars of invertebrata and of fishes contain a considerable number of species each, while there are at least thirty barrels, kegs, or large cans filled with specimens, which it has not yet been convenient to separate and assort.

An equally gratifying increase is shown in the skins and skeletons, of which a table similar to the preceding is herewith presented:

	1851.	1854.	1855.
Prepared mammals	none	351	1,200
Birds	3,700	4,354	4,425
Skulls and skeletons generally	912	1,276	2,050

An addition, however, of at least 1,500 specimens of North American birds is to be made to this list of specimens in hand, but not yet regularly entered.

Catalogue lists of shells, insects, minerals, fossils, plants, &c., have not yet been prepared, although the increase here has likewise been very great.

D—*Principal Desiderata of the Museum.*

Although the collections received by the Institution have been so large and valuable, there are still some special desiderata, which it may be well to mention here, in hopes of having them supplied. Among the mammals east of the Mississippi most wanted are the two species of swamp rabbit; the one (*Lepus aquaticus*) found in Mississippi, Louisiana, and Alabama, considerably larger than the common gray rabbit, (*L. sylvaticus;*) the other from the Atlantic southern States, near the seaboard, (*L. palustris,*) smaller than that last mentioned. Next to these come the squirrels, especially the rusty-bellied varieties, from the southern and western States. The various

kinds, even those most common, of the mice, moles, shrews, &c., are very desirable.

A particular desideratum, as yet unsatisfied, is the Florida pouched rat, or "salamander," (*Geomys pineti*,) abundant in Florida and Georgia, where, though its heaps of earth are met with in every direction, the animal itself is rarely seen and caught. A steel trap set at night, and baited with sweet potatoes, or other vegetable substance, would probably secure them readily, as the western species may be taken in like manner.

While the species from the west of the Missouri are universally desirable, the large reddish-brown hare of northern Texas, the black and grizzly bear, the wolverine or glutton, the black-tailed deer of the Missouri, and the Rocky mountain goat, are of particular interest.

As an additional illustration of our desiderata among the mammals, I subjoin a copy of a circular on the subject, issued by you last spring, and containing special instructions for preserving and forwarding.

Skeletons, with skulls of mammals, as indeed of all vertebrata, are always desirable.

Of birds, the most prominent desiderata from the eastern portion of the continent are the American golden eagle, (*Aquila chrysaetos*,) the flamingo, (*Phœnicopterus ruber*,) and the courleco, (*Aramus scolopaceus*,) from Florida, and the trumpeter-swan, (*Cygnus buccinator*,) of the upper Mississippi.

Eggs of birds are always desirable, especially such as may serve to complete the work of Dr. Brewer on American eggs, now under way.

Among the North American reptiles, there are but two species of serpents described by Dr. Holbrook not in the collection; these are the *Coluber couperi*, or gopher snake, a very large, thick blue-black snake, found on the dry pine hills on the seaboard of Georgia, especially along the Altamaha river; the other is the *Trigonocephalus atrofuscus*, a copper-head snake, having subquadrate blotches on the back, and quite dark in color. This species is found in Tennessee.

Of the tortoises, any terrapins from the Atlantic, Gulf coasts, or the West, are desirable, and these can readily be sent alive. The Florida land-turtle, or "gopher," is also wanted. Of the salamanders, large numbers of the *Menobranchus*, *Menopoma*, *Siren*, and *Amphiuma*, are always wanted for dissection or distribution. These may be popularly described as lizard-shaped animals, with slimy skins, living in water or mud, especially of rice-fields, (from the southern kinds,) having two or four legs, and with or without gills on the sides of the neck. They are usually called alligators in the western States, though erroneously; in size they range from six inches to two feet.

Of fishes, those particularly desirable are the species of sunfish, &c., found in fresh-water creeks, emptying directly into salt or brackish water.

E—*Premiums for Collections.*

It may, under certain circumstances, be desirable for State organizations, such as that of the New York Cabinet of Natural History, to

offer premiums for the best collections in particular departments of natural history, (within the State,) with the privilege of taking the others offered at a fair valuation. This would excite a spirit of emulation between societies and individuals, which could not fail of beneficial results, independently of the value of the collections themselves. The credit of having been the first to propose this plan in America is, perhaps, due to the Ottawa Atheneum, of *Ottawa, Canada*, which* has offered premiums of from two to ten pounds, amounting in the aggregate to £33 10s.

F—*Distribution of Collections.*

With increasing materials at its command, the Institution is able to do more and more in furnishing the means of scientific research to naturalists at home and abroad, either as an absolute donation or as an exchange for specimens received or promised. More assistance of this kind has been rendered in 1855 than in any previous year. Thus many specimens of American turtles and terrapins have been sent to Professor Agassiz to aid him in preparing materials for the first volume of his great work on American zoölogy. To Dr. J. Wyman also have been sent specimens of lophoid fishes and Perennia branchiate reptiles, to be used in his investigations. *Coleoptera* have been sent to J. L. Leconte, mammals to Major LeConte, eggs of birds to Dr. T. M. Brewer, infusorial earths to Professor Bailey, plants to Drs. Torrey and Gray.

A collection of 21 species of North American serpents was sent to the Jardin des Plantes, of Paris, embracing a number not previously in its possession. Many living specimens were also sent, but unfortunately lost, in a manner previously referred to. Duplicates of collections received have also been sent to institutions in this country, as fishes, birds and mammals to the Philadelphia Academy of Natural Sciences, fishes to the medical department of Pennsylvania University, mammals to the Boston Society of Natural History, &c.

G—*Exchange of Specimens.*

Much has been done by the Institution in 1855, as in preceding years, in the way of facilitating the labors of naturalists, by bringing into communication those of like tastes in different parts of this country, or the world. Many persons have thus been enabled to secure important additions to their means of research. Its extensive lists of workers in natural science throughout the world enables the Institution readily to meet the wishes of parties, by referring at once to those most likely to assist in accomplishing some special object.

Among the gentlemen who are desirous of having their wishes made known to fellow-workers in science, may be mentioned the following:

M. Zanardini, of Venice, desires to exchange specimens of Medi-

* Journal of Education for Upper Canada, (Toronto,) November, 1855, page 175.

terranean and other European algae for specimens from North America.

W. A. Thomas, of Irvington, Westchester county, New York, desires to exchange minerals and fossils of New York for those of other States.

James Lewis, of Mohawk, New York, is prepared to exchange shells of New York for others from the south and west.

B. Pybas, of Tuscumbia, Alabama, will exchange shells of the Tennessee river for Silurian and Tertiary fossils.

Frank Higgins, of Columbus, Ohio, will exchange Ohio shells for those of southern States.

Dr. Emile Cornaria, Assistant Director of the Civic Museum, Milan, will exchange vertebrata, mollusca, insects, and fossils of Italy, Hungary, &c., for corresponding specimens from America.

H—*List of Additions to the Museum of the Smithsonian Institution in* 1855.

Dr. R. P. Abbott, U. S. A.—Reptiles from near Fort Yuma, California.

Professor L. Agassiz.—Fresh-water fish from China; mammals from Massachusetts and Lake Superior.

Dr. W. W. Anderson.—Living deer and antelope from Texas. Specimens of destructive insects (*Spenophorus*) from South Carolina.

Dr. W. W. Anderson, U. S. A.—Reptiles, fishes, and young beaver in alcohol, from Texas.

Professor E. B. Andrews.—Reptiles from western Louisiana. Deposited.

Seth Andrews.—Infusorial earth from Olympia, Washington Territory.

Dr. W. O. Ayres.—Fishes and scalops from San Francisco.

S. F. Baird.—Collections of fishes and reptiles made at Elizabethtown, Saranac Lake, Ogdensburg, and Madrid. Thirty skins of mammals from northern New York. Living racoon from California.

Thomas Barnett.—Minerals and fossils from Niagara Falls.

Dr. J. B. Barratt.—Skin of *scalops*, and two boxes of insects from South Carolina.

A. C. Barry.—Mammals and fishes from Wisconsin.

John G. Bell.—Polar hare (*Lepus glacialis*) and mounted quail, (*Ortyx virginianus.*) Specimens in flesh of the varying hare of New York, (*Lepus americanus.*)

J. Jacob Bower.—Specimen in flesh of black swan of Australia, Barnacle goose, and blue-headed pigeon from his aviary.

Dr. T. M. Brewer.—Mammals in alcohol from Massachusetts.

J. L. Bridger.—Keg of mammals and reptiles, skins of squirrels and hares, from North Carolina.

Solomon G. Brown.—Mammals from vicinity of Washington.

A. Campbell.—Two foetal black-tail deer from California.

Major J. H. Carleton, U. S. A.—Seeds of grass from the Pecos river.

Captain J. B. Casey, U. S. A.—Tail of a ray, (Tampa Bay.)

Rollin R. Child.—Skin of *Vespertilio noveboracensis*, from Wisconsin.

George Clarke.—Box of fresh white fish (*Coregonus*) from Lake Erie, in ice. Barrel of fishes in alcohol from the Maumee river.

James Clarke.—Specimens of Stickleback from England.

Robert Clarke.—Skulls of wolf and moose from northern New York.

Dr. J. G. Cooper.—Skins of mammals, birds, and case of specimens in alcohol, Shoalwater bay. Mammals from Santa Clara, California.

Lieut. D. N. Couch, U. S. A.—Box of mammals and birds, Kansas.

Rev. M. A. Curtis, Armand D. R. Curtis, and M. Ashley Curtis.—Numerous skins of mammals and birds, eggs of birds, reptiles in alcohol, from North and South Carolina.

R. D. Cutts.—Skins of birds and mammals, with reptiles and fishes in alcohol, from San Francisco county, California.

H. Davis.—Nests and eggs of birds, mammals in alcohol, from New York.

J. W. Dawson.—Specimens of *Jaculus*, *Arviola*, and *Sorex*, from Nova Scotia. Deposited.

E. A. Dayton.—Keg of fishes (crooked mullet) from Grass river, New York.

Samuel A. Dewey.—Chalcedony and Itacolumite from North Carolina.

W. A. Dougal.—Living mole, (*Scalops aquaticus.*)

Dr. John D. Easter.—Salamander and gryllotalpa from Germany.

Dr. George Engelmann.—Mammals, reptiles, and crustacea from Missouri.

Professor L. C. Ervendberg.—Collection of plants from Comal county, Texas.

S. B. Erwin.—Slab of Itacolumite from Burke county, North Carolina.

Dr. John Evans.—Can of reptiles and fishes from Upper Missouri. Pair of living wild cats.

Dr. J. Evans and Wm. P. Hendricks.—Living grizzly bear from Upper Missouri.

Dr. Eversfield.—Nut of double cocoanut, (*Lodoicea seychellana.*)

Rev. Frederick Fitzgerald.—Reptiles in alcohol. Skin of barred owl (*Strix nebulosa*) from North Carolina.

Dr. E. Foreman.—Two sets of minerals.

A. Galbraith.—Skin of purple sand-piper, (*Tringa maritima,*) Philadelphia.

C. Gautier.—Living deer mouse, (*Hesperomys.*)

Dr. Rodney Glisan, U. S. A.—Bale of dried plants, Fort Arbuckle.

J. M. Gilliss, U. S. N.—Box of birds from Chili.

Mr. Goldsboro.—Living *Heterodon platyrhinos* from Virginia.

Mr. P. Grant.—Blind-fish and crab, *Amblyopsis spelaeus*, and *Cambarus pellucidus*, from Mammoth cave, Kentucky.

James T. Gulick.—Skin of *metarenia* from Sandwich Islands.

Dr. S. E. Hale.—Two fresh specimens of pine martin or sable (*Mustela huro*) from northern New York.

Dr. J. F. Hammond, U. S. A.—Box of mammals, reptiles, fishes, &c., from Fort Reading, California.

Dr. W. A. Hammond, U. S. A.—Bottle of insects from Kansas.

Mr. Harvey.—Specimens of reptiles, fishes, and fossils from the Upper Missouri.

Master Herder.—Irish specimen of Baltimore oriole, (*Icterus Baltimore.*)

Dr. Hilgard.—Skeletons of *Astur cooperi* and *Sciurus migratorius* (grey squirrel) from Missouri.

Dr. Hilgard.—Three boxes dried European plants. Deposited.

Robert Howell.—Mammals, reptiles, and fishes of New York.

Dr. P. R. Hoy.—Skull of *Spermophilus franklinii*, and many skins of mammals, from Wisconsin.

Jardin des Plantes.—Collection of Mexican serpents, types of species described in Erpetologie genérale.

Sir Wm. Jardine.—Skins of weasels, foxes, hares, and arvicolas from Scotland.

J. W. P. Jenks.—Over 600 specimens of small mammals of Massachusetts in alcohol, and 120 skins.

Dr. C. J. B. Karsten.—Specimens of meteoric iron from Thorn, Prussia.

George Kennicott.—Box of birds' eggs from Illinois.

Robert Kennicott.—Several collections of living reptiles, about 200 in number; reptiles, fishes, and mammals in alcohol; dried skins of mammals; eggs of birds; specimens of seventeen-year locusts; living grey gopher, *Spermophilus franklinii*, &c., from Illinois.

J. Kirkpatrick.—Living *Nerodia nigra* from Lorain county, Ohio.

C. F. Kirtland.—Fishes and reptiles from Ohio.

Professor J. P. Kirtland.—Seven skins of mammals from Ohio.

Mr. Kniesley.—Eight hundred small mammals from Clarke county, Virginia, in alcohol.

Th. Kümlien.—Five skins of birds from Wisconsin. Skin of *Sorex brevicaudus.*

Geo. N. Lawrence.—Skins of *Sciurus* and *Sorex* from Iowa, of *Arvicola* and *Sorex* from New York.

Major Le Conte.—Skin of *Reithrodon lecontii* from Georgia.

Leo. Lesquereux.—Salamanders from Ohio.

J. Lewis.—Shells from New York.

Marshall MacDonald.—Living deer mouse (*Hesperomys*) from Virginia.

Dr. A. Means.—Specimens of *Polyodon* from Tennessee.

Montreal Society of Natural History.—Skin of *Hesperomys* from Canada.

W. E. Moore and A. J. Stevens.—Mammals, fishes, and salamander from Iowa.

Dr. James Morrow.—Five skins of *Hesperomys aureolus* from South Carolina.

R. J. Napper.—Box of bird-skins from Manilla.

H. M. Neisler.—Fifteen specimens of shells from the Chattahoochee river.

Dr. Nichols.—Mammals in flesh from vicinity of Washington. Two specimens of *Crax* and *Nasua* in flesh from Paraguay.

Geo. W. Oakley.—Box of pyntiferous rock from Cayuga county, New York.

Captain W. P. Palmer, U. S. A.—Specimens of *Heterodon platyrhinos* from Virginia.

W. Patten.—Skin of *Mus rattus* from Pennsylvania.

Lieut. T. E. Patterson, U. S. A.—Double-headed rattlesnake from Camp Yuma.

D. Orrin Plumb.—Box of infusorial earth ; specimens in alcohol of fishes ; skull of rattlesnake ; specimen of gibbsite.

Professor F. Poey.—Fishes from Cuba.

James P. Postell.—Eggs of birds and reptiles from Georgia.

John Potts.—Reptiles and fishes in alcohol; skins of mammals and birds from Mexico.

B. Pybas.—Reptiles, fishes, and fossils from Alabama.

Thomas Rainey.—Fishes (*Callichthys* and *Osteoglossum*) from Para.

Edward Ravenel.—Box of recent and fossil shells of Carolina, including *Encope macrophora, Mellita ampla,* and *caroliniana.*

Carrington Raymond.—Australian Boomerang club and satchel.

Commander C. Ringgold, U. S. N.—Bow and four bone-tipped arrows—island of Nitenda.

Wynaham Robertson.—End of lower jaw of young mastodon from Washington county, Virginia.

E. S. Robinson.—Insects from Mississippi.

F. Schafhirt.—Separated human skull.

F. D Sergeant.—Living specimens of bull-snake (*Pityophis sayi*) and jar of reptiles from Illinois.

W. J. Shaw.—Mammals, birds, insects and plants from Illinois.

Dr. Short, Lieut. D. N. Couch, and *Professor A. Gray.*—Set of plants of Mexico and Texas from the Berlandier collection.

Dr. B. F. Shumard.—Reptiles and fishes from Missouri.

Dr. Wm. Spillman.—Fishes, reptiles, shells, and fossils from Mississippi.

F. Sturm.—Skins, nests, and eggs of birds ; skins and skulls of mammals from Europe.

Dr. George Suckley, U. S. A.—Very large collections of mammals, birds, reptiles, fishes, and invertebrates from Washington and Oregon Territories. Living serpent, *Epicrates maurus,* from Panama.

A. S. Taylor.—Dried specimens of grasshopper, and of *Talitrus,* from California.

Major G. H. Thomas, U. S. A.—Box of river sediment, &c., from the Colorado river.

Professor Z. Thompson.—Skins of mammals and alcoholic specimens from Vermont.

Dr. W. F. Tolmie.—Skulls of birds from the Pacific.

General Totten, U. S. A.—Two cabinets containing a large collection of shells. Deposited.

Lieut. W. P. Trowbridge, U. S. A.—Box of birds and mammals from San Diego, California, collected by Andrew Cassidy; collection of muds from San Diego; skins of mammals collected in Oregon by Job Wayne; box of marine plants ; two boxes mammals and birds, collected by T. A. Szabo; keg of reptiles and fishes from coast of Cali-

fornia; other collections, in alcohol, from Cape Flattery and Farralones; box of shells, La Paz, &c.

N. Trübner.—Collection of 150 slides from the microscope, exhibiting dissections, illustrating different families of insects; also 25 miscellaneous slides prepared by H. Frey.

Col. Joseph Tuley.—Fresh skin of elk (*Elaphus Canadensis*) from his park.

Colonel Alfred Vaughan and Dr. F. V. Hayden.—Skins and skulls; mammals and birds; reptiles and fishes in alcohol; box of fossils, from Upper Missouri.

Gen. Ward.—*Heterodon niger* from Sing Sing, New York.

David Welsh.—Skins of squirrels (*Tamias* and *Sciurus*) from New York.

Plowden C. J. Weston.—Reptiles and birds in alcohol; fishes from South Carolina; fern in alcohol.

Dr. Wilson, U. S. A.—Shells from Japan.

Dr. T. G. Wormley.—Reptiles and fishes from Ohio.

Lieut. H. G. Wright, U. S. A., and Dr. D. D. Whitehurst.—Fishes and invertebrates from Tortugas.

Gustavus Würdemann.—Eggs and skins of birds, reptiles, fishes, and invertebrates, in alcohol; pair of living roseate spoonbills, (*Platalea Ajaja,*) from Indian river, Florida, and coast of Georgia and South Carolina.

Professor J. Wyman.—*Arviciola*, *Sorex*, and *Cyclopterus*, from Labrador. *Scaphiopus holbrookii* from Cambridge. Deposited.

LIST OF METEOROLOGICAL OBSERVERS.

State.	Name of observer.	Residence.	County.
Nova Scotia	Henry Poole	Albion Mines	Pictou.
	Prof. A. P. S. Stuart	Horton, Acadia College.	
Canada	Dr. Charles Smallwood	St. Martin	Laval.
	Dr. A. Hall	Montreal	
Maine	J. D. Parker	Steuben	Washington.
	Henry Willis	Portland	Cumberland.
	W. E. Dana	Perry	Washington.
	George B. Barrows	Fryeburg	Oxford.
	John J. Bell	Carmel	Penobscot.
	R. H. Gardiner	Gardiner	Kennebec.
	Rev. S. H. Merrill	Bluehill	Hancock.
	Samuel A. Eveleth	Windham	Cumberland.
	G. W. Guptill	Cornish	York.
New Hampshire	B. Gould Brown	Stratford	Coos.
	Dr. William Prescott	Concord	Merrimac.
	R. C. Mack	Londonderry	Rockingham.
	Samuel N. Bell	Manchester	Hillsboro'.
	R. F. Hanscom	North Barnstead	Belknap.
	Henry A. Sawyer, A. M.	Great Falls	Strafford.
	Rev. L. W. Leonard	Exeter	Rockingham.
Vermont	D. Buckland	Brandon	Rutland.
	James A. Paddock	Craftsbury	Orleans.
	J. C. Baker	Saxe's Mills	Franklin.
	A. Jackman	Norwich	Windsor.
	George Bliss	Shelburne	Chittenden.
	James K. Colby	St. Johnsbury	Caledonia.
Massachusetts	Lucius C. Allin	Springfield	Hampden.
	William Bacon	Richmond	Berkshire.
	John Brooks	Princeton	Worcester.
	Rev. Emerson Davis	Westfield	Hampden.
	Amasa Holcomb	Southwick	Hampden.
	James Orton, Lavalette Wilson	Williamstown	Berkshire.
	Hon. William Mitchell	Nantucket	Nantucket.
	Prof. E. S. Snell	Amherst	Hampshire.
	H. C. Perkins, M. D.	Newburyport	Essex.
	Edward A. Smith, M. D., Frank H. Rice, M. D.	Worcester	Worcester.
	Samuel Rodman	New Bedford	Bristol.
	John George Metcalf	Mendon	Worcester.
	Henry Rice	North Attleboro'	Bristol.
	Albert Schlegel	Taunton	Bristol.
	W. C. Bond	Cambridge	Middlesex.
	R. R. Gifford	Wood's Hole	Barnstable.
Rhode Island	Prof. A. Caswell	Providence	Providence.
	E. G. Arnold	East Greenwich	Washington.
Connecticut	Rev. T. Edwards	New London	New London.
	D. Hunt	Pomfret	Windham.
	Aaron B. Hull	Georgetown	Fairfield.
	James Rankin	Saybrook	Middlesex.
	N. Scholfield	Norwich	New London.
New York	Prof. O. W. Morris	New York	New York.
	Thos. B. Arden	Beverly	Putnam.
	E. W. Johnson	Canton	St. Lawrence.
	Ephraim Byram	Sag Harbor	Suffolk.
	John Lefferts	Lodi	Seneca.
	Wm. S. Malcolm	Oswego	Oswego.
	John Bowman	Baldwinsville	Onondaga.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
New York—Cont.	W. E. Guest	Ogdensburgh	St. Lawrence.
	A. W. Morehouse	Spencertown	Columbia.
	J. Everett Breed	Smithville	Jefferson.
	Rev. W. D. Wilson	Geneva	Ontario.
	P. O. Williams, M. D	Watertown	Jefferson.
	W. W. Sanger, M. D	Blackwell's Island	New York.
	John Felt	Liberty	Sullivan.
	J. W. Chickering	Ovid	Seneca.
	E. M. Alba, M D	Angelica	Alleghany.
	Prof. C. Dewey Wm. C. Pratt	Rochester	Monroe.
	Joseph W. Taylor	Plattsburg	Clinton.
	Edw. C. Reed	Homer	Cortland.
	W. H. Denning	Fishkill Landing	Dutchess.
	Mrs. M. J. Lobdell	North Salem	Westchester.
	E. A. Dayton	Madrid	St. Lawrence.
	John R. French	Mexico	Oswego.
	Stephen Landon	Eden	Erie.
	S. De Witt Bloodgood J. S. Gibbons	New York	New York.
	J. Caroll House	Lowville	Lewis.
	Dr. H. P. Sartwell	Penn Yan	Yates.
	Rev. Thos. H. Strong	Flatbush	Kings.
	Stillman Spooner	Wampsville	Madison.
New Jersey	R. L. Cooke	Bloomfield	Essex.
	Dr. E. R. Schmidt	Burlington	Burlington.
	W. A. Whitehead	Newark	Essex.
Pennsylvania	Joseph Edwards	Chromedale	Delaware.
	Rev. Grier Ralston	Norristown	Montgomery.
	John Heisely	Harrisburg	Dauphin.
	M. Jacobs	Gettysburg	Adams.
	Fenelon Darlington	Pocopson	Chester.
	Samuel Brown	Bedford	Bedford.
	Ebenezer Hance	Morrisville	Bucks.
	Paul Swift	Haverford	Philadelphia.
	Francis Schreiner	Moss Grove	Crawford.
	Chas. S. James	Lewisburg	Union.
	J. F. Thickstun	Meadville	Crawford.
	W. W. Wilson	Pittsburg	Alleghany.
	O. T. Hobbs	Randolph	Crawford.
	Wm. Smith	Canonsburg	Washington.
	John Eggert	Berwick	Columbia.
	H. A. Brickenstein	Nazareth Hall	Northampton.
	Prof. Jas. A. Kirkpatrick	Philadelphia	Philadelphia.
	Prof. W. C. Wilson	Carlisle	Cumberland.
	Victor Scriba	Troy Hill	Alleghany.
	Jno. Hastings Wm. Martin	Pittsburg	Alleghany.
	A. Heger	Pottsville	Schuylkill.
Delaware	Professor W. A. Crawford R. A. Martin	Newark	Newcastle.
Maryland	Miss H. M. Baer	Sykesville	Carroll.
	Henry E. Hanshaw	Frederick	Frederick.
	B. O. Lowndes	Bladensburg	Prince George.
	James A. Pearce, jr	Chestertown	Kent.
	A. Zumbrock, M. D	Annapolis	Anne Arundel.
Virginia	Lieut. R. F. Astrop	Crichton's Store	Brunswick.
	Samuel Couch	Buffalo	Putnam.
	Benjamin Hallowell	Alexandria	Alexandria.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
Virginia—Cont'd	D. H. Ellis	Wardensville	Hardy.
	James T. Clarke	Mount Solon	Augusta.
	J. W. Marvin	Winchester	Frederick.
	Thomas Patton	Lewisburg	Greenbrier.
	W. C. Quincy	West Union	Doddridge.
	Miss E. Kownslar	Berryville	Clark.
	William Skeen	Huntersville	Pocahontas.
	Prof. N. B. Webster	Portsmouth	Norfolk.
North Carolina	Prof. Dan. Morelle	Goldsborough	Wayne.
	Prof. James Phillips	Chapel Hill	Orange.
South Carolina	E. N. Fuller	Edisto Island	Colleton.
	Rev. A. Glennie	Waccaman	All Saints Parish.
	Dr. Jos. Johnson	Charleston	Charleston.
	H. W. Ravenel	Aiken	Barnwell.
	T. A. Young, M.D.	Camden	Kershaw.
Georgia	Dr. James Anderson	The Rock	Upson.
	R. P. Gibson	Whitemarsh Island	Chatham.
	F. M. Pendleton	Sparta	Hancock.
	John F. Posey	Savannah	Chatham.
	W. Haines	Augusta	Richmond.
Florida	Dr. A. S. Baldwin	Jacksonville	Duval.
	James B. Bailey	Garrisville	Alachua.
	William C. Dennis	Salt Ponds	Island Key West.
	Lieut. Jos. Fry	Pensacola	Escambia.
	John Pearson		
	Hon. Augustus Steele	Cedar Keys	Levy.
Alabama	George Benagh	Tuscaloosa	Tuscaloosa.
	S. J. Cumming	Monroeville	Monroe.
	Prof. John Darby	Auburn	Macon.
	H. Tutwiler	Green Springs	Green.
Mississippi	Prof. J. Boyd Elliott	Port Gibson	Claiborne.
	Prof. L. Harper	Oxford	Lafayette.
	James S. Lull	Columbus	Lowndes.
	Rev E. S. Robinson	Garlandsville	Jasper.
Louisiana	Dr. E. H. Barton	New Orleans	Orleans.
Texas	J. L. Forke	New Wied	Comal.
	S. K. Jennings, M. D	Austin	Travis.
Tennessee	Dr. R. T. Carver	Friendship	Dyer.
	T. L. Griswold	Knoxville	Knox.
	William M. Stewart	Glenwood	Montgomery.
Kentucky	O. Beatty	Danville	Boyle.
	L. G. Ray, M. D.	Paris	Bourbon.
	George S. Savage, M. D	Millersburg	Bourbon.
	John Swain, M. D	Ballardsville	Oldham.
	Mrs. Lawrence Young	Springdale	Jefferson.
Ohio	Prof. J. W. Andrews	Marietta	Washington.
	R. S. Bosworth	College Hill	Hamilton.
	F. A. Benton	Mount Vernon	Knox.
	George L. Crookham	Jackson C. H.	Jackson.
	M. Gilmore		
	Miss Ardelia Cunningham	Unionville	Lake.
	Jacob M. Desellem	Richmond	Jefferson.
	L. M. Dayton	Newark	Licking.
	J. H. Fairchild	Oberlin	Loraine.
	L. Groneweg	Germantown	Montgomery.
	Geo. W. Harper	Cincinnati	Hamilton.
	Ebenezer Hannaford	Cheviot	Hamilton.
	James D. Herrick	Jefferson	Ashtabula.
	F. Hollenbeck	Perrysburg	Wood.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
Ohio—Continued..	J. G. F. Holston, M. D	Zanesville	Muskingum.
	G. A. Hyde	Cleveland	Cuyahoga.
	S. L. Hillier, S. M. Luther	Hiram	Portage.
	John Ingram, M. D	Savannah	Ashland.
	G. W. Livezay	Gallipolis	Gallia.
	J. McD. Mathews	Hillsborough	Highland.
	James H. Poe	Portsmouth	Scioto.
	Prof. S. N. Sanford	Granville	Licking.
	Joseph Shaw	Bellefontaine	Logan.
	W. L. Schenck, M. D	Franklin	Warren.
	Prof. M. G. Williams	Urbana	Champaign.
Michigan	Seth L. Andrews, M. D	Romeo	Macomb.
	Wm. Campbell	Battle Creek	Calhoun.
	Alfred E. Currier	Grand Rapids	Kent.
	Rev. George Duffield	Detroit	Wayne.
	L. H. Strang	Saugatuck	Alleghany.
	J. J. Strang	St. James	Michilimackinac.
	Isaac Stone	Romeo	Macomb.
	Miss Octavia C. Walker	Cooper	Kalamazoo.
	H. Whelpley	Monroe	Monroe.
	Lum Woodruff, Prof. A. Winchell	Ann Arbor	Washtenaw.
Indiana	W. W. Austin	Richmond	Wayne.
	C. Barnes	New Albany	Floyd.
	John Chappellsmith	New Harmony	Posey.
	Dr. V. Kersey	Milton	Wayne.
	Joseph Moore	Richmond	Wayne.
Illinois	Dr. Fr. Brendel	Peoria	Peoria.
	Wm. V. Eldredge	Brighton	Macoupin.
	John Grant	Manchester	Scott.
	Joel Hall	Athens	Menard.
	J. O. Harris, M. D	Ottawa	La Salle.
	John James, M. D	Upper Alton	Madison.
	S. B. Mead, M. D	Augusta	Hancock.
	Henry A. Titze	West Salem	Edwards.
	Benj. Whitaker	Warsaw	Hancock.
Missouri	Chas. Q. Chandler, M. D	Rockport	Boone.
	Edw. Duffield, M. D	Hannibal	Marion.
	Geo. Engelmann, M. D	St. Louis	St. Louis.
	O. H. P. Lear	Dry Ridge	Marion.
Iowa	E. C. Bidwell, M. D	Quasqueton	Buchanan.
	Townsend M. Connel	Pleasant Plain	Jefferson.
	Dr. Asa Horr	Dubuque	Dubuque.
	Daniel McCready	Fort Madison	Lee.
	Benj. F. Odell, Mary G. Odell	Plum Spring	Delaware.
	T. S. Parvin	Muscatine	Muscatine.
	E. H. A. Scheeper	Pella	Marion.
Wisconsin	Miss M. E. Baker	Ceresca	Fond du Lac.
	Prof. S. A. Bean	Waukesha	Waukesha.
	John E. Himoe	Norway	Racine.
	Wm. H Newton, L. Washington	Superior	Douglas.
	J. L. Pickard	Platteville	Grant.
	Prof. Wm. Porter	Beloit	Rock.
	F. C. Pomeroy	Milwaukie	Milwaukie.
	J. F. Willard	Janesville	Rock.
	Carl Winkler	Milwaukie	Milwaukie.

METEOROLOGICAL LIST—Continued.

State.	Name of observer.	Residence.	County.
Minnesota	S. R. Riggs	Hazlewood	
	D. B. Spencer	St. Joseph	Pembina.
California	Dr. H. Gibbons	San Francisco	San Francisco.
	Dr. F. W. Hatch Dr. Thos. M. Logan	Sacramento	Sacramento.
	Dr. Robert K. Reid	Stockton	San Joaquin.
H. B. Territory	Donald Gunn	Red River Settlem't	
Paraguay	E. A. Hopkins		
Mexico	Prof. L. C. Ervendberg		
Jamaica	James G. Sawkins		
Nicaragua	J. Moses		
Venezuela	A. Fendler		

REPORT OF THE SECRETARY FOR 1856.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: The report of the operations of the year which has just closed may be considered as completing the first decade of the history of the establishment entrusted to your care. The act incorporating the Institution was approved by the President, August 20, 1846, and the first session of the Board of Regents was commenced on the 7th of the following September. It was, however, principally occupied in discussions relative to the plan of organization, which was not adopted until the beginning of 1847; and hence, although this report will be the eleventh, yet, in reality, it completes the account of but little more than the operations of ten years. It may therefore be proper, on the present occasion, to present in review a few of the prominent points in the history of the Institution.

In the beginning of an establishment of this kind, intended to last as long as the government of the United States shall endure, it was more important that every step should be in the proper direction, than that great advances should be made. The condition of an institution after a given time is to be estimated by what it has done well, rather than by the amount of what it has accomplished. Activity improperly directed is worse than inaction, and a wrong step at the commencement may produce effects which will be injuriously felt during the whole succeeding career.

From the outset there were many obstacles in the way of the proper establishment of this Institution. It was not clear to the minds of many that the general government had the power to accept a trust intended for the promotion of knowledge; and after this point was settled in the affirmative, a new difficulty arose in construing the will. The bequest was of so novel a character, and the terms in which it was expressed so brief, though precise, that much difference of opinion naturally prevailed as to the intention of the donor and the means of carrying it into execution. Another difficulty grew out of the manner

in which the funds were invested; and from these causes it was not until after a delay of eight years that the law which organized the Institution was enacted. Congress, it is true, intended in good faith to compensate for this delay by granting interest on the fund from the time the money was received into the treasury of the United States; but, unfortunately, the whole of this accrued interest, and as much of the annual income as might be thought necessary, were by the authority of law appropriated to a building of a magnitude incommensurate with the means or wants of the establishment. The administration of the trust was given in charge to a Board of Regents, whose special duty it was to study the character of the bequest with more attention than it had previously received. They were not, however, left entirely free to adopt such a plan as after mature deliberation they might think best fitted to carry out the intention of the donor, but were directed to include in the organization several objects which, in the opinion of a majority of the Board, were not in accordance with a strict interpretation of the will, or with the annual income of the bequest.

The founder of the Institution was a man of liberal education, a graduate of Oxford, an active member of the Royal Society, and devoted, during a long life, to original scientific research. Not content with the acquisition of ordinary learning, he sought by his own labors to enlarge the bounds of existing knowledge. Well acquainted with the precise meaning of words, while he left the mode of accomplishing his benevolent design to the trustees whom he had chosen, he specified definitely the object of his bequest. In consideration of his character, as evinced by his life, there can be no reasonable doubt that he intended by the terms "an establishment for the increase and diffusion of knowledge among men," an institution to promote the discovery of new truths, and the diffusion of these to every part of the civilized world. This view, however, was not at first entertained, and various plans, founded on misconceptions, were proposed for the organization of the Institution. The most prominent of these propositions were, first, to found a national university which should be supplementary to the colleges of the country; secondly, to diffuse popular information among the people of the United States by the distribution of tracts; thirdly, to establish at the seat of government a large library; and fourthly, a national museum. Though these propositions embraced objects of high importance in themselves, and probably affected the legislation of Congress, they did not embody the prominent ideas of the testator. They were restricted in their influ-

ence to this country, confined to a limited diffusion of existing knowledge, and made no provision for new discoveries.

Fortunately the Board of Regents, with more precise knowledge of the subject and with more liberal views, after much deliberation, were enabled to adopt a plan of organization, which, while it provided for the requirements of Congress, presented as its most prominent feature the promotion of original research in the various branches of science.

Although the directors have had to contend with popular misconceptions and with opposition from other sources in carrying out this plan, it has constantly been adhered to, and by its means a reputation has been established and an influence exerted in the line of the promotion of knowledge as wide as the civilized world. All the requirements of Congress have been strictly complied with, a building, making provision on a liberal scale for a library, a museum, a gallery of art, lectures, &c., has been erected at a cost of 325,000 dollars; and this sum, by prolonging the time of completing the building, has been paid entirely out of the interest. The whole amount of the original bequest, 515,000 dollars, remains untouched in the Treasury of the United States; and in order to assist in defraying the heavy annual expense of the support of the establishment necessarily connected with so large an edifice, the sum of 125,000 dollars has been saved from the income and added to the principal.

A library has been established, unrivaled in its series of the transactions of learned societies, and containing nearly 50,000 articles; a museum has been collected, the most extensive in the world, as regards the natural history of the North American continent; a cabinet of apparatus has been procured through the liberality of Dr. Hare, and other means sufficient to illustrate the principal phenomena of chemistry and natural philosophy, as well as to serve the purpose of original research; and an annual series of lectures have been given to large audiences by some of the most distinguished scientific and literary individuals in the United States.

Although economy and forethought have been observed in providing for these objects, they have absorbed a considerable portion of the income, and lessened the amount of good which might have been accomplished by a policy of a more truly cosmopolitan character. They have, however, as far as possible, been made subservient to the direct promotion of knowledge; and in this behalf, notwithstanding its limited means, the Institution has accomplished much that is important.

It has published a large series of original papers on the following branches of science, namely on

Mathematics and Physics	4
Astronomy	14
Meteorology	5
Chemistry and Technology	2
Geography, Ethnology and Philology	11
Microscopical Science	4
Zoology and Physiology	8
Botany	7
Palæontology	4
Geology	1
Miscellaneous	11
Making in all	71

Not only have these memoirs been published and distributed at the expense of the Institution, but the production of most of them has been facilitated by assistance rendered by its funds, its library, its collections, and its influence. They are not mere essays or compilations relative to previously known and established truths, intended to diffuse popular information among the people of the United States, but positive additions to the sum of human knowledge, presented in a form best fitted for the student and the teacher, and designed through them to improve the condition of man generally. Though in some cases they may appear to have no connexion with his wants, yet they are really essential to his mental, moral, or physical development. Every well established truth is an addition to the sum of human power, and though it may not find an immediate application to the economy of every day life, we may safely commit it to the stream of time, in the confident anticipation that the world will not fail to realize its beneficial results. We are assured, as we have said before, both from the example of Smithson himself, and from the words conveying the intention of his bequest, that the promotion of the discovery of such truths was his principal design in founding the Institution which is to perpetuate and honor his name. Copies of the published memoirs are sent to all the first-class libraries of the civilized world, and in this way the idea of "diffusion of knowledge among men" has been most effectually realized. Besides the memoirs referred to, a large number of important reports and miscellaneous papers have been published.

Natural history explorations have been made at the expense of the government, but principally at the instance and under the scientific direction of this Institution, which have done more to develop a knowledge of the peculiar character of the western portions of this continent than all previous researches on the subject. A system of exchange is now in successful operation, connecting in friendly relations the cultivators of literature and science in this country, with their brethren in every part of the Old World. A large amount of valuable material has been collected with regard to the meteorology of the North American continent, and a system of observations organized which, if properly conducted in future, will tend to establish a knowledge of the peculiarities of our climate, and to develope the laws of the storms which visit particularly the eastern portion of the United States during the winter. A series of original researches have been made in the Institution in regard to different branches of natural history, and also to portions of physical science particularly applicable to economical purposes.

In consideration of the difficulties with which the directors of the Institution have had to contend, it will, I think, be generally admitted that more has been accomplished than, under the circumstances, could have reasonably been anticipated. Although several steps may have been taken which were not in the proper direction, the Regents can scarcely be considered responsible for these, since they were not entirely free to choose their own course, but were obliged to be governed by the provisions of the act of incorporation.

Whatever ground of doubt may have existed as to the authority of Congress to accept the charge of the bequest, there can be none as to the obligation to carry out the intention of the testator now that the duty has been undertaken. The character of the government for justice and intelligence is involved in the faithful and proper discharge of the obligation assumed; and this becomes a matter of graver importance when it is considered that on the successful administration of the affairs of this Institution depends the bestowment of other legacies of a similar character intended for the good of men. If this Institution should prove a failure, the loss would not be confined to the money bequeathed by Smithson, but would involve the loss of confidence in the management by public bodies of like trusts committed to their care.

The adverse effects of the early and consequently imperfect legis-

lation 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 larger 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 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, &c., is about $5,000, and if the plan proposed is adopted, the Institution and the Patent Office will both be benefitted. 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.

Nothing has occurred during the past year to vary the character of the financial statement which has been given in previous reports. By a reference to the report of the Building Committee, it will be seen that a final settlement has been made with the contractor, and, from the statements of the Executive Committee, that $120,000 have been invested in State stocks, bearing an annual interest of $7,830, and that there is also in the hands of the Treasurer $5,000 to be invested.

During the present year the income from the extra fund can, for the first time, be appropriated, at least in part, to other purposes than the building. The repairs, however, the cases and furniture required for the care of the collections, together with the lighting and heating, the pay of the watchman and laborers rendered necessary by so large an establishment, will consume a considerable portion of the income from this source. The expenditure on these items will tend to increase rather than diminish with time, and therefore it will be prudent to confine the appropriations considerably within the income, in order to meet unforeseen demands.

No especial appropriation has yet been made by Congress for continuing the improvement of the grounds; and it is to be regretted that years should be suffered to pass without planting the trees which are in the future to add to the beauty, health, and comfort of the metropolis of the nation. Unjust censure is frequently bestowed on the Institution on account of the neglected condition of these grounds, over which it has no control, and on which it would manifestly be improper to expend any of its funds. No part of the public domain is more used than the reservation on which the building stands, and I doubt not, if the matter were properly brought before Congress, an appropriation for the immediate supply of trees and its general improvement would be granted.

During the past year a beautiful monument has been erected near the Institution by the American Pomological Society, to the memory of the lamented Downing. It is a just tribute to the worth of one of the benefactors of our country, and affords an interesting addition to the ornamental plan furnished by himself for the public parks of this city. The adoption of this plan is in part due to the efforts of the Regents in the way of embellishing the grounds around the Smithsonian building.

Publications.—The eighth annual quarto volume of Contributions to Knowledge has been printed and distributed. It contains the following memoirs:

Archæology of the United States, or Sketches, Historical and Bibliographical, of the progress of information and opinion respecting vestiges of antiquity in the United States, by Samuel F. Haven, Esq.

On the recent Secular Period of the Aurora Borealis, by Denison Olmsted, L.L.D.

The Tangencies of Circles and of Spheres, by Major Benjamin Alvord, U. S. A.

Researches, Chemical and Physiological, concerning certain North American Vertebrata, by Joseph Jones, M.D.

Record of Auroral Phenomena, observed in the higher northern latitudes, by Peter Force, Esq.

List of the transactions of learned societies in the library of the Smithsonian Institution.

An account has been given of all the articles published in the 8th volume, with the exception of the paper of Dr. Jones. The investigations recorded in this memoir were made by an under graduate of the medical department of the University of Pennsylvania, and were accepted for publication on the authority of Professors Jackson and Leidy of that institution. The experiments were made on alligators, terrapins, reptiles, fishes, and other animals. They were necessarily attended with much labor and many embarrassments, on account of the peculiar habits of the animals on which they were made, and the difficulty of access to, and the miasmatic condition of, the localities whence the specimens were obtained. The investigations were, for the most part, conducted in Liberty county, Georgia, where the author had an opportunity of obtaining fresh specimens of vertebrate animals seldom enjoyed by previous observers; and the industry and zeal which he has exhibited in prosecuting his researches are highly commendable, particularly in the case of an under graduate of one of our medical universities.

The memoir is divided into a series of chapters, the first and second of which relate to the analysis of the blood of animals in the normal condition; the third and fourth to the physical and chemical changes in the solids and fluids of animals when deprived of food and drink, and also the effects of a change of diet. The remaining chapters present a series of observations upon the alimentary canal, the comparative anatomy and physiology of the pancreas, liver, spleen, the kidneys, and the urine. The following are among the conclusions arrived

at by the author; and though some of them may have been previously obtained, yet they will serve even in these cases to verify the results of other investigations.

The amount of water in the blood is greatest in the invertebrata. Among vertebrate animals it is greatest in fishes and aquatic reptiles, and least in serpents, birds, and mammals. It would appear, as a general law, that as the organs of the animal are developed, and the temperature and intellect correspondingly increased, the blood becomes richer in organic constituents. The blood of serpents, at first sight, appears to form an exception to this conclusion; the larger amount of solid matter existing in their blood is, however, accounted for by the fact that they seldom or never drink water, and as they are constantly, though slowly, evaporating this fluid, the blood must necessarily become concentrated and yield a larger quantity of solid constituents upon analysis. The proportion of the constituents of the blood of mammalia varies as much in individuals of the same species as in those of remotely separated genera. In the invertebrate animals the number of blood corpuscles is very small in comparison with that in the vertebrata. The fibrine constitutes a remarkable index of the vital, organic, and intellectual endowments of animals. In the whole of the invertebrate kingdom it is absent, except in a few of the most highly organized. In the lower order of the vertebrata, as fishes and batrachians, it is soft, unstable, and readily converted into albumen. The proportion of fixed saline constituents in the blood is remarkably uniform throughout the whole animal kingdom. Among the vertebrate animals the greatest amount of mineral constituents is found in fishes and reptiles inhabiting the salt water. In every instance during abstinence from nourishment, the water of the blood diminishes more rapidly than the solid portions. The rapidity of the consumption of the watery element, and the consequent concentration of blood, is connected with the vital and physical condition of the animal, being more rapid in the case of those of warm blood. The corpuscles waste during starvation, as well as the other components, thus proving that they have an important office to fulfil in the support of the tissues and organs of the living animal. The fibrine relatively increases during starvation and thirst. The fat of the body wastes more rapidly than any other of the tissues. The continuance of life of the animal during starvation and thirst is inversely proportional to the rapidity of change of its elements, and, as a necessary consequence, to its temperature and organic development. The relative weight of the heart to that of the body was found proportionably smaller in fishes

and larger in birds than in other animals. The blood lost during starvation was rapidly restored with vegetable diet, its solid constituents, however, were less with the latter than with animal food. The proportion between the blood corpuscles and liquor sanguinis was not altered, though the saline constituents were diminished with a vegetable diet. In many instances the shells of the terrapins became softer, and the effect of a change of diet was also exhibited in the digestive organs. The small intestines were enlarged, and a much greater amount of water was thrown into the circulation than in the case of the use of animal food, and hence water, holding albumen in solution, accumulated in the cellular tissues and serous cavities. The urine was rendered more abundant, and its specific gravity and chemical relations changed.

The remarkable difference which is known to exist between the digestive apparatus of carnivorous and graminivorous animals, is exhibited most strikingly in the comparative length of the alimentary canal; for example, that of the common cat is five feet and a third in length, while that of the sheep is eighty-eight feet.

Fishes afford the best means of studying the development of the pancreas; the permanent forms which it assumes in them being but the transient condition of its development during the growth of the higher animals. This organ is found in carnivorous fishes, reptiles, and mammalia, to be relatively much larger than in frugivorous and graminivorous animals. The pancreas of warm-blooded is larger than that of cold-blooded carnivora. The opinion advanced by Bernard is sustained, viz: that the office of the pancreas is to prepare fatty matter for absorption. The shape and appearance of the liver vary greatly. The former appears to be determined by that of the animal and its abdominal cavity. The size also varies, and on this point a series of results are given as to the ratio of its weight to that of the whole body. The livers of all animals, cold or warm-blooded, as far as the author's observations have extended, yield grape sugar, which passes into the circulation and disappears in the lungs so long as normal respiration is maintained. In cold-blooded animals it is never a healthy constituent of the urine; if a supply of oxygen be cut off, it is accumulated in the blood and eliminated by the kidneys. The spleen, which is absent from all invertebrate animals, varies in form, size, and position in different reptiles. In the mammalia it is large, and presents manifold diversities of form. It is smallest in birds and ophidians, and largest in fishes and mammals. It appears to be an

organ of subordinate importance in the animal economy, and of its real office the anatomist is still ignorant. Its function is not indispensable to the maintenance of life.

The kidneys are excreting and not secreting organs; and the amount and character of the excretions depend upon certain materials in the blood. When the kidneys are excised, other membranes and organs assume their office; and it is probable that in lower animals, which are without this organ, its functions are performed by the mucous membrane of the stomach and intestines. As far as the observations of the author extend, the kidneys are larger in carnivorous than in other animals. The urine of fishes is difficult to be obtained, the bladders are almost always empty. The amount of urine excreted by a warm-blooded animal is from forty to several hundred times that furnished by a cold-blooded animal.

From this very brief exposition of the results obtained some idea may be formed of the amount of labor bestowed on these investigations; and whatever estimate may be formed of the speculations of the author, there can be but one opinion as to the value of the facts which he presents.

The next article accepted since the date of the last report, and which has been printed and partially distributed, will form a part of the 9th volume. It is by J. D. Runkle, and is entitled, "New tables for determining the values of the co-efficients in the perturbative function of planetary motions which depend upon the ratio of the mean distances." The object of these tables is to facilitate the calculation of the places of the planets, and other astronomical researches.

In determining the mutual action of any two planets in our solar system, there are certain quantities, depending upon the ratio of the mean distances of these bodies from the sun, which must first be computed. The number of these quantities, and the labor necessary to compute each one of them, makes this first step in the reduction of the mutual action of the two planets to numbers, a serious work. But when it is remembered that there are fifty planets already known, and that others, especially among the asteroid group, are probably still to be discovered, the desirableness of determining all these quantities by some short and easy process cannot admit of question. The tables just published by the Institution accomplish this desired end with the greatest possible facility. Their use gives the same advantage in the calculations to which they are applied that a table of logarithms affords in arithmetical operations. The tedious labor of

computing these quantities for the old planets has already been performed three or four times over—a labor which these tables would have saved, and will save in the future for all the planets whose mean distances are not at present sufficiently well known. The supplement to the tables contains the qualities necessary in the computation of the mutual perturbations of the eight principal planets; and the supplement continued, which will be published during the present year, will contain the quantities which correspond to the asteroids. In order to ensure accuracy in printing these tables, they have been stereotyped. The work was referred to Prof. B. Peirce, of Harvard University, and Capt. C. H. Davis, Superintendent of the American Nautical Almanac, and it is published on their recommendation.

Another paper which has been accepted for publication, and is now ready for distribution, is by Prof. Wolcott Gibbs, of New York, and Dr. F. A. Genth, of Philadelphia, entitled "Researches on the Ammonia-cobalt bases." It consists of a laborious series of investigations relative to a very interesting part of chemistry. This memoir is chiefly important from a theoretical point of view, though it will probably be found to possess many important practical applications. Chemists have long recognized the existence of a class of bodies called bases, which possess the property of neutralizing acids, and of forming with them what are commonly called salts. These bases are usually oxides of metals, or of substances which play in combination the part of metals. Thus the protoxide and sesquioxide of iron are in this sense simple bases, while quinine, morphine, strychnine, &c., form examples of complex bases, or oxides of what chemists term compound radicals. It usually happens that metals which belong to the same natural family or group form oxides which have an analogous constitution. Thus iron, manganese, chromium, cobalt, and nickel all form sesquioxides as well as protoxides. The protoxides of these metals are strong bases. The sesquioxides of chromium, iron, and manganese are also bases, while those of cobalt and nickel rarely, if ever, exhibit basic properties. Under these circumstances, it is very interesting to find that the union of the sesquioxide of cobalt with a few equivalents of ammonia, or of ammonia and deutoxide of nitrogen, confers upon it the property of forming stable combinations with acids, or, in other words, *salts*. In the memoir referred to, four distinct classes of such compound bases are described. Of these, two are entirely new, while the others had, up to this time, been very imperfectly investigated.

The bases described in the memoir are termed conjugate, from the

fact that they contain substances in a manner yoked together. Such compounds are not altogether new, and chemists have long assumed or admitted the existence of both conjugate acids and bases. In its most general form, the idea of a conjugate body implies that two or more substances are united in such a way that the properties of one or two of these substances are lost or become insensible, while those of another are more or less essentially modified. Thus the body A may either increase or diminish the acid or basic properties of the body B, but its own properties are at the same time lost, or at least do not appear in those of the compound. The ammonia-cobalt bases furnish the best defined and most instructive class of conjugate bodies yet discovered, and have abundantly repaid the very great labor which has been bestowed upon them. It can scarcely be doubted that their study will give an impulse to chemical science, and will be followed by that of other bodies of the same character. The remarkably beautiful and brilliant colors which many of these compounds exhibit lead to the hope that some, at least, may find direct practical applications in dyeing. Drs. Gibbs and Genth propose to continue their researches, and to present the fruits of an extended study in a second part of their memoir.

This paper is illustrated by a number of wood engravings of the forms of the crystals, drawn under the direction of Prof. Dana, to whom the authors are indebted for the determination of the systems to which many of the crystals belong, and of their principal forms. They have also been furnished with facilities in the line of their researches from the Smithsonian fund, which renders it proper that the results should first appear in the "Contributions" of the Institution, although the paper will probably be republished in some of the scientific periodicals of the day.

In the reports for 1850 and 1852, accounts are given of a work prepared for the Smithsonian Institution by Professor Harvey, of the University of Dublin, on the Algæ found along the eastern and southern coasts of the United States. Two parts of this work have been published, and have received the approbation of the scientific world.

In reference to the first part, I may be allowed to quote the following remarks of the late Professor Forbes, of Edinburgh, than whom no better authority could be cited:

"Professor Harvey is one of the ablest and most philosophical of living botanists. His fame with the multitude is, however, very small compared with the honor assigned to him by his scientific

peers. * * * A more proper person than Professor Harvey could not have been selected for the elaboration of a 'Nereis Boreali-Americana,' and most honorable is it to the directors of the Smithsonian Institution of North America that they should have selected this gentleman for the task of which we have now the first fruits. The trustees of that establishment are pursuing a course which is sure to do much towards the wholesome development of science in the United States. In the present instance they have done what is both wise and generous, and, in seeking the best man to do the difficult work they require done, have recognized nobly the truth that science belongs to the world, to all mankind, laboring for the benefit of all regions and races alike."

Professor Harvey has lately returned from an exploration around the shores of the Pacific ocean, and has promised to complete the third part of the work during the present year. It will include an account of the Algæ along the coasts of Oregon and California. The labors of the author, including the drawings of the plants on the stone, are entirely gratuitous; yet the publication of the work is very expensive, and it is proposed to lessen the cost to the Institution by striking off a number of extra copies for sale to individuals. This may be done without risk, since a growing taste is manifested in the study of this interesting branch of botany, and a number of copies have already been ordered by booksellers.

The three papers mentioned in the report for 1855, on surface geology, by Professor Hitchcock, are now in the press. By a reduction in the size, and a re-arrangement of the plates under the superintendence of Professor Baird, the cost of the publication of these communications will be much diminished. The plates require to be colored, and the reduction of expense, as well as an increased beauty of effect, is produced by adopting the chromo-lithographic process. The author proposes to apply to the legislature of Massachusetts for an appropriation to purchase copies of this work as a supplement to his report on the geology of that State.

Since the last meeting of the Board, the paper previously mentioned on the "Relative Intensity of the Heat and Light of the Sun, by L. W. Meech," has been published and partially distributed. The following propositions are discussed in this memoir, viz: The proportion of a planet's surface which is irradiated by the sun at a given time, as deduced from the relative size and distance of the two bodies. The sun's intensity upon the planets in relation to their orbits. The

law of the sun's intensity at any instant during the day. Determination of the sun's hourly and diurnal intensity. On local and climatic changes of the sun's intensity. On the diurnal and annual duration of sunlight and twilight. These are all mathematical deductions from well established principles, and constitute the preliminary problems towards a logical solution of the phenomena of the meteorology of our earth. The author offers to continue his interesting investigations in this line of research, provided the Institution will employ a person to make the arithmetical calculations, or, in other words, to deduce from the formulæ the numerical values of the quantities required. His own time must be principally occupied in other duties, though he will cheerfully devote his leisure hours to the investigations, with a view of extending the bounds of knowledge. He considers most of the memoirs which have been published in the transactions of different learned societies as preparatory to a more complete solution of the problem of terrestrial heat. He has succeeded in bringing the formulæ of the theory of heat in closer connexion with observation than heretofore, and thinks there is now an opportunity presented for increasing our knowledge of meteorology on the "theoretic side." From a consideration of the interesting problems which have been discussed in the memoir just published, and the manner of their solution, it can scarcely be doubted that valuable results will be produced by an appropriation for the continuance of these researches.

The first part of the paper on Oölogy, described in the last report, is now in the hands of the printer. Every possible pains has been taken to make the illustrations as accurate representations of the objects as can be accomplished by art. The globular shape of the eggs, and the receding aspect of their markings, have heretofore baffled all endeavors to represent them correctly. The best and most artistic works of this kind, involving a very expensive operation, are but partially successful. The desideratum has been obtained by the employment of photography in making the original delineations, and this has furnished an exact and available basis, which the engraver can copy at his leisure, and which represents with fidelity, otherwise unattainable, the appearance to be perpetuated. These improvements have been made by Mr. L. H. Bradford, of Boston, to whom the engraving has been entrusted. The plates will be printed in colors. An order has been received from England, in advance, for a number of copies of this work, the proceeds of which will be devoted to lessening the cost of the illustrations.

The publication of the paper mentioned in the report for 1854, relative to the Zapotec remains in Mitla, Mexico, was delayed on account of the absence of Mr. Brantz Mayer, who undertook to prepare an account of the drawings made by Mr. Sawkins, with general observations on Mexican history and archæology. It has, however, been published since the date of the last report, and will form a part of the ninth volume of the contributions. It was referred to Mr. Haven, of the Antiquarian Society, Worcester, Massachusetts, and to Dr. E. H. Davis, of New York. This paper, as well as that of Mr. Haven on the archæology of the United States, possesses much more popular interest than many of the Contributions published by the Institutions, and is therefore in greater demand.

Reports on Progress of Knowledge.—One of the propositions embraced in the plan of organization is the publication of reports on the progress of knowledge; but the portion of the fund which could be expended in printing has been so much more advantageously employed in giving to the world memoirs consisting of original contributions to science, that but little has been done in regard to this part of the original plan. It has not, however, been entirely neglected. Besides the work of Messrs. Booth and Morfit on the progress of the Chemical Arts, the last annual report of the Regents to Congress contains an account of late researches relative to Electricity. Another part of the same work will be given in an appendix to this report.

The report on forest trees by Dr. Gray, of Cambridge, is still in progress, but has been delayed principally on account of the more pressing engagements of the author in preparing his description of plants collected by different expeditions undertaken by the government, and in part from the difficulty of obtaining the necessary drawings for its illustration. Some of these can only be made at particular seasons of the year, during fructification, and other periods of the different phases of the parts of the trees. A sufficient number of the drawings have been prepared to form a considerable portion of the work; but as these in many cases belong to different genera, they cannot properly be published until the others are prepared, which are necessary to complete definite series. Nevertheless, it is expected that the first part of the work will be ready for the press during this year. Instead, however, of presenting it in the form of a report, it has been thought advisable to publish it as a part of the quarto series of original Contributions to Knowledge. For, though the facts it contains are not entirely new, the work will in no sense be a compi-

lation; the drawings and descriptions will all be original, and it will probably contain a series of experiments and observations on the economical uses of our trees, which have never before been published. Besides this, the quarto form is best adapted for the illustrations.

The Report on education, mentioned at the last meeting of the Board as in progress of preparation by the Hon. Henry Barnard, of Connecticut, has not yet been completed. We hope, however, to be able to obtain the article during the present year, and to give it to the public either as an appendix to the annual report or in a separate form.

The printing of the second and enlarged edition of the *Meteorological and physical tables*, which was announced in the last report as having been commenced, has been delayed on account of an error detected by the author in the reduction of one of the formulas, which required the recomputation of a considerable number of pages. We regret that much disappointment has been felt at the long delay of the appearance of these tables, which has been owing to the many pressing engagements of the author. We have now directed the printer to strike off such portions of the work as are stereotyped, and these will probably be ready for distribution to our meteorological observers before the publication of this report.

These tables will serve to form a part of a great work suggested by Mr. Babbage, entitled "The Constants of Nature and Art," intended to contain all facts which can be expressed in numbers, in the various branches of knowledge, such as the atomic weights of bodies, specific gravities, elasticity, tenacity, specific heat, conducting power, melting point; weight of different gases, liquids, and solids; the strength of different materials; velocity of sound of cannon balls; electricity, light, animals, &c., &c., &c. Such a work would be perpetually useful in original investigations, as well as in the application of science to the useful arts; but to carry out fully the idea of the author, the co-operation of a number of institutions would be necessary. It, however, consists of parts, any one of which will be considered of immediate value. An account and examples of this work are given in the appendix.

The materials for a new edition of the *Report on Libraries* have been collected, and are now being arranged and prepared for the press by Mr. Rhees, chief clerk of the Institution. Considerable difficulty has been experienced in obtaining answers to the circulars first issued, but the distribution of a second edition has called forth a large amount

of interesting information. The work will exhibit the rapid progress which this country is making in the means of acquiring knowledge, as well as indicate the kind of books which receive most attention. It was at first proposed to publish it as a part of the appendix of the Report to Congress; but it has been found impossible to complete it in time for that purpose, and it will, therefore, be printed by the Institution in a separate form.

Exchanges.—The system of international exchanges has been carried on during the year 1856 with unabated activity, but with increasing expense, notwithstanding the liberal assistance which has been continued by the several transportation companies mentioned in the last report. A large room, occupying nearly the whole of the first floor of the east wing, 75 feet long and upwards of 30 feet in width, has been devoted entirely to the business connected with the exchanges. It has been fitted up with cases, shelves, and boxes, similar in arrangement to a post office, in which a separate space is appropriated to each country and each institution.

This part of the general operations of the Institution continues to be received with much favor by literary and scientific societies and individuals in this country and abroad, and is increasing every year in extent and usefulness. We hope, however, hereafter to render it more perfect and useful, particularly by increasing the frequency of transmissions.

I regret that at this time I am not able to give the exact statistics of the amount sent and received during the past year, since a second invoice is now in the course of preparation, containing many articles which should properly be included among those of the present year.

Meteorology.—In the last report of the Board of Regents it was announced that an arrangement had been made with the Commissioner of Patents by which the system of meteorology, established under the direction of the Institution, would be extended, and the results published more fully than could be done by the Smithsonian income alone; that a new set of blank forms had been prepared by myself, and widely distributed under the frank of the Patent Office; and also that an appropriation had been made for the purchase of a large number of rain-gauges, to be presented to observers in different parts of the country. This copartnership, as it may be called, has produced good results; the number of observers has increased, and the character of the instruments and of the observations has been

improved. The reduction of the registers has been continued by Prof. Coffin during the past year. He has completed those for 1854 and 1855, and is now engaged on those for 1856. A summary of the more important reductions for 1854 and 1855 was given in the last Report of the Patent Office, and hope was entertained that an arrangement could be made by which the whole series would be published at the expense of the general government. But this expectation has not been realized, and the Institution has commenced to stereotype the work on its own account. Copies of the stereotype impressions will be forwarded, from time to time, to observers, as they become ready for distribution.

During the past year many additions have been made to the number of observers, and increased interest has been awakened in the subject of meteorology. Quite a number of observers have furnished themselves with full sets of standard instruments, and the system has thus been increased in precision as well as magnitude. It is to be regretted, however, that the observers are not more uniformly distributed over the whole country; while the northern and eastern States are abundantly supplied the southern and western are deficient, particularly Indiana, Kentucky, Tennessee, Mississippi, Arkansas, Louisiana, and Texas.

Several of the observers publish the results of their observations in the newspapers of their vicinity, and we would commend this custom to general adoption. It serves to direct attention to the importance of precise records of the weather, to awaken a greater public interest in the subject of meteorology, and to gratify a laudable curiosity in the comparison of the variations of the different seasons. We would also recommend to the observers generally the plan adopted by some of them, of the construction of diagrams, exhibiting to the eye, at a single glance, the peculiarities of temperature, moisture, and direction of the wind, for different seasons and years.

All the materials possessed by the Institution relative to the direction and force of the wind, derived either from its own system or found in works received by exchange, have been placed in the hands of Prof. Coffin, to enable him to prepare a supplement to his valuable memoir on the "Winds of the Northern Hemisphere." This work requires a large amount of laborious arithmetical calculation, to defray the expense of a part of which a small sum has been granted from the appropriation for meteorology. The fact was also mentioned in the last report, that a valuable series of observations made in Texas and Mexico, by the late Dr. Berlandier, was placed at our disposition

by Lieutenant Couch, late of the United States army; and I am happy to state to the Board that these observations are at present in the process of revision, and that they will be published, at least in part, if not entirely, during the next year. The Institution is now also prepared to publish a number of series of observations continued for considerable periods of time, which will be of importance in the comparison of the weather of different years.

The great object in view in regard to this branch of science is to furnish materials which all who are so disposed may study, and from which deductions may be made as to the peculiarities of our climate, or the general meteorological phenomena of the globe. It is highly desirable that as many minds as possible should be employed on this subject, and it is consequently important that the greatest procurable amount of authentic data should be furnished to them as the basis of their investigations. The continent of North America presents a field of peculiar interest in regard to geography, geology, botany, zoology, and meteorology, which has been cultivated more industriously since the establishment of this Institution than at any former period; and now, with the proper co-operation of the medical department of the army, by means of observations made at the different military posts on the west, the system about to be established in Canada on the north, and that of the Smithsonian and Patent Office on the east, with that of the National Observatory on the sea surrounding our coast, more extended and accurate means than were ever before in existence will be offered for the solution of some of the most interesting problems of climatology. In order, however, to full success in this enterprise, all considerations of personal or institutional aggrandizement should be entirely discarded, and each party be impelled alone by the desire to advance as much as is in its power the cause of truth. The policy of this institution has ever been of a character as liberal as its means would permit, and we trust it will not cease to extend a generous co-operation to every well devised plan intended to promote knowledge.

We cannot hold out the idea that great results are at once to be obtained for the improvement of agriculture, and the promotion of health and comfort, by a system of meteorological investigation. There are no royal roads to knowledge, and we can only advance to new and important truths along the rugged path of experience, guided by cautious induction. We cannot promise to the farmer any great reduction in the time of the growth of his crops, or the means of pre-

dicting, with unerring certainty, the approach of storms. But in the course of a number of years the average character of the climate of the different parts of the country may be ascertained, and the data furnished for reducing to certainty, on the principle of insurance, what plants can be most profitably cultivated in a particular place; and it is highly probable that the laws of storms may be so far determined that we shall be able, when informed by the telegraph that one has commenced in any part of the country, to say how it will spread, and whether it may be expected to extend to our own locality. We make these remarks in order to prevent disappointment and the evils produced by exciting expectations which cannot possibly be realized.

Terrestrial Magnetism.—Nearly a continuous record of the changes of magnetic declination has been kept up by the photographic method, during the greater part of the past year, at the magnetic observatory established by the Institution and the United States Coast Survey. The series was interrupted, in December, by some improvements in the arrangement of the building, and by preparations for the mounting of additional instruments for recording the changes of horizontal and vertical force. The apparatus was constructed, at the request of Professor Bache, under the direction of Charles Brooke, Esq., of London, who originally designed this method of registration, and who kindly undertook to adjust all the delicate compensations. Similar instruments are in operation at the magnetic observatories of Greenwich, Paris and Toronto; and it is hoped that a continuous corresponding record will in future be made here, which will prove of great interest and utility in the study of the phenomena of terrestrial magnetism.

The set of portable magnetic instruments for absolute determinations belonging to the Institution are placed in charge of Baron Muller, who is making a scientific expedition to Mexico and Central America. Recent investigations having shown that magnetic observations in those regions, where none have been made since Humboldt visited them, more than fifty years ago, would have a special value in determining the law of distribution, the Institution availed itself of the opportunity offered by Baron Muller's expedition, to forward this branch of knowledge by furnishing instruments, and appropriating an amount adequate to cover the additional expenses occasioned by these observations. Full copies of the records are transmitted to the Institution as opportunity offers. The results of the observations, as far as

received, are given in the appendix to this report; they will be published in detail when the series is complete.

Laboratory.—It was stated in the last report that, in conformity with the act of Congress incorporating the Institution, a laboratory had been fitted up with the necessary appliances for original research in chemistry and other branches of physical science. During the past year, besides the examination of minerals and other substances submitted to the Institution, a series of experiments have been made relative to the strength of materials for building purposes, to some points of meteorology, and to electrical induction. The results that have been obtained from these investigations will, in due time, be given to the public.

Library.—During the past year the library has received, by exchange, a larger accession than during any previous year. The whole number of volumes, parts of volumes, and other articles obtained by this means, is 5,361.

The series of transactions and scientific periodicals is gradually becoming more and more complete; and, in the course of a few years, this collection will be as extensive as any to be found in the Old World. A second part of the catalogue of transactions, now in the library, has been published, and distributed to foreign institutions. In this the deficiencies of the library are pointed out, and in many cases these have already been supplied by the liberality of the societies having duplicates of the desired articles.

Though the books received by donation and exchange are of the most valuable character, and such as cannot, in many cases, be procured by purchase, yet, as they are generally presented in parts of volumes in paper covers, they require a large expenditure for binding. During the last two years, the sum of three thousand dollars has been paid for this purpose.

Among the liberal donors to whom the Smithsonian Library is indebted, principally on account of the system of exchange, special acknowledgment is due to the Prussian government for the continuation of the celebrated work, by Lepsius, on Egypt; to Baron Korff, of the Imperial library of Russia, for the volumes of the monuments of the Cimmerian Bosphorus; to the Board of Health of London, for a full set of its reports; to the Imperial Society of Naturalists of Moscow, for 21 volumes, 8vo, of the Bulletin of its proceedings; to F. A. Brockhaus, of Leipsic, for 151 quarto volumes of the Encyclopadie der Wissenschaften; to Justus Perthes, of Gotha, for ninety-

two volumes of maps and other geographical publications; to R. Lepsius, for a nearly complete series of his philological and ethnological works; to the Naturforschende Gesellschaft, at Basle, for seventy-three volumes of rare scientific journals; to the Geological Society of France, for eleven volumes of its Bulletin, and four volumes of its Memoirs; to the Observatory at Milan, for fifteen volumes of Effemeridi; to the University of Athens, for thirty-four volumes of modern Greek works; to the University of Tubingen, for twenty-eight folio and quarto volumes of rare and curious incunabula; to the Riksbibliotek of Stockholm, for three hundred volumes of proceedings of the Swedish Diet; to the London Admiralty, for ninety charts, published from August, 1855, to August, 1856; to Dr. Thomas B. Wilson, of Philadelphia, for a set of Buffon's works, 28 volumes, and Nouveau Dictionnaire d'Historie Naturelle, 30 volumes; to the Duke de Lugnes, for a fac-simile of the inscription on the Sidonian sarcophagus, and the volume describing it, which were furnished at the request of the Institution, for the use of some of our oriental scholars, by its liberal author.

In regard to the last mentioned donation the following account may, perhaps, be interesting: A sarcophagus, bearing a long Phœnician inscription, having been exhumed in the vicinity of the ancient Sidon, in the beginning of the year 1855, the American missionaries on the spot, with praiseworthy zeal for learning, took copies of the writing and transmitted them to this country and to Europe, and scholars on both sides of the water immediately entered upon its study and gave their interpretations to the world. Meanwhile, the sarcophagus itself was purchased by the Duc de Lugnes and presented to the French government, who deposited it in the gallery of the Louvre. It had become evident that the copies of the inscription on which the first interpretation was based, owing to the imperfect means at command, were necessarily, in several respects, unreliable. At the request of Prof. E. E. Salisbury, of Yale College, and William W. Turner, Librarian of the Patent Office, who had chiefly occupied themselves with the study of the monument in this country, application was made to the Duc de Lugnes, who, with generous promptness, presented to the Institution exceedingly well executed *fac-similes* of the inscriptions on the lid and on the sides of the sarcophagus, and a copy of the work illustrating the same, published by himself for private distribution. Thus American scholars are afforded the same opportunity as is possessed by their compeers in Europe of making

an independent study, with authentic materials, of this highly interesting relic of antiquity.

We have frequently stated that the principal object of the library is to furnish the colaborators of the Institution with the means of ascertaining what has been accomplished in the particular line of their research. For this purpose, under certain restrictions, we have forwarded books to different parts of the country, and this we are enabled to do, without much risk of loss, by means of the system of express agency which now forms a net-work of intercommunication over all parts of the United States. A volume may, it is true, be occasionally lost; but it is better to hazard an occurrence of this kind than that the books should not be used. The library is also consulted by the officers of the army, the navy, of the Coast Survey, and the men of science who have been connected with the several exploring expeditions; and in this way, it has been made to subserve the general object of the Institution in the promotion of knowledge. The expense of this part, however, of the operations of the library is small, in comparison with that which is in reality of little importance. I allude to the cost of keeping up a reading-room, in which the light publications of the day, obtained through the copyright law, are perused principally by young persons. Although the law requiring a copy of each book for which a copyright is granted, to be deposited in the library was intended to benefit the Institution, and would do so were it designed to establish a general miscellaneous collection, yet as this is not the case, and as some of the principal publishers do not regard the law, the enactment has proved an injury rather than a benefit. The articles received are principally elementary school manuals and the ephemeral productions of the teeming press, including labels for patent medicines, perfumery, and sheets of popular music. The cost of postage, clerk-hire, certificates, shelf-room, &c., of these far exceeds the value of the good works received. Indeed, all the books published in the United States, which might be required for the library, could have been purchased for one-tenth of what has been expended on those obtained by the copyright law. Similar complaints are made by the Library of Congress and the Department of State; and it is therefore evident that this subject requires the attention of government. Three copies of every work are now required to be sent to Washington, but in no one of these cases is the intention of the copyright law fully carried out. If the books are to be preserved as evidence of title it would seem most fit that they should be deposited

and preserved in the Patent Office with other samples of the protected products of original thought, namely: models of invention and specimens of design.

Two double cases, each fifty feet in length, have been provided during the present year, which, with the previous shelves, will be sufficient to hold the books at present in the library and those which may be received for some time to come.

Museum.—It has been stated in previous reports that it is not the design of the Institution to form a general museum of all objects of natural history, but of such as are of a more immediate interest in advancing definite branches of physical research; and in view of this, special attention has been bestowed on developing the peculiarities of the productions of the American continent, with a view to ascertain what changes animals and plants have undergone, how they differ in their present as well as their past forms from those on other portions of the globe, and also the distribution of the same species, and the relations which they bear to the soil and climate where they are found. The great object of studies of this class is to determine the laws of the production, growth, and existence of living beings. The nature of life itself is at present unknown to us, except in its relation to certain organic forms and changes going on in them. It is, to our apprehension, inseparably connected in this world with transformations of bodies chemically composed of a few elementary materials, which are constantly being combined and decomposed, in accordance with laws peculiar to the living being. In reference to the forms which these materials assume, the whole animal kingdom has been referred to four great types or plans of structure, the Vertebrata, the Articulata, the Mollusca, and the Radiata. From these four types all the varieties that are found on the surface of the earth are derived. It appears to be a principle of nature that the most diversified effects are made to follow from a single conception, a fact which is well expressed by the terms "multiplicity in unity." Whilst every part of the earth is peopled with animals constructed in accordance with these types, the fauna of no two parts of the world are precisely alike. Difference in conditions of climate or soil, or difference in original character, have produced a diversity, the nature of which is an important object of the naturalist to investigate. For example, fishes of the same name, and apparently of precisely the same character, found on the east and west sides of the Rocky mountains, present peculiarities which, though slight, are invariable, and which mark a difference of origin or of

condition. But it is not sufficient for the full investigation of the subject to provide the means of studying the living faunas and floras which now characterize different districts;—science also requires the collection of materials for the investigation of the animal and vegetable forms which existed at the same and different localities at various epochs in the past history of the globe, or, in other words, it is desirous to obtain data for the investigation of the phenomena of life, as it is exhibited in time as well as in space; and hence attention is also given to the collection of complete suites of the organic remains, particularly of the hitherto unexplored parts of this country.

In reference to the solution of some important questions now pending in relation to natural history, Professor Agassiz has called our attention to several special collections, and as his suggestions are of general interest, I will here mention them. First, he commends to attention the tertiary shells, on account of their bearing on the problem of the mean annual temperature of the globe at different periods anterior to its present geological condition. Different species of these animals exist at present each in water of a given temperature; and by ascertaining the temperature congenial to each species from actual observation on different parts of the coast, a thermometrical scale would be given by which to determine the climate of any place in the past geological periods in which these animals existed. The United States is most favorably situated for the solution of this question. Its eastern coast extends north and south over more than 23 degrees of latitude, along which shells are everywhere common, and present remarkable changes in their distribution and mode of association. A large collection of these fossil shells from the tertiary beds in different latitudes from Maine to Georgia, properly arranged, would, in time, afford as precise data for ascertaining the mean annual temperature of these shores during the different periods of the tertiary times as an actual series of instrumental observations.

Another collection to which the same distinguished naturalist has called our attention is a series of embryos and young animals of different species. It is a well established fact that animals of a higher type pass from the first inception of life in the embryonic state through a series of forms resembling the lower animals, so that even in the case of man himself the embryo assumes the form of the fish or the reptile. The study, therefore, of a series of animals, selected at different periods of gestation, is of the highest importance in tracing the progress of their separate developments, and also of ascertaining the probable forms under which organized beings may be exhibited in different parts of the present, or in the remains of the past ages of the

world. A collection which might be readily made at one of the great centres, where hundreds of thousands of swine are killed, would enable us to clear up the history of the growth of this animal, and to establish the true relations between the living and fossil quadrupeds of this class, or, perhaps, afford the means of tracing a correct outline of those types which have become extinct, and the forms of which are, perhaps, only preserved in our day in some transient state of the offspring, uncompleted in the womb of our living species. Indeed, so far does Professor Agassiz carry this idea, that he entertains no doubt of the practicability of drawing correct figures of the fossil *Palœtherium* and *Anoplotherium* from the embryos of our present allied animals, viz: of our hogs and horses.

The museum continues to receive large additions from the government surveys and other sources. According to the statement of Prof. Baird, the specimens catalogued at the end of the year 1856 were as follows, viz: Of *mammals*, 2,046; of *birds*, 5,855; of *skulls and skeletons*, 3,060, making in all an aggregate of nearly eleven thousand articles, besides 2,000 mammals in alcohol, and at least 1,200 skins of birds not yet entered on the museum registers.

However valuable these collections may be in themselves, they are but the rough materials from which science is to be evolved; and so long as the specimens remain undescribed, and their places undetermined in the system of organized beings, though they may serve to gratify an unenlightened curiosity, they are of no importance in the discovery of the laws of life.

The collections of the Institution are intended for original investigation, and for this purpose the use of them, under certain restrictions, will be given to any person having the knowledge and skill necessary to the prosecution of researches of this character. It is not the policy of the Institution to hoard them up for mere display, or for the special use of those who may be immediately connected with the establishment. *Cöoperation*, not monopoly, as we have stated in previous reports, is the motto which expresses our principle of action. It is an object of the Institution to induce as many persons as possible to undertake the study of special branches of natural history, and to furnish them, as far as possible, with the means of knowing what has been done, as well as of adding to the stock of existing knowledge. The only return which is required is that proper credit in all cases should be awarded to the Institution for the facilities it has afforded.

Included in the additions to the museum during the last few years from government exploring parties and private individuals have been a number of living animals. Among these were two bald eagles, an

antelope, monkeys, raccoons, two wild cats, a jaguar, and a large grizzly bear, the latter from the Rocky Mountains. Though these objects are of importance in serving as models for drawings by the various artists engaged in figuring the collections of the different surveying and exploring expeditions, it is neither compatible with the means of the Institution, nor the duties of the Secretary and his assistants to take the custody of specimens of this character. We have, however, been relieved from this unenviable charge by the kind cöoperation of Dr. Nichols, Superintendent of the Government Insane Asylum, who has provided suitable accommodations for the animals on the extensive grounds of that institution, and rendered them subservient to its benevolent object in the amusement and consequent improvement of its patients. As they are in the immediate neighborhood of this city, they are readily accessible to strangers, and students of natural history, who visit the seat of government. While presents of this kind evince kind feelings, and are complimentary to the management of the Institution, the expense of transportation in some cases has been rather a heavy tax, and while we cannot very well refuse donations of this character, they would be much more acceptable were they received free of cost.

In connexion with this subject it may be stated that we have frequent applications for exchanges of specimens with foreign institutions; but while we are anxious to diffuse as widely as possible a knowledge of the natural history of this country, and to distribute articles which may serve to verify the Smithsonian publications, still it is not the policy with the present income to collect specimens other than those directly intended to illustrate the productions of the North American continent.

For a detailed account of the operations of the museum, the explorations which have been undertaken during the year at the expense of the government or otherwise, and the sources from which donations have been received, I will refer to the report of Prof. Baird, herewith submitted.

Gallery of Art.—The room apropriated to the gallery of art is still occupied by the series of interesting Indian portraits, by Mr. Stanley. It is to be hoped that Congress will make an appropriation for the purchase of these illustrations of a race of men rapidly disappearing before the advance of civilization. The collection should be kept together and carefully preserved as a faithful ethnological record of the characteristics of the aboriginal inhabitants of the western portion of our continent. It is the most complete collection of the kind now in existence, and it would be a matter of lasting regret were the pictures

sold to individuals, and thus separated. Mr. Stanley, though possessing much enthusiasm and liberality in regard to his art and commendable pride in this collection, will feel compelled, in justice to his family, to dispose of it to individuals, unless Congress becomes the purchaser.

The Institution possesses a valuable collection of engravings, well calculated to illustrate every epoch in the history of the art, as well as the style of the greatest masters. It is desirable that a catalogue be prepared, under the names of the engravers, in alphabetical series and with references to the volume and page, of the authors by whom the pieces have been described and criticised. The smaller engravings should be mounted in portfolios or volumes, and the larger regularly arranged, and where necessary, mounted on sheets of thick paper or paste-board, and placed in portfolios. A sufficient number to illustrate various styles, and also such as are of extraordinary merit, rarity, or cost, ought to be framed as a means of preservation as well as of exhibition.

It was a part of the original programme of organization, to furnish accommodations free of expense for the exhibition of works of art, and since there is no city of the Union visited by a greater number of intelligent strangers than Washington, particularly during the session of Congress, it is, perhaps, one of the best places in our country for this purpose. A few artists during the past year have availed themselves of the advantages thus afforded, and perhaps others would embrace the opportunity were the facts more generally known.

Lectures.—Arrangements have been made for the usual number of lectures during the present session of Congress. The plan previously adopted has been adhered to, namely, to give courses of lectures on particular branches of knowledge, interspersed occasionally with single lectures on particular topics. It may be proper to mention that the amount paid the lecturer is merely intended to defray liberally his expenses, and not as full remuneration for his services. Frequent applications have been made, as in previous years, for invitations to lecture; but as a general rule, the honor has not been extended to those who appeared most solicitous to obtain it. Men of standing and established reputation have principally been chosen, and the discourses which they have delivered have been such as to improve the moral and intellectual character of the audience. All subjects of a political or sectarian character have been excluded.

The following is a list of the lectures* which were delivered during the winter of 1856–'57:

Three lectures by Prof. Jos. Le Conte, of Georgia, on "Coal," and and three lectures on "Coral."

One lecture by J. R. Thompson, Esq., of Richmond, Virginia, on "European Journalism."

One lecture by Dr. J. G. Kohl, on "The History of American Geography."

Five lectures by Rev. J. G. Morris, M. D., of Baltimore, on the "Habits and Instincts of Insects."

Six lectures by Prof. Benjamin Pierce, of Cambridge, Mass., on "Potential Physics."

1. The elements of potential physics. The material universe considered as a machine, as a work of art, or as the manifest word of God.
2. Potential arithmetic.
3. Potential algebra.
4. Potential geometry.
5. Analytic morphology, or the world's architecture.
6. The realization of the imaginary, and the powers of justice and love.

One lecture by Rev. Geo. W. Bethune, D. D., of Brooklyn, N. Y., on "The Orator."

Three lectures by W. Gilmore Simms, Esq., of South Carolina:

1. On the Professions.
2. Ante-Columbian History of America.
3. Ante-Colonial History of the United States.

Eight lectures by Dr. D. B. Reid, of Edinburg, on the "Progress of Architecture in relation to Ventilation, Warming, Lighting, Fire-Proofing, Acoustics, and the general preservation of Health."

The operations of the Institution have been continually expanding, and it is with difficulty they can be kept within the limit required by the Smithsonian fund. So far, therefore, from wanting general fields of usefulness, the opportunity of doing good is only restricted by the amount of means which can be employed.

Respectfully submitted.

JOSEPH HENRY.

WASHINGTON, *January*, 1857.

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* In order to complete the list for the winter of 1856–'57 the lectures delivered after the date of the report have been added.

APPENDIX TO THE REPORT OF THE SECRETARY.

SMITHSONIAN INSTITUTION,
December 31, 1856.

SIR: I beg leave to present herewith a report for the year 1856 of operations of such departments of the Smithsonian Institution as have been intrusted by you to my care.

Respectfully submitted.

SPENCER F. BAIRD,
Assistant Secretary.

JOSEPH HENRY, LL.D.,
Secretary Smithsonian Institution.

I.—PUBLICATIONS.—The eighth volume of the Smithsonian Contributions to Knowledge was published and distributed during the year. In size it exceeds any of those preceding it in the series, embracing 556 pages of text and nine plates. A large portion of the ninth volume is also printed, and it is expected that the rest will be finished early in 1857.

The octavo publications during the year consist of the tenth annual report to Congress and Coffin's Psychrometrical Tables.

II.—EXCHANGES.—The receipts by exchange during 1856, both for the Smithsonian Institution itself and for the other parties for whom it acts as agent, have been unusually great, considerably exceeding those of any previous year, as will be shown by the following table:

The following table exhibits the total of receipts as compared with 1855.

	1855.		1856.	
Volumes—Octavo	717		966	
" Quarto	233		329	
" Folio	87		61	
		1,037		1,356
Parts of volumes and pamphlets—				
Octavo	1,427		1,413	
Quarto	239		383	
Folio	41		38	
		1,707		1,834
Maps, charts, and engravings		26		140
Total		2,770		3,330
Number of distinct donations		1,779		2,331

The copies of the eighth volume of Smithsonian Contributions to Knowledge were all duly forwarded to such addresses in the United States and Europe as were entitled to receive them. Those for Europe

were accompanied, as usual, by the publications of all the American societies, and filled 36 large boxes. The Institution did not receive enough copies of its separate memoirs for distribution at that time, and the transmission to minor societies and individuals was deferred until the begining of 1857. The statistics of the whole will be presented altogether in the next report.

III.—MUSEUM.

A.—*Increase of the Museum.*

In my last report I had occasion to call attention to the very large increase in magnitude of the collections received in 1855 compared with those of preceding years. As many of these had been gathered by parties engaged in government surveys, of which few were in the field in 1856, it was not expected that this year would equal the last in the extent of additions to the museum of the Smithsonian Institution. On the contrary, however, there has been no year in which so many valuable accessions have been made; the pre-eminence consisting not only in the number of specimens, but in their intrinsic value and variety. For details on this subject I must refer to subsequent portions of my report, and shall here only present a comparative table of receipts for the three past years:

	1854.	1855.	1856.
Number of articles received—			
Barrels and kegs	35	26	19
Cans	26	18	23
Jars	175	187	127
Boxes	94	159	234
Bales	—	7	1
Packages	32	79	87
Total	362	476	491
Separate donations	130	229	274
Donors	85	130	160

From the above table it will be seen that the increase in the number of packages of donations, and of donors, during 1856, has been almost as marked as that of 1855 over 1854. I shall now proceed to advert briefly to the most important sources whence these collections were derived, and then mention the principal additions in the different branches of the museum. As in past years, the bulk of the specimens received were collected by government parties, and deposited with the Smithsonian Institution in pursuance of the act of Congress which directs this disposition of all natural history property of the United States which may be in the city of Washington.

a.—THE MEXICAN BOUNDARY LINE.

Survey of the boundary line between the United States and Mexico—Major W. H. Emory, U. S. A., commissioner.—In my last report the

return of the main party under the commissioner was announced, and brief mention made of the important collections gathered during the survey. The party engaged on the western portion of the line, under Lieutenant N. Michler, arrived in Washington early in the present year. The natural history collections were made by Arthur Schott, esq., and were in very great variety, embracing many species new to the fauna of the United States; thus rendering still more just the remarks made in my last report upon the comprehensiveness and value of the natural history results of the United States and Mexican boundary survey.

Fort Yuma.—An important addition to our knowledge of the zoology of the Mexican boundary line was made by Major G. H. Thomas, United States army, assisted by Lieutenant Dubarry, United States army, in a series of the animals of Fort Yuma. This embraced several new species; the most important of which was a *Phyllostome* bat, the first member of that family ever found within the limits of the United States.

b.—REGIONS WEST OF THE MISSOURI.

The government parties engaged in the regions north of the Mexican boundary line and on or west of the Missouri river, and from which collections have been received in 1856, are three in number; the results of which were important and satisfactory in a high degree. The labors of other parties of a more private character working within the same field have also yielded fruits of great value.

1. *The exploration of the Llano Estacado, under Captain J. Pope, United States army.*—This expedition was sent out in 1854 for the purpose of testing the practicability of artesian borings for water in the desert plains of Texas. It returned in October, 1856, after having succeeded in accumulating a large mass of facts and observations respecting the geology, geography, topography, magnetism, meteorology, and other physical features of the climate and soil of the staked plains. But the results of most interest here consist in a very extensive collection of the animals of that little known region, embracing full series of its vertebrata and insects. The collection, in respect to the latter, is indeed of hitherto unexampled extent in the history of government expeditions; Captain Pope having directed particular attention to specimens in this obscure department of American zoology. The result is to be found in sixty boxes of pinned insects of all orders, in great excellence of preservation, and furnishing, not only ample materials for the study of geographical distribution, but likely to throw much light on the character, habits, and changes of many species of western insects, already possessing a painful prominence for their devastations of plants of both wild and cultivated growth.

Complete collections of the mammals, birds, reptiles, and fishes of this region were also made; among them several species entirely new, and others not previously known, except in very different localities.

Large collections in botany, mineralogy, and geology were also made, but have not been received at the Institution.

2. *Exploration of the Missouri and Yellowstone rivers, under Lieut. G. K. Warren, United States army.*—This expedition, accompanied by Dr. F. V. Hayden as geologist and naturalist, left St. Louis in April, and returned in November, having in the mean time explored the whole Missouri, from Council Bluffs to a point eighty miles above the mouth of the Yellowstone, and up the latter to the mouth of the Powder river. Short as was the time actually occupied in the field—scarcely six months—the party not only made the regular astronomical and topographical observations, but also contributed in a high degree to the advancement of natural science, by securing the largest collection in natural history ever obtained by any one government expedition to the West. Some idea of the extent of these collections may be formed from the fact that they embraced one hundred and fifty mammals, six hundred birds, (one hundred and thirty-five species,) skulls in large number, with several skeletons of each of the large quadrupeds of the plains; about forty boxes of selected fossils, weighing several tons, among them an extensive series of the remarkable plants of the tertiary, first discovered in North America by Dr. Hayden on a previous exploration, together with numerous plants, Indian implements, dresses, &c. All the large mammals of the plains, buffalo, elk, deer, bears, wolves, antelope, bighorn, &c., are represented in full by a series of skins, skeletons, and skulls, in perfect condition, fitted at any time to be mounted and placed on exhibition.

3. *Expedition for the construction of a wagon road from Fort Riley to Bridger's Pass, under Lieutenant F. T. Bryan, United States army.*—This party, accompanied by W. S. Wood, esq., of Philadelphia, as collector and naturalist, left St. Louis in May, and returned in November. The collections of the expedition, though exceeded in magnitude by those of Lieutenant Warren and Captain Pope, were yet of very great extent, and embraced a number of species larger than usual in proportion to that of the specimens, owing to the careful selection rendered necessary by the limited amount of transportation. A peculiar interest attached to this party from the fact of its route having been in part along or near that of Major Long's expedition in 1819, who, as is well known, was accompanied as naturalist by the eminent Say. Thirty-seven years had elapsed, and many of the species observed on that occasion, and shortly after described, were either obscurely known or altogether overlooked, owing to the loss in one way or another of the original specimens. It will, then, be a source of no little gratification to those interested in the natural history of America to learn, that in the collections made by Mr. Wood are to be found nearly all the vertebrate species gathered by Say in the way out to the Rocky mountains; those on Say's return route having also been collected by Captains Marcy, Whipple, Gunnison, and Beckwith, a few years ago.

The most important collections made under Lieutenant Bryan consist of the mammals, birds, reptiles, and fishes. Specimens of nearly

all the species observed were obtained, embracing, as did those of the two explorations previously mentioned, several new species.

Exploration of the Upper Missouri to the mouth of the Judith, in 1855, *by Dr. F. V. Hayden.*—Numerous collections made on this occasion by Dr. Hayden were received during the year, and included very many specimens of vertebrata, insects, and fossils of much the same character as those referred to under head of Lieutenant Warren's expedition. It was on this occasion that Dr. Hayden made the discovery on the Judith river of a peculiar formation which, by its reptilian remains, would seem to represent the wealden of England, as suggested by Dr. Leidy.

Explorations of Dr. J. G. Cooper and Dr. George Suckley, United States army.—The final collections of Dr. Cooper made in Washington Territory and California were received in 1856, and closed the important labors of this naturalist, commenced in 1853. These embraced all the departments of natural history, including many species before unknown. This gentleman, as mentioned in a previous report, went out as surgeon and naturalist to Washington Territory with the western division of Governor Stevens' Pacific railroad party, under charge of Captain George B. McClellan; and after the expiration of his engagement remained in the country, chiefly at Vancouver and Shoalwater bay, spending a short time, previous to his return to the Atlantic coast, near San Francisco.

Dr. Suckley, after returning on leave to the United States in 1855, went back in November of that year to Washington Territory in company with a detachment of United States troops. Stationed most of his time at Steilacoom, on Puget Sound, the scene of his former labors, in fact, Dr. Suckley renewed many of his previous collections, and added considerably to his list of species; and sent to Washington many boxes of specimens.* To these two gentlemen, in connexion with J. K. Townsend, esq., we are indebted for a knowledge of the entire natural history of the coast regions of northern Oregon and Washington Territories such as is possessed by but few States—by their labors the vertebrate animals being, not only well known, but the geographical distribution of the species minutely ascertained, and the fullest notices of the habits and peculiarities placed on record. Indeed, it is a serious question whether the species of the Atlantic coast and its adjoining regions are as well known as those of the Pacific slope, through the labors of Drs. Cooper, Suckley, Townsend, Gambel, Heermann, Kennerly, Webb, Newberry, and J. F. Hammond; Lieutenant W. P. Trowbridge and his assistants, Messrs. James Wayne, A. Cassidy, T. A. Szabo; Major G. H. Thomas, Lieutenant Dubarry, and Messrs. Nuttall, Bell, Bowman, Schott, Ayres, Gibbons, Taylor, Gibbs, Grayson, Samuels, Hutton, and others.

From Dr. J. F. Hammond, United States army, many valuable

* Among these were some skins of mountain goats, presented by Lieutenant Nugen, United States army.

collections, gathered in southern California, were received, furnishing not only several species not previously in our collections, but also supplying most important materials for determining the distribution of the animals of the western slope generally.

Mr. A. S. Taylor, of Monterey, has furnished a variety of species, while A. J. Grayson, esq., has supplied a number of birds of much interest.

Other California collections, of greater or less extent, were received from Capt. Stone and Dr. Antisell, and A. Campbell, esq.

Explorations in the vicinity of Petaluma, (Cal.) by E. Samuels, esq.—Brief mention was made in my last report of the fitting out of Mr. Samuels by the Boston Society of Natural History and the Smithsonian Institution, aided by the liberality of the United States mail line to California, via Panama. Mr. Samuels returned in July last, having thoroughly explored the field of his labors, and gathered a rich collection of specimens, embracing many rare and new species. The liberal promises of the Pacific Mail Steamship Company, the Panama Railroad Company, and the United States Mail Steamship Company, have been more than realized in the free passage home given to Mr. Samuels and all his large collections—an act of generosity which may well excite the attention and recognition of the lovers of science. Nor should less meed of praise be awarded to Messrs. Wells, Fargo & Co. for their free transmission to San Francisco of Mr. Samuels' boxes, thus facilitating their semi-monthly despatch to Washington.

It may, perhaps, not be out of place here to state that the above mentioned mail line still continues its kind offices by transporting, free of charge, all packages of the Smithsonian Institution containing books of specimens of natural history. The United States mail line, also, has furnished free freight of a similar character from Cuba and New Orleans to New York.

The results of Mr. Samuels' explorations will shortly be published in connected form in the journal of the Boston Society of Natural History, illustrated with the necessary plates and figures.

Collections in Texas, Kansas, Nebraska, and Utah.—In addition to the great collection made by Capt. Pope, Lieut. Bryan, Lieut. Warren, and Dr. Hayden in these territories, several others have been received, of more or less importance, which will be referred to under their appropriate head. A collection of plants from the vicinity of Fort Belknap, made by Dr. Vollum, United States army, and of plants and animals from Fort Chadbourne, by Dr. E. Swift, United States army, have added to our knowledge of the natural history of Texas. A collection of reptiles and birds from Fort Riley, Kansas, was also received from Dr. W. F. Hammond.

c.—REGIONS EAST OF THE MISSOURI.

It will be impossible, with the limits assigned me, to go into detail respecting the collections from this portion of the United States, although much of great value has been received. The principal con-

tributors will be referred to hereafter, under the head of special departments of the museum, as well as in the alphabetical list of "additions to the museum."

d.—OTHER PORTIONS OF THE WORLD.

The year 1856 has witnessed the safe and successful return of the two naval explorations sent out in the early part of 1853, and diligently occupied ever since in fulfilling the objects of their mission. These were, the expedition for the survey of the China seas and Behring Straits, (first under command of Capt. C. Ringgold, United States navy, and subsequently under Capt. J. Rodgers, United States navy,) and the expedition for the exploration of the La Plata and its tributaries, under Capt. T. J. Page, United States navy.

The Behring Straits expedition, accompanied by Wm. Stimpson as zoologist and Charles Wright as botanist, visited the island of Madeira, Cape of Good Hope, China seas, Japan, Kamtschatka, Behring Straits, and the coast of California, returning from Tahiti, via Cape Horn, in the very short time of seventy-four days. The natural history results were of great magnitude, filling many boxes and barrels, and embracing very many new and rare species. Some idea of the value of the collection may be formed from the following brief enumeration of the animals brought home:

Vertebrata	846	species.
Insects	400	"
Crustacea	980	"
Annileds	220	"
Mollusca	2,359	"
Radiata	406	"
Total	5,211	"

Of these, it is probable that more than one-half are undescribed. The plants have not yet been assorted, but it is believed that they will be not inferior in extent to the animals. They occupy in the original boxes and bales a bulk of over 100 cubic feet.

Mr. Wright left the vessel at San Francisco, and returned via Nicaragua. He there made a valuable collection of plants and animals, but was prevented from completing his explorations by the internal troubles of the country. He has since gone to Cuba, to investigate the botany of that island.

It may be proper to remark here, that the whole of a very rich collection of invertebrates made in the Arctic seas was dredged from the vessel under the immediate superintendence of Captain Rodgers himself, while the scientific corps was engaged in another portion of Behring's Straits.

The exploration and survey of the La Plata and its tributaries, under Captain T. J. Page, though consisting of but a single steamer, the Water Witch, of only 400 tons, and unprovided with naturalists, has yet accomplished much for natural science in the collection of very full series of the birds, reptiles, fishes, insects, and plants of the

country, with many interesting specimens of minerals, fossils, woods, and other native products. A point of special attention was that of plants useful in the materia medica, and of these many new and rare kinds were obtained, which cannot fail to be of economical importance.

In making these collections, Captain Page was ably seconded by Dr. Carter, surgeon of the vessel, Lieutenant Powell and the other officers, as well as by E. Palmer, horticulturalist. In addition to the specimens themselves, many valuable notes on the habits and peculiarities of the species were obtained.

Mr. Palmer left the expedition before its return on account of ill health, and while waiting a passage home made some additional collections of reptiles, fishes, and insects, of much interest.

At the present time, all of the collections of these two naval expeditions are stowed in the Smithsonian building, waiting some action of Congress by which they may be published to the world. Funds are needed to make the necessary drawings of new or unfigured species, and to compensate naturalists for preparing the different reports.

e.—SYSTEMATIC STATEMENT OF ADDITIONS TO THE MUSEUM.

Under the present head, I can only mention, in brief terms, the most important additions made in the different classes of animals, referring for particulars to the alphabetical list of contributions. The collections made by the government expeditions will be discussed at length in their official reports. In the systematic catalogues also of the collections of the Institution, in preparation for publication, as soon as their extent will warrant, will be found a careful and detailed indication of the donor and locality of every specimen. It may, however, be well to extend the table of catalogue specimens, given on page 54 of last year's report, to 1856, for the sake of exhibiting the increase in several departments.

	1851.	1852.	1853.	1854.	1855.	1856.
Mammals	None.	114	198	351	1,200	2,046
Birds	.....	.....	.....	4,353	4,425	5,855
Skulls and skeletons	911	1,074	1,190	1,275	2,050	3,060

To the above enumeration, however, must be added nearly 2,000 mammals in alcohol, and at least 1,200 skins of birds, not yet entered on the museum register.

No count has been made of the jars filled during the year with specimens in alcohol. It is believed, however, that the number of 9,171, may be safely increased to nearly 12,000.

Mammals.—It is in this class that the additions have been most extensive and important, the number of the larger species especially,

being very great. Out of the whole number of additions already catalogued, 846, the following are those of the larger animals.

Black Bear, *Ursus americanus*	1	Jaguar, *Felis onza*	1
Cinnamon Bear, *Ursus cinnamomeus*	1	Prairie Dog, *Cynomys ludovicianus*	50
Grizzly Bear, *Ursus ferox*	10	Beaver, *Castor canadensis*	7
Racoon, (*two species*)	6	Common Deer, *Cervus virginianus*	18
Wolf, *Lupus occidentalis*	10	Black Tail Deer, *Cervus columbianus*	7
Prairie Wolf, *Lupus latrans*	6	Mule Deer, *Cervus macrotis*	11
Red Fox, *Vulpes fulvus*	6	Elk, *Cervis canadensis*	12
Gray Fox, *Vulpes Virginianus*	6	Antelope, *Antelope americana*	18
Badger *Taxidea labradoria*	5	Bighorn, *Ovis montana*	5
Wild Cat, *of three species*	19	Mountain Goat, *Capra montana*	4
Panther, *Felis concolor*	5	Buffalo, *Bison americana*	5

As might readily be inferred, most of the above mentioned specimens were received from Captain Pope, Lieutenant Warren, Lieutenant Bryan, and Dr. Hayden; those collected by Lieutenant Warren being of extraordinary variety and number.

Continuations of the collections on the west coast, both of mammals and birds from Doctors Cooper, Suckley, and Hammond, Mr. Samuels and others, have been of much interest. Messrs. Kennicott, Jenks, Pastel, Wilson, Curtis, and others, have contributed many specimens from the Atlantic region.

Several rich collections of European and Siberian mammals have been received, and furnish the much desired opportunities of comparison with American species. Among them may be mentioned *Dipus jaculus, acontion, sagitta; Meriones opimus, tamaricinus; Spermophilus guttatus, eversmanni, erythrogenys; Cricetus arenarius, frumentarius; Myodes novegicus, torquatus, obensis, lagurus, obscurus, schisticolor; Arvicola rutilus, oeconomus; Lagomys alpinus; Tamias pallasii.** *Mustela sibirica, Feliscatus, &c.*—These have been received from Dr. George Hartlaub, of Bremen, Dr. F. Brandt, of St. Petersburg, and Maximilian, Prince of Wied.

A deficiency in the collection last year of the *Geomys pinetis*, or pouched rat of Georgia, sometimes called "salamander," has been supplied by specimens received from Dr. Baldwin, Dr. Gesner, and Mr. Burgwyn.

Birds.—Many specimens of birds have been received from various parts of the world, and among the North American specimens are several new species. A collection of nearly 100 Australian species was presented by Mr. Warfield. Some rare birds from Bolivia were deposited by Mr. Evans.

Reptiles.—Among many, the most interesting specimens of reptiles added during the year are two of *Lepidosiren annectens* from the

* By this name I denote the species of ground squirrel found in Siberia by Pallas, and by him considered the same with the ground squirrel of the United States. The most superficial comparison of the two shows them to be distinct, and as the American animal was first described by Linnaeus as *Tamias striatus*, it must retain the name. In the necessity for a new name for the Siberian species, I propose that of the discoverer, in the absence, as far as I can ascertain, of any other.

west coast of Africa, presented by Sir William Jardine. This almost completes the rich series of ichthyoid reptiles in the Smithsonian collection, the only deficiency being that of the gigantic salamander of Japan, (*Siiboldia.*)

Fishes.—The number of fishes received has not been very great, compared with previous years, as but few portions of the United States lack representatives in the Smithsonian museum at the present time.

Insects.—But few insects have been added during the year, with the exception of those already referred to under the head of government expeditions.

Other Invertebrates.—A large collection of 100 species of *Achatinella*, from the Sandwich Islands, was presented by Dr. Newcomb, and of shells and crustacea of Florida and Michigan, by O. M. Dorman, Esq.

Plants.—The principal plants received have been from Texas, collected by Drs. Swift and Vollum, of the United States army.

Fossils and Minerals.—The principal private collections under this head, besides those contributed by Dr. Hayden, were received from I. Lippman, of Saxony, the K. L. C. Akademie of Breslau, and the Naturforschende Gesellschaft, of Emden.

Living animals.—These consisted chiefly of a Prairie Dog (*Cynomys ludovicianus,*) Sage Rabbit (*Lepus artemisia,*) and Prairie Fox (*Vulpes macrourus,*) collected by Lieutenant Warren and party. Some living animals were brought home by Captain Page, as a Jaguar, and Nutria (*Myopotamus coypus.*) The latter has since died. Mr. David Miller presented a Pennsylvania Fox Squirrel (*Sciurus cinereus.*) Many specimens of *Arvicola* and *Hesperomys* (mice) were transmitted by Robert Kennicott.

Several hundred living turtles were received and transmitted to Professsor Agassiz for examination.

The living animals received from time to time have been found of great use, as studies for the artists engaged in making drawings for the various government reports. Several of the specimens, as the Spermophiles, Prairie Dog, Prairie Fox, Antelope, &c., had never been figured previously, except from distorted, dried skins.

In the following tables will be found references to the regions from which collections have been received, and to the nature of the specimens; and at the end a full list of all the donations, arranged alphabetically by donors. In some cases it has been impossible to ascertain the source of collections, owing to the omission by the donor of his name and address.

I.—Geographical Index to Specimens received.

Vancouver's island.—Turner.
Washington and Oregon.—Carter, Cooper, Newberry, Nugen, Suckley.
California.—Antisell, Campbell, Cooper, Dubarry, Emory, Grayson, Hammond, Samuels, Stone, Suckley, Taylor, Thomas, Trowbridge.
Utah.—Carrington.
Nebraska.—Atkinson, Bryan, Hayden, Stevens, Walker, Warren, Watson.
Kansas.—Bryan, Carleton, Hammond.
Missouri.—Agassiz, Engelmann, Riddell, Wilson.
Texas.—Antisell, Pope, Swift, Vollum.
New Mexico.—Bowman.
Arkansas.—Burke.
Mississippi.—Bellman, Teunison.
Florida.—Baldwin, Burgwyn, Churchill, Dorman, Savery, Smith, Welsh, Würdemann.
Georgia.—Churchill, Gesner, Glover, Jones, Leconte, Postell, Wilson.
South Carolina.—Agassiz, Curtis.
North Carolina.—Bridger, Hunter.
Virginia.—Brakeley, Brooks, Cabanis, Easter, Hall, Hotchkiss, Jenks, Joynes, McCue, Massy, Tompkins, Tuley.
Maryland and District of Columbia.—Lowndes, Moss, Newberry, Younger.
Pennsylvania.—Baird, Brickenstein, Brugger, Cassin, Mackey, Miller, Stauffer, Thickstun.
New Jersey.—Ashmead, Baird, Brown, Cooper.
New York.—Baker, Benton, Byram, Davis, Guest, Hale, Howell, Reid, White.
Massachusetts.—Atwood, Brewer, Jenks, Jenkins.
Vermont.—Thompson.
New Hampshire.—Harvey.
Maine.—Hamlin.
Michigan.—Dickinson, Dorman, Newberry, Reynolds.
Wisconsin.—Bell, Hoy.
Illinois.—Dorman, Kennicott.
Iowa.—Bidwell, Glover, Odell.
Ohio.—Kirtland, Luther, Merrick, Newberry, Newton, Spence.
Indiana.—Cox.
Tennessee.—Mitchell.
Kentucky.—Bibb.
Nova Scotia.—Dawson, Downes, Gilpin, Ross, Willis.
Newfoundland.—Skues, Stabb.
Mexico.—Bobadilla, Hartlaub.
Nicaragua.—Anderson, Smith, Wright.
Cuba.—Poey.
Panama.—Cooper, Evans, Raymond, Rowell, Suckley.
Paraguay.—Page, Palmer.
Brazil.—Cabanis, Page.

Bolivia.—Evans, Fry.
Jamaica.—Wilson.
England.—Denny, Jardine.
Germany.—K. L. C. Akademie, Breslau, Lippmann, Max., Pr. Wied, Naturforschende Gesellschaft, Emdon.
Siberia.—Brandt, Hartlaub.
Africa.—Jardine.
Sandwich Islands.—Newcomb.
North Pacific seas.—Rodgers.
Australia.—Warfield.

II.—Systematic Index to Specimens received.

Mammals.—Antisell, Atkinson, Baird, Baker, Baldwin, Bell, Bidwell, Byram, Brakeley, Brandt, Brewer, Bridger, Bryan, Burgwyn, Carleton, Cooper, Curtis, Davis, Dawson, Denny, Downes, Dubarry, Easter, Emory, Engelmann, Gesner, Gilpin, Glover, Grayson, Hale, Hall, Hammond, Hartlaub, Hayden, Howell, Jardine, Jenks, Jones, Kennicott, Leconte, Lowndes, Luther, Massey, Max., Pr. Wied, Miller, Moore, Mitchell, Newberry, Newton, Nugen, Odell, Page, Poey, Pope, Postell, Reid, Riddell, Rodgers, Rowell, Samuels, Savery, Skues, Smith, Stabb, Stevens, Swift, Suckley, Taylor, Teunison, Thickstun, Thomas, Thompson, Trowbridge, Tuley, Warfield, Warren, Watson, Wilson.

Birds.—Bidwell, Bryan, Cabanis, Cassin, Cooper, Davis, Easter, Emory, Evans, Glover, Grayson, Hammond, Hartlaub, Hayden, Kirtland, Luther, Page, Pope, Rodgers, Samuels, Savery, Stabb, Swift, Suckley, Trowbridge, Warfield, Warren, Würdemann.

Reptiles.—Agassiz, Antisell, Ashmead, Baldwin, Brakeley, Brickenstein, Bridger, Baird, Bryan, Cabanis, Churchill, Denny, Dickinson, Emory, Gesner, Glover, Jardine, Jones, Kennicott, Mitchell, Newberry, Page, Palmer, Poey, Pope, Reynolds, Rodgers, Rowell, Samuels, Smith, Stauffer, Swift, Suckley, Taylor, Teunison, Thickstun, Thomas, Walker, Warren, Wilson, Wright, Würdemann, Younger.

Fishes.—Baird, Bibb, Brugger, Bryan, Churchill, Cox, Denny, Emory, Engelmann, Evans, Guest, Jardine, Kirtland, Mitchell, Page, Palmer, Pope, Rodgers, Samuels, Suckley, Taylor, Tennison, Trowbridge, Warren, Welsh, Würdemann.

Insects.—Baldwin, Bowman, Bryan, Cooper, Emory, Mackey, Moss, Palmer, Pope, Raymond, Rodgers, Rowell, Samuels, Swift, Suckley, Taylor, Walker, Warren.

Other Invertebrates.—Antisell, Atwood, Bellman, Bibb, Bidwell, Bryan, Dorman, Luther, Newcomb, Plant, Pope, Rodgers, Samuels, Smith, Stone, Suckley, Willis.

Plants.—Brown, Carter, Churchill, Cooper, Joynes, Raymond, Rodgers, Swift, Vollum, Wright.

Fossils and Minerals.—Bidwell, Bobadilla, Brooks, Burke, Campbell, Carrington, Denny, Fry, Hammond, Harvey, Hayden, Horner, Hotchkiss, Hunter, Jenkins, Jenks, K. L. C. Akad., Lippmann, McCue, Merrick, Naturf. Ges., Emden, Newberry, Ross, Spence, Taylor, Thickstun, Turner, Warren, Wilson.

Miscellaneous.—Hamlin, Hoy, Swift, Tompkins, Trübner, White, Wilson.

B.—*Work done in the Museum.*

The various collections of the year have been unpacked, assorted, and catalogued as fast as received. Books have been opened for the registry of the fishes and invertebrates of the series, which will be labelled and entered as rapidly as circumstances will admit.

C.—*Distribution and use of the Smithsonian Collections.*

As in the previous years, the collections of the Smithsonian Institution have been freely open to the use of any persons engaged in original research, and many specimens also distributed as exchanges. The entire series of turtles has been sent to Professor Agassiz, to be used in the preparation of his work, and many hundreds of living ones were procured for him. Dr. Wyman has had many specimens and preparations of salamanders and ichthyoid reptiles. Eggs of North American birds have been furnished to Dr. Brewer, coleoptera to Dr. Leconte, neuroptera to Mr. Uhler, hymenoptera to M. Desaussure; seeds to the United States Patent Office; shells to Dr. Gould, Mr. Lea, Hugh Cuming, and Mr. Cooper; birds to the Bremen museum and to Dr. Hoy; living reptiles to the Zoological Society of London; fossils to Dr. Leidy, &c., &c.

D.—*Present Condition of the Museum.*

The present condition of the museum of the Smithsonian Institution may be summed up as follows:

1st. Its collection of the vertebrate animals of North America, including skins, specimens entire in alchohol, and skeletons and skulls, is in every department, the richest in the world in materials for illustrating species and their geographical distribution.

Of invertebrate animals—as insects, shells, crustacea, &c., plants, minerals, rock specimens, and fossils—its collections from the western half of the United States are incomparably superior to all others, while from the eastern portion of the continent it has very good series, though surpassed in the extent of the different divisions by a number of others, both public and private. A single exception may perhaps be found in the private cabinet of coleoptera belonging to Dr. Leconte, which is by far the richest known in the species of North America generally. It

will, however, be a comparatively easy matter to complete the deficiencies of the Smithsonian collection so as to furnish, in a few years, as perfect a collection of the natural productions of North America generally as could reasonably be expected. In most cases, it will be merely necessary for the Institution to express a desire to possess such collections from the Atlantic and middle portions of the continent to have them offered spontaneously. Hitherto it has not been considered expedient to throw the doors open very wide for the reception of the more common and better known species.

Of collections from other parts of the world, the Institution possesses excellent series in many branches of natural history from Paraguay, Chili, Europe, Siberia, China, Japan, South Africa, and the Pacific ocean generally. The results of the Paraguay expedition under Captain Page, United States navy, and the Behring Straits expedition, first under command of Captain Ringgold, and then under Captain Rodgers, are of pre-eminent magnitude and value, far exceeding, in many respects, those of any previous exploring parties to the same region.

In illustration of the preceding remarks respecting collections in North American zoology, it may be stated that the series of vertebrata is almost complete, very few known species being wanting. Skins of all the more prominent mammals, as buffalo, elk, deer of five species, antelopes, mountain goats, bighorn or mountain sheep, black, cinnamon, and grizzly bears, wolves, foxes, beaver, badger, otters, prairie dogs, and marmots, peccaries, panther, jaguar, ocelot or tiger cat, lynxes of four species, wolverine or carcajou, &c., are now packed away within the walls of the Smithsonian Institution, ready at any time to be mounted. All the species interesting to the hunter, the traveller, the farmer, or the man of science can here be examined or studied. The total number of North American species cannot be less than two hundred, exclusive of bats, seals, and cetaceans. Messrs. Audubon and Bachman describe about one hundred and fifty North American species of mammals. This Institution possesses about one hundred and thirty of these; and about fifty additional species have already been detected, although the examination of the entire collection has not yet been completed.

Of North American birds, the Institution possesses nearly all described by Audubon, and at least one hundred and fifty additional species.

The registered and catalogued specimens of quadrupeds amount to 2,040, of birds to 6,055, of skeletons and skulls to 3,060, nearly all North American. To these, however, must be added at least 2,000 North American quadrupeds in alcohol, and 1,200 birds not yet entered

Of reptiles, the North American species in the museum of the Smithsonian Institution amount to between 350 and 400. Of the 150 species described in Holbrook's North American Herpetology, the latest authority on the subject, it possesses every genuine species, with one or two exceptions, and at least two hundred additional ones. It has about 130 species of North American serpents for the 49 described by Holbrook.

Of the number of species of North American fishes, it is impossible to form even an approximate estimate, the increase having been so great. It will not, however, be too much to say that the Institution has between four or five hundred species either entirely new or else described first from its shelves.

Of skeletons and skulls of North American vertebrata, the Smithsonian series is very full, embracing, as shown by a preceding table, over 3,000 specimens.

The collection of minerals and fossils, (including those gathered by nearly all the United States geological surveys, as by Dr. D. D. Owen, C. T. Jackson, Foster and Whitney, Evans, &c.,) are all carefully classed and catalogued, so as to correspond with and fully illustrate the reports of these gentlemen. There is also a large collection of geological specimens, made many years ago in New Mexico and Texas, as well as in Sonora, Chihuahua, and other portions of northern Mexico, which, with the accompanying notes, furnish indications of many mineral regions and mining localities now totally unknown to the people of the United States. Hints are to be derived from a careful study of this collection of the highest importance in the development of the mineral region along the Mexican boundary line.

It may, perhaps, be well here briefly to mention the government expeditions, by which these collections were made from time to time, under the authority of the departments. The present and preceding reports contain much fuller details concerning them.

A.—*Geological Surveys.*

1. The survey of Wisconsin, Iowa, Minnesota, and a portion of Nebraska, by Dr. David Dale Owen.
2. The survey of the Lake Superior district, by Dr. Charles T. Jackson.
3. The survey of the same region, by Messrs. Foster and Whitney.
4. The survey of Oregon, by Dr. John Evans.

B.—*Boundary Surveys.*

5. The survey of the line between the United States and Mexico, first organized under honorable J. B. Weller, as commissioner, and Major W. H. Emory, as chief of the scientific department, then under John R. Bartlett, commissioner, and Colonel J. D. Graham, chief of the scientific corps, succeeded subsequently by Major W. H. Emory, then under General R. B. Campbell, commissioner, and Major W. H. Emory, chief of the scientific corps.
6. The survey of the boundary line of the Gadsden purchase, under Major W. H. Emory, commissioner.

C.—*Surveys of a Railroad route to the Pacific.*

7. Along the 47th parallel, under Governor I. I. Stevens.
8. Along the 38th and 39th parallel, under Captain J. W. Gunnison.
9. Along the 41st parallel, under Captain E. G. Beckwith.
10. Along the 35th parallel, under Lieutenant A. W. Whipple.
11. In California, under Lieutenant R. S. Williamson.
12. Along the 32d parallel, western division, under Lieutenant J. G. Parke.
13. Along the 32d parallel, eastern division, under Captain J. Pope.
14. In a portion of California, under Lieutenant J. G. Parke.
15. In northern California and Oregon, under Lieutenant R. S. Williamson.

D.—*Miscellaneous Expeditions under the War Department.*

16. Expedition along the 32d parallel, eastern division, for experimenting upon artesian borings, under Captain Pope.
17. Exploration of Red river, under Captain R. B. Marcy.
18. Survey of Indian reservation in Texas, under Captain R. B. Marcy.
19. Exploration of the upper Missouri and Yellowstone, under Lieutenant G. K. Warren.
20. Construction of a wagon road from Fort Leavenworth to Bridger's Pass, under Lieutenant F. T. Bryan.

E.—*Naval Expeditions under the Navy Department.*

21. The United States naval astronomical expedition in Chile, under Lieutenant J. M. Gilliss.
22. The Japan Expedition, under Commodore M. C. Perry.
23. Exploration of the China seas and Behrings Straits, first under command of Captain C. Ringgold, then under Captain J. Rodgers.
24. Exploration of the La Plata and its tributaries, under Captain T. J. Page.
25. Exploration of the west coast of Greenland and Smith's sound, under Dr. E. K. Kane.

The preceding enumeration embraces the government explorations, by which collections of various kinds were made to a greater or less extent, and deposited with the Smithsonian Institution, in pursuance of the law of Congress. The government expeditions, the collections of which are now deposited at the Patent Office, are as follows:

1. The United States Exploring Expedition, under Captain Wilkes.
2. The geological surveys of the northwest in 1840, under Dr. D. D. Owen.
3. The exploration of the Salt Lake valley, under Captain H. Stansbury.
4. The exploration of the Creek boundary line, and of the Zuñi river, under Captain L. Sitgreaves.

5. The Amazon expedition under Lieutenants Herndon and Gibbon.

It will thus be seen, that of thirty government explorations, the collections of five-sixths or twenty-four, are now deposited with the Smithsonian Insfitution; the remaining ones, one-sixth in number, are still in the Patent Office, though not all on exhibition. The same proportion as above will pretty nearly indicate the comparative magnitude of the collections in the two buildings. The disproportion in favor of the Smithsonian collections will be still greater if we except the extensive series of implements, utensils, clothing, and fabrics generally of the Pacific islands, as collected by Captain Wilkes. To realize the difference between the two collections, it must be understood that at the present time all the Smithsonian collections are packed away in the smallest possible compass, very few specimens mounted, the alcoholic collections crowded closely together in five or six different rooms; the shells, minerals, fossils, &c., necessarily boxed up and stowed away in basement rooms.

E.—*Alphabetical Index of Additions to the Museum of the Smithsonian Institution during the year* 1856.

Professor Agassiz.—Three specimens *Emys serrata* from Charleston, South Carolina; *E. belli*, *E. troostii*, and *E. elegans* from Osage river; *E. mobilensis* from Mobile.

Lieutenant Anderson.—One *Dryophis*, two *Istiophorus*, and ten skins of birds from Greytown, Nicaragua.

Dr. Antisell.—Two boxes fossils and minerals from California; skeleton of rattlesnake and spermophile; skin of toad from the Gila river; Hermit crab from Matagorda, Texas.

Charles Ashmead.—*Salamandra tigrina* from Beesley's Point, New Jersey.

E. G. Atkinson.—Skin of spotted buffalo calf from Fort Pierre.

Captain N. Atwood.—Three fresh specimens of *Euryale* from Cape Cod.

S. F. Baird.—Fishes in alcohol; skeletons and jaws of fishes; small mammals from Beesley's Point, New Jersey, and Carlisle, Pennsylvania.

M. Baker.—Skins of fisher or black cat (*Mustela canadensis*) and weasel, skulls of bear, deer, minks, otter, fisher, and martin, from Essex county, New York.

Dr. Baldwin.—Bottle insects, living *Testudo polyphemus* or *gopher* and *Geomys pinetis* or salamander, from Jacksonville, Florida.

J. G. Bell.—Box with two rabbits (*Lepus sylvaticus*) from Wisconsin.

C. Bellman.—Mollusca from Biloxi, Mississippi.

Dr. J. H. Benton and W. E. Guest.—*Lucioperca*, with tumor on head.

Dr. George R. Bibb.—Blind fish and crustacea from the Mammoth Cave, Kentucky.

Dr. E. C. Bidwell.—Skins of birds and mammals, fossils, and shells, from Iowa.

Don J. B. Bobadilla.—Fragment of tusk of mastodon from Mexico, called by Dr. Weidner *Duranzotherium bobadillense.*

Captain A. Bowman, U. S. A.—Specimens of cochineal collected near Fort Stanton, New Mexico, lat. 34°.

J. and A. Brakeley.—Skins of deer and other mammals, skulls of mammals, living rattlesnakes, young *Lynx rufus* in flesh, bones of deer, turkey buzzard, from western Virginia.

Dr. F. Brandt.—Twelve skins Siberian mammals from eastern Siberia.

Dr. T. M. Brewer.—Mammals from Massachusetts.

J. H. Brickenstein.—Living terrapins from eastern Pennsylvania.

J. L. Bridger.—Living snakes, terrapins, fox squirrels, from North Carolina.

J. S. O. Brooks.—Crystallized salt from Kanawha, Virginia.

Dr. George G. Brown.—American amadou from New Jersey.

Samuel Brugger.—One can reptiles and fishes from Potter county, Pennsylvania.

Lieutenant F. T. Bryan, U. S. A.—Six boxes, one keg, containing alcoholic specimens, birds, mammals, and skeletons, from United States wagon road expedition to Bridger's Pass.

W. H. K. Burgwyn.—*Geomys* or "salamander" from Florida.

Rev. John Burke.—Minerals and fossils from Fort Washita.

Dr. George Cabanis.—Living land turtle, roots of Tuckahoe from Virginia.

Dr. J. Cabanis.—Skins of Vireo from Brazil.

E. N. Byram.—Mice and moles from Long Island.

Albert Campbell.—Fossil plant from Santa Inez, California.

Major J. H. Carleton, U. S. A.—Two foetus of buffalo from the plains.

Albert Carrington.—Coals from Utah.

M. Carter.—*Ceanothus occidentalis* from Oregon.

J. Cassin.—Skins of *Loxia leucoptera* and *Americana.*

General Churchill, U. S. A.—Four living gophers, (*Testudo polyphemus,*) four *Emys terrapin, Echineis, Syngnathus,* and serpents; seeds of plants, from Georgia and Florida.

Dr. J. G. Cooper.—Mammals, birds, and plants from California and Washington Territories. Living turtles from Panama.

William Cooper.—Eighteen skins of mammals.

E. T. Cox.—Skin of *Labrax* from Indiana.

Rev. M. A. Curtis and Sons.—Skins of *Sigmodon, Reithrodon,* and *Hesperomys,* mammals and reptiles in alcohol, from South Carolina.

H. Davis.—Mammals and birds from Waterville, New York.

J. W. Dawson.—Specimens of *Jaculus* from Nova Scotia.

H. Denny.—Mammals, reptiles, fishes, and fossils, from England.

W. C. Dickinson.—*Menobranchus* from Portage Lake, Lake Superior.

O. M. Dorman.—Shells from Michigan and Illinois. Shells and crustacea from Florida.

J. Downes.—Skin, *Lepus glacialis,* from Newfoundland. *Hesperomys* from Nova Scotia.

Dr. J. D. Easter.—Three skins of mice from Virginia. *Cardinalis Virginianus* (red bird) in flesh from Harper's Ferry.

Major W. H. Emory, U. S. A.—Mammals and birds, reptiles and fishes, insects and shells, collected by Arthur Schott, from San Diego, via Camp Yuma, to El Paso.

Dr. Engelmann.—Cask of fishes and six skins squirrels from St. Louis.

M. Evans.—*Hemiramphus* and *Ailurichthys* from Panama. Box of Bolivian birds. Deposited.

W. A. Fry.—Sulphate of lime encrusted with quartz from the Andes.

D. W. Gesner.—Jar reptiles and mammals, skulls, from western Georgia.

A. J. Grayson.—Birds, mammals, fishes, and eggs, from California.

Dr. S. E. Hale.—Skins and skulls of mammals from Essex county, New York.

Dr. John P. Hall.—Deformed pig from Fairfax county, Virginia.

A. C. Hamlin.—Cast of ancient inscriptions on rock from Maine. Casts of fossil cetacean from Bangor.

Dr. J. F. Hammond, U. S. A.—Birds and mammals from California.

Dr. W. A. Hammond, U. S. A.—Box of minerals and jar of alcoholic specimens from Kansas.

Dr. G. Hartlaub.—Skins of Siberian mammalia, skins of birds of Mexico and Cuba.

M. Harvey.—Minerals from Hampshire county, New Hampshire.

Dr. F. V. Hayden.—Skins of birds, skins and skulls of black-tail deer, antelope, mountain sheep, beaver, prairie dogs, and other mammals; reptiles, fishes, and mammals in alcohol; shells, fossil remains, &c., collected in 1854 and 1855, on the Upper Missouri.

John Hitz.—Cones and seeds of *Pinus cembra* from Switzerland.

Dr. Horner, U. S. N.—Box of minerals.

J. Hotchkiss.—Fossil bone of deer from Virginia.

Robert Howell.—Specimens of mammals from Tioga county, New York.

Dr. P. R. Hoy.—Box Indian antiquities from Wisconsin.

Dr. C. L. Hunter.—Rutile and Lazulite from North Carolina.

Sir W. Jardine.—Mammals, fishes, reptiles, &c., from England. *Lepidosiren annectens* from Africa.

Captain T. A. Jenkins, U. S. N.—Minerals and rocks from Gay Head.

J. W. P. Jenks.—Mammals from Middleboro', Massachusetts.

W. Jenks.—Silicified wood from Alexandria, Virginia.

Dr. Joseph Jones.—Reptiles and mammals in alcohol, from Colonel's island, Georgia.

J. R. Joynes.—Living plants from the eastern shore of Virginia.

K. L. C. Akademie der Naturforscher, Breslau.—Minerals from Germany.

Robert Kennicott.—Mammals, reptiles, and fishes, skins and in alcohol, living serpents, salamanders, and mammals, from Illinois.

Dr. J. P. Kirtland.—Skins *Bombycilla garrula*, 1 jar of fishes, skin of wolf and squirrels from Cleveland, Ohio.

J. Lippman.—Minerals, (148 specimens,) from Schwarzenberg, Saxony.

B. O. Lowndes.—*Arvicola pinetorum* (field mouse) from Bladensburg, Maryland.

S. M. Luther.—Eggs, shells and skin of mink from Portage county, Ohio.

J. M. Cue.—Fossil bones of deer and woodchuck from Augusta county, Virginia.

R. B. Marcy, U. S. A.—Box of minerals and fossils from Fort Belknap.

A. W. Massey.—Skins of raccoon, gray fox, and jar of mammals from Spottsylvania, Virginia.

Maximilian, Prince of Wied.—Skins of European mammals.

Professor F. Merrich.—Fossil fishes from Delaware, Ohio. Deposited

Dr. Ed. Merrill.—2 packages moss from Louisiana.

D. Miller, jr.—Living fox squirrel from Pennsylvania.

Mr. Milton.—Coins from Michigan.

Professor Mitchell.—Reptiles, fishes and mammals from Tennessee.

Carlton R. Moore.—Deformed antlers of *Cervus virginianus.*

W. Moss.—Specimens of *Scarabœus tityus* from near Washington.

Dr. J. S. Newberry.—Minerals, fossil fishes, and reptiles from Ohio, skull of beaver from Lake Superior, skins of cinnamon bear, black bear, and young grizzlis from Oregon.

Dr. Newcomb.—100 species and 40 varieties of *Achatinella* from the Sandwich Islands.

Judge C. Newton.—*Arvicola* and *Hesperomys* in alcohol from Ohio.

New Orleans Academy of Natural Sciences.—One keg of serpents, and skins of squirrels from New Orleans.

Dr. Nichols.—Racoon from California.

John E. Nitchie.—Box minerals (*Lead ores*) from Shelburne, New Hampshire.

Lieutenant Nugen, U. S. A.—Skins of mountain goat from Cascade mountains, Oregon.

B. F. Odell.—Box with skins of mammals, lynx, rabbit, &c., from Iowa.

Captain Page, U. S. N.—Skin of ant-eater and goat, tank of alcoholic specimens, 4 bales plants from Paraguay, box birds, keg containing skin of Jaguar, *Myopotamus*, and armadillo from the Salado river, Paraguay.

Edward Palmer.—Reptiles, fishes and insects from Paraguay.

J. T. K. Plant.—Shells and miscellanea from Washington.

Professor Poey.—*Solenodon paradoxa.* Skull of *Capromys, Emys decussata*, and *rugosa*, from Cuba.

Captain Pope, U. S. A.—14 boxes of collections in all departments of natural history from the Llano Estacado, of Texas.

J. P. Postell.—Skins and skulls, mammals, shells, from Georgia.

J. W. Raymond.—Living plant, *Espirito santo*, from Panama. Large grasshopper from Aspinwall.

Peter Reid.—Portions of three specimens, *Tamias striatus*, from New York.

J. L. Reynolds.—*Menobranchus*, from Portage Lake.

Dr. J. L. Riddel.—Skin of *Sciurus magnicaudatus* from Missouri.

Captain Rodgers, U. S. N.—20 boxes, 9 kegs, one bale natural history collections from the Pacific coast.

Alexander P. Ross.—Slab sandstone from Pictou, Nova Scotia.

Joseph Rowell.—Box of shells, sloth and reptiles in alcohol, from Panama.

E. Samuels.—Birds, mammals, skeletons, plants, reptiles, and fishes, from Petaluma, California.

Mr. Savery.—Specimens of birds and mammals from Florida. (Deposited in part.)

Dr. B. F. Shumard.—*Salamandra glutinosa* from Missouri.

Dr. J. M. Skues.—Skin *Lepus glacialis* from Newfoundland.

J. W. Smith —Crustacea, and young rabbits from Florida.

W. A. Smith.—Two Iguanas from Nicaragua.

William Spence.—Large slab with coal fossils from Coalport, Ohio.

Dr. H. H. Stabb.—Two polar hares, 4 ptarmigans, 1 pine grosbeak, in flesh, from Newfoundland.

J. Stauffer.—Bottle of reptiles from Lancaster county, Pennsylvania.

Dr. C. W. Stevens.—Skull of grizzly bear from upper Missouri. (Deposited.)

Captain Stone.—Shells from near Santa Barbara, California.

Dr. Swift, U. S. A.—Dried plants, reptiles, insects, skins of birds, five mammals, sediments of rivers, from Fort Chadbourne, Texas.

Dr. George Suckley, U. S. A.—2 boxes mammals, birds, reptiles, fishes, and insects from Steilacoom; box of shells, skins, birds, mammals, from Panama and San Francisco.

A. S. Taylor.—Specimens of sediments, insects, reptiles, and fishes, gophers and minerals from Monterey, California.

Miss Helen Teunison.—Reptiles, fishes, and mammals, from Monticello, Mississippi.

J. F. Thickstun.—(For the institution of Natural History, Meadville, Pennsylvania.) Can mammals and reptiles in alcohol, box minerals, from Meadville, Pennsylvania.

Major G. H. Thomas, and Lieutenant Dubarry, U. S. A.—12 jars mammals and reptiles, one Phyllostome bat from Fort Yuma, California.

Professor Z. Thompson.—Specimens in alcohol of small mammalia from Burlington, Vermont.

Dr. D. Tompkins.—Perforated stones, used by Indian in games. From the banks of the Roanoke river.

Lieutenant W. P. Trowbridge U. S. A.—Skins of birds and mammals, can of fishes, from San Miguel, California; skeleton of sea lion from San Francisco.

N. Trübner.—280 microscopic slides of insects prepared by A. Heeger, Vienna.

Colonel Tuley.—Fresh skin of *Cervus dama*, (Fallow deer,) from Clark county, Virginia.

Dr Thomas T. Turner.—Cretaceous fossils from Nanaimo, gulf of Georgia, Vancouver's island.

Dr. Vollum, U. S. A.—Plants from Fort Belknap, Texas.

Rev. L. Vortisch.—Ancient German antiquities from Saxony.

M. Walker.—Jar reptiles and insects from Nebraska.

H. Mactier Warfield.—100 specimens of birds from Australia, *Ornithorhynchus* and *Petaurus*.

Lieutenant G. K. Warren, U. S. A.—48 boxes, collections in all departments of natural history, from the upper Missouri.

Mr. Watson.—Miscellaneous bones and part of skeleton of horse from Nebraska.

David Welsh.— Jaws of *Myliobatis* and gophers from Florida.

A. White.—Specimens of filterings and sediments for microscopic examination from Cazenova, New York.

John R. Willis.—Box of shells from vicinity of Halifax, Nova Scotia.

Mr. Wilson.—Specimens of vegetable fibre from Jamaica.

Dr. D. D. Wilson through *Dr. J. S. Newberry.*—Coal plants and fossil remains, from Missouri.

Dr. S. N. Wilson.—Skins, mammals, alcoholic specimens, and shells, living terrapins, from Georgia.

W. S. Wood.—See Bryan.

Charles Wright.—Seeds and dried plants, 12 jars reptiles, and insects from Nicaragua.

G. Würdemann.—Shells, eggs, and alcoholic specimens from Florida.

Washington Market.—Sargus ovis from Norfolk. Living *Emys rubriventris*, young sturgeon, fresh white fronted goose, muskrat, *Fuligula collaris*, from Potomac river.

Ed. C. Younger.—Reptiles from Washington.

Unknown.—Box of European birds.

——?.—Fishes from Puget's sound.

——?.—Box water-worn pebbles.

LIST OF METEOROLOGICAL STATIONS AND OBSERVERS

FOR THE YEAR 1856.

NOVA SCOTIA AND CANADA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Hall, Dr. A	Montreal		45 30	73 36	57
Stuart, A. P. S	Wolfville	Horton N. S.	45 06	64 25	95
Smallwood, Dr. Chas	St. Martin	Laval	45 32	73 36	118
Magnetic Observatory	Toronto		43 39	79 21	108

MAINE.

Barrows, Geo. B	Fryeburg	Oxford	44 03	71 00	
Bell, John J	Carmel	Penobscot	44 47	69 00	175
Dana, W. D	Perry	Washington	45 00	67 06	100
Eveleth, Sam'l A	Windham	Cumberland	43 49	70 17	
Gardiner, R. H	Gardiner	Kennebec	44 11	69 46	90
Guptill, G. W	Cornishville	York	43 40	70 44	800
Parker, J. D	Steuben	Washington	44 44	67 58	50
Willis, Henry	Portland	Cumberland	43 39	70 15	87
Wilbur, Benj. F	Monson	Piscataquis			

NEW HAMPSHIRE.

Bell, Sam'l N	Manchester	Hillsborough	42 59	71 28	300
Brown, B. Gould	Stratford	Coos	44 08	71 34	1,000
Hanscam, R. F	North Barnstead	Belknap	43 38	71 27	
Mack, R. C	Londonderry	Rockingham	42 53	71 20	
Odell, Fletcher	Shelbourne	Coos	44 23	71 06	
Prescott, Dr. Wm	Concord	Merrimack	43 12	71 29	374
Purmort, Nath	West Enfield	Grafton	43 30	72 00	
Sawyer, Geo. B	Salmon Falls	Strafford	43 12	71 00	
Sawyer, Henry E	Great Falls	Strafford	43 17	70 52	

VERMONT.

Bliss, Geo	Shelburne	Chittenden	44 23	73 00	150
Bliss, L. W	Bradford	Orange	43 55	72 15	
Buckland, David	Brandon	Rutland	43 45	73 00	
Jackman, A	Norwich	Windsor	43 42	72 20	
Paddock, Jas. A	Craftsbury	Orleans	44 40	72 30	1,100

MASSACHUSETTS.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Allin, Lucius	Springfield	Hampden	42 06	72 35	199
Bacon, William	Richmond	Berkshire	42 23	73 20	1,190
Bond, Prof. W. C	Cambridge	Middlesex	42 22	71 07	
Brooks, John	Princeton	Worcester	42 28	71 53	1,113
Darling, L. A	Bridgewater	Plymouth	42 00	71 00	142
Davis, Rev. E	Westfield	Hampden	42 06	72 48	
Holcomb, Amasa	Southwick	Hampden	42 02	72 10	265
MaGee, Irving Wilson, L	Williamstown	Berkshire	42 43	73 13	720
Metcalf, John Geo	Mendon	Worcester	42 06	72 33	
Mitchell, Hon. Wm	Nantucket	Nantucket	41 16	70 06	30
Perkins, Dr. H C	Newburyport	Essex	42 47	70 52	46
Rice, Henry	North Attleboro'	Bristol	41 59	71 22	175
Rodman, Sam'l	New Bedford	Bristol	41 39	70 56	90
Rice, Frank H. Smith, Edw. A Sargent, John S	Worcester	Worcester	42 16	71 48	536
Snell, Prof. E. S	Amherst	Hampshire	42 22	72 34	267
Schlegel, Albert	Taunton	Bristol	41 49	71 09	
Tirrell, Dr. N. Quincy	Weymouth	Norfolk	43 00	71 00	150

RHODE ISLAND.

Arnold, E. G	Acquidueset	Washington			
Caswell, Prof. A	Providence	Providence	41 49	71 25	120

CONNECTICUT.

Edwards, Rev. T	New London	New London	41 21	72 12	90
Harrison, Benj. F	Wallingford	New Haven	41 26	72 50	133
Hull, Aaron B	Georgetown	Fairfield	41 15	73 00	300
Hunt, D	Pomfret	Windham	41 52	72 23	596
Rankin, Jas	Saybrook	Middlesex	41 18	72 20	10
Scholfield, N	Norwich	New London	41 32	72 03	
Yeomans, W. H	Columbia	Tolland	42 20	72 46	

NEW YORK.

Aubin, John	Fordham	Westchester	40 54		147
Alba, Dr. E. M	Angelica	Alleghany	42 15	78 01	1,500
Arden, Thos. B	Beverly	Putnam	41 22	72 12	180
Bowman, John	Baldwinsville	Onondaga	43 04	76 41	
Breed, J. Everett	Smithville	Jefferson	44 00	76 01	
Byram, E. N	Sag Harbor	Suffolk	41 00	72 20	40
Chickering, J. W	Ovid	Seneca	42 41	76 52	
Dayton, E. A	Madrid	St. Lawrence	44 43	75 33	280
Denning, W. H	Fishkill Landing.	Dutchess	41 34	74 18	42
Dewey, Prof. Chester	Rochester	Monroe	43 08	77 51	516

NEW YORK—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Felt, John	Liberty	Sullivan	41 45	74 45	1,474
French, John R	Mexico	Oswego	43 27	76 14	423
Gorton, J. S	Westfarms	Westchester	40 53		150
Greene, Prof. Dascom	Troy	Rensselaer	42 44		
Guest, W. E	Ogdensburgh	St. Lawrence	44 43	75 26	
House, J. Carroll	Lowville	Lewis	43 46	75 38	
Johnson, E W	Canton	St. Lawrence	44 38	75 15	304
Kendall, John F	Pompey Hill	Onondaga			1,737
Lefferts, John	Lodi	Seneca	42 37	76 53	
Lobdell, Mrs. M. J	North Salem	Westchester	41 20	73 38	361
Malcolm, Wm. S	Oswego	Oswego	43 28	77 34	232
Morehouse, A. W	Spencertown	Columbia	42 19	73 41	800
Morris, Prof. O. W	New York	New York	40 43	74 05	159
Norton, J. H	Plainville	Onondaga	43 00		
Pernot, Claudius	Fordham	Westchester	40 54		147
Pratt, W. C	Rochester	Monroe	43 08	77 51	516
Reed, Edward C	Homer	Courtland	42 38	76 11	1,100
Reid, Peter	Lake P. O	Washington	43 15	73 33	
Riker, Walter H	Saratoga	Saratoga	42 00	74 00	960
Root, Prof. O	Clinton	Oneida	43 00	75 20	500
Sanger, Dr. W. W	Blackwells Island		40 45	73 57	29
Sartwell, Dr. H. P	Penn Yan	Yates	42 42		740
Spooner, Stillman	Wampsville	Madison	43 04	75 50	500
Smith, J. Metcalf	McGrawville	Courtland	42 34		
Taylor, Jos. W	Plattsburgh	Clinton	44 40		156
Tourtellot, Dr. L. A	Utica	Oneida	43 07	75 15	500
Van Kleek, Rev. R. D	Flatbush	Kings	40 37	74 01	54
White, Aaron	Cazenovia	Madison	42 55	75 46	1,260
Williams, Dr. P. O	Watertown	Jefferson	43 56	75 55	
Wilson, Rev. W. D	Geneva	Ontario	42 53	77 02	567
Woodward, Lewis	West Concord	Erie	43 00	79 00	2,000
Yale, Walter D	Houseville	Lewis	43 40	75 32	

NEW JERSEY.

Cooke, R. L	Bloomfield	Essex	40 49	74 11	120
Dodd, C. M	Salem	Salem	39 34	75 27	
Frost, Adolph Schmidt, Dr. E. R	Burlington	Burlington	40 00	75 12	26
Whitehead, W. A	Newark	Essex	40 45	74 10	30

PENNSYLVANIA.

Brown, Samuel	Bedford	Bedford	40 01	78 30	
Baird, John H	Tarentum	Alleghany	40 37		950
Brickenstein, H. A	Nazareth	Northampton	40 43	75 21	
Brugger, Samuel	Fleming	Centre	40 55	77 53	780
Chorpenning, Dr. F	Somerset	Somerset	40 02	79 02	1,997
Darlington, Fenelon	Pocopson	Chester	39 54	75 37	218
Edwards, Joseph	Chromedale	Delaware	39 55	75 25	196
Eggert, John	Berwick	Columbia	41 05	76 15	
Friel, P	Shamokin	Northumberland	40 45		700
Hance, Ebenezer	Morrisville	Bucks	40 12	74 53	30
Heisely, Dr. John	Harrisburg	Dauphin	40 16	76 50	

PENNSYLVANIA—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Hobbs, O. T.	Randolph	Crawford	41 28	80 10	1,720
Jacobs, Rev. M.	Gettysburg	Adams	39 51	77 15	
James, Charles S.	Lewisburg	Union	40 58	76 58	
Kirkpatrick, Prof. J. A.	Philadelphia	Philadelphia	39 57	75 11	60
Kohler, Edward	North Whitehall	Lehigh	40 40		250
Ralston, Rev. J. Grier	Norristown	Montgomery	40 08	75 19	153
Schreiner, Francis	Moss Grove	Crawford	41 40	79 51	
Scriba, Victor	Troy Hill	Alleghany			
Smith, Prof. Wm.	Canonsburg	Washington	40 25	80 07	
Swift, Dr. Paul	West Haverford	Delaware	40 00	75 21	
Thickstun, J. F.	Meadville	Crawford	41 39	80 11	1,088
Wilson, Prof. W. C.	Carlisle	Cumberland	40 12	77 11	500
Wilson, W. W.	Pittsburgh	Alleghany	40 32	80 02	1,026

DELAWARE.

Crawford, W. A. Craven, Thos. J. Martin, R. A.	Newark	New Castle	39 38	75 47	120

MARYLAND.

Baer, Miss H. M.	Shellman Hills	Carroll	39 23	76 57	700
Goodman, W. R.	Annapolis	Anne Arundel	38 58	76 29	
Hanshaw, Henry E.	Frederick	Frederick	39 24	77 18	
Lowndes, B. O.	Bladensburg	Prince George	38 57	76 58	
Pearce, James A., jr.	Chestertown	Kent	39 14	76 02	
Stagg, T. G.	Ridge	St. Mary's			
Zumbrock, A., M. D.	Annapolis	Anne Arundel	38 58	76 29	34

VIRGINIA.

Astrop, Lieut. R. F.	Crichton's Store	Brunswick	36 40	77 46	
Beckwith, T. S., M. D.	Garysville	Prince George			
Clarke, James T.	Mount Solon	Augusta			
Couch, Samuel	Ashland	Putnam	38 38	81 57	
Ellis, D. H.	Crack Whip	Hardy	39 30		
Fauntleroy, H. H.	Montrose	Westmoreland	38 07	76 54	200
Hallowell, Benjamin	Alexandria	Alexandria	38 48	77 01	56
Hoff, Josiah W.	Wirt C. H.	Wirt	35 05		
Hotchkiss, Jed	Mossy Creek	Augusta	39 35	78 30	
Kendall, James E.	Charleston	Jefferson	38 20	81 21	
Kownslar, Miss Ellen	Berryville	Clark	39 09	78 00	575
Marvin, John W.	Winchester	Frederick	39 15	78 10	
Patton, Thomas, M. D.	Lewisburg	Greenbrier	38 00	80 00	2,000
Purdie, John R.	Smithfield	Isle of Wight	36 50	76 41	100
Quincy, W. C.	West Union	Doddridge	39 15	81 00	1,100
Ruffin, Julian C.	Ruthven	Prince George	37 21	77 33	
Ruffner, David L.	Kanawha	Kanawha	37 53		
Skeen, William	Huntersville	Pocahontas	39 30		2,640
Webster, Prof. N. B.	Portsmouth	Norfolk	36 50	76 19	34

NORTH CAROLINA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
McDowell, Rev. A.	Murfreesboro'	Hertford	36 30		
Moore, Geo. F., M. D.	Gaston	Northampton			
Morelle, Daniel	Goldsboro'	Wayne			
Phillips, Prof. James	Chapel Hill	Orange	35 54	79 17	

SOUTH CAROLINA.

Fuller, E N., M. D	Edisto Island	Colleton	32 34	80 18	23
Glennie, Rev. Alex'r	Waccaman	All Saints	33 40	79 17	20
Johnson, Joseph, M.D.	Charleston	Charleston	32 46	80 00	30
Ravenel, H. W	Aiken	Barnwell	33 32	81 34	565
White, Prof. J. B	Columbia	Richland	33 57	81 07	
Young, J. A., M. D	Camden	Kershaw	34 17	80 33	275

GEORGIA.

Anderson, Jas., M. D	The Rock	Upson	32 52	84 23	833
Gibson, R. P	Whitemarsh Is'd.	Savannah	32 04	81 05	
Haines, William	Augusta	Richmond	33 28	81 54	
Pendleton, E. M., M.D.	Sparta	Hancock	33 17	83 09	550
Posey, John F.	Savannah	Chatham	32 05	81 07	42

FLORIDA.

Bailey, James B	Garrisville	Alachua	29 35	82 26	
Baldwin, A. G., M. D	Jacksonville	Duval	30 30	82 00	13
Dennis, W. C	Salt Ponds	Key West	24 33	81 48	
Fry, Lieut. Joseph	Pensacola	Escambia	30 20	87 16	12
Mauran, P. B., M. D	St. Augustine	St. John's	29 48	81 35	8
Steele, Aug	Cedar Keys	Levy	29 07	83 02	12

ALABAMA.

Alison, H. L., M D	Carlowville	Dallas	32 10	87 15	300
Darby, Prof. John	Auburn	Macon	33 37	88 03	821
Tutwiler, H.	Greene Springs	Greene	32 50	87 46	
Waller, Robert B	Greensboro'	Greene	32 30	87 10	350

MISSISSIPPI.

Elliott, Prof. J. Boyd	Port Gibson	Claiborne	31 50	91 00	500
Harper, Dr. L	Oxford	Lafayette	34 20	89 25	338
Lull, James S	Columbus	Lowndes	33 30	88 29	227
Smith, J. Edwards	Natchez	Adams	31 34	91 24	

LOUISIANA.

Name of observer.	Station.	County.	N. lat.	W. long	Height.
			° ′	° ′	*Feet.*
Barton, E. H., M. D	New Orleans	Orleans	29 57	90 00	
Kilpatrick, A. R., M.D.	Trinity.	Catahoula	31 30	91 46	108
Merrill, Edward, M. D.	Trinity.	Catahoula			
Taylor, Lewes, B.	New Orleans	Orleans.	29 57	90 00	

TEXAS.

Brightman, John C	Helena	Karnes			
Forke, J. L.	New Wied	Comal.	29 42	98 15	
Jennings, S. K., M. D	Austin	Travis.	30 20	97 46	
Rucker, B. H	Washington.	Washington			

TENNESSEE.

Bean, Jas. B.	Walnut Grove	Greene	36 00	82 53	1,350
Griswold, Prof. T. L	Knoxville	Knox	35 59	83 50	1,000
Stewart, William M.	Glenwood	Montgomery	36 28	87 13	481

KENTUCKY.

Beatty, O.	Danville	Boyle	37 40	84 30	950
Ray, L G., M. D.	Paris	Bourbon	38 16	84 07	
Savage, Geo. S., M. D.	Millersburg	Bourbon	38 40	84 27	804
Swain, John, M. D.	Ballardsville	Oldham	38 26	85 30	

OHIO.

Bennett, Henry	Collingwood	Lucas			
Binkerd, J. S.	Germantown	Montgomery	39 39	84 11	
Bosworth, R. S.	College Hill.	Hamilton	39 19	84 25	800
Cunningham, Miss A.	Unionville	Lake	41 52	81 00	650
Dayton, L. M.	Zanesville	Muskingum	39 58	82 19	
Fairchild, J. H.	Oberlin.	Loraine	41 20	82 15	800
Fischer, Jas. C., M. D.	Dayton.	Montgomery	39 44	89 11	
Groneweg, Lewis	Germantown.	Montgomery	39 30	84 11	720
Hannaford, Ebenezer	Cheviot	Hamilton	39 07	84 34	
Harper, George W.	Cincinnati	Hamilton	39 06	84 27	150
Herrick, James D.	Jefferson	Ashtabula	42 00	81 00	
Hillier, Spencer L.	Hiram	Portage	41 20	81 15	675
Hollenbeck, F. & D. K.	Perrysburg	Wood	41 39	83 40	
Holston, J. G. F., M. D.	Zanesville	Muskingum	39 58	82 29	700
Hyde, G. A.	Cleveland	Cuyahoga	41 30	81 40	665
Ingram, John, M. D	Savannah.	Ashland	41 12	82 31	
Livezay, G. W.	Gallipolis	Gallia	39 00	82 01	520
Luther, S. M.	Hiram	Portage	41 20	81 15	675
Mathews, J. McD.	Hillsboro'	Highland	39 13	83 30	1,000

OHIO—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
McCarty, H. D.	West Bedford	Coshocton	40 18	82 01	
Poe, James H.	Portsmouth.	Scioto	38 50	82 49	468
Sanford, Prof. S. N.	Granville.	Licking	40 03	82 34	995
Schenck, W. L., M. D.	Franklin	Warren			
Shaw, Joseph	Bellefontaine	Logan	40 21	83 40	
Williams, Prof. M. G.	Urbana	Champaign	40 06	83 43	1,015

MICHIGAN.

Andrews, Seth L. & G. P.	Romeo	Macomb	42 44	83 00	730
Campbell, Wm. M.	Battle Creek	Calhoun	42 20	85 10	
Currier, A. O.	Grand Rapids	Kent	43 00	86 00	752
Duffield, Rev. Geo.	Detroit.	Wayne	42 24	82 58	620
Goff, Mrs. M. A.	Eagle River	Houghton			
Strang, James J.	St. James.	Beaver Island	45 44	85 27	598
Streng, L. H.	Saugatuck	Alleghan	40 30	85 50	
Walker, Mrs. O. C.	Cooper	Kalamazoo	42 40	85 31	
Whelpley, Miss H.	Monroe	Monroe	41 56	83 22	590
Whittlesey, Chas. S.	Copper Falls		47 25	88 16	1,230
Winchell, Prof. A.	Ann Arbor	Washtenaw	42 16	83 44	891
Woodruff, Lum.	Ann Arbor	Washtenaw	42 16	83 30	850

INDIANA.

Barnes, C.	New Albany	Floyd			
Chappellsmith, John.	New Harmony	Posey	38 08	87 50	320
Moore, Joseph	Richmond	Wayne	39 47	84 47	800
Smith, Hamilton	Cannelton	Perry			

ILLINOIS.

Babcock, E.	Riley	McHenry	42 08	88 33	650
Brendel, Fred., M. D.	Peoria	Peoria			
Eldredge, William V.	Brighton	Macoupin			
Grant, John	Manchester	Scott	39 33	90 34	683
Hall, Joel	Athens	Menard	39 52	89 56	
Harris, J. O., M. D.	Ottawa	La Salle	41 20	88 47	500
Hiscox, G. D.	Chicago	Cook	41 53	87 41	600
James, John, M. D.	Upper Alton	Madison	39 00	89 36	
Mead, S. B., M. D.	Augusta	Hancock	40 12	89 45	200
Rogers, O. P.	Marengo	McHenry	42 14	88 38	
Titze, Henry A.	West Salem	Edwards	38 30	88 00	
Whitaker, Benjamin	Warsaw	Hancock			

MISSOURI.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Chandler, Chas. Q., M. D.	Rockport	Boone	38 55	92 38	
Duffield, Edw., M. D.	Hannibal	Marion	39 45	91 00	
Engelmann, Geo., M. D.	St. Louis	St. Louis	38 37	90 16	481
Wislizenus, A., M. D.	St. Louis	"			461

IOWA.

Beal, Dexter	Fairbanks	Buchanan	42 45	87 16	
Bidwell, E. C., M. D.	Quasqueton	Buchanan	42 23	91 43	890
Connel, Townsend M.	Pleasant Plain.	Jefferson			
Fairall, Hermann H.	Iowa City	Johnson			
Fory, John C.	Bellevue	Jackson			
Goss, Geo. C. & Wm. K.	Border Plains	Webster			
McCready, Daniel	Fort Madison	Lee	40 37	91 28	
Parker, Nathan H.	Clinton	Clinton			
Parvin, T. S.	Muscatine	Muscatine	41 26	91 05	586
Scheeper, E. H. A.	Pella	Marion	41 30	72 55	730
Shaffer, J. M.	Fairfield	Jefferson			

WISCONSIN.

Bean, Prof. S. A.	Waukesha	Waukesha			
Breed, J. Everett	New London	Waupacca			
Durham, W. J.	Racine	Racine	42 49	87 40	
Himoe, John E.	Norway	Racine	42 50	88 10	
Loring, C. jr. / Washington, L. & R.	Superior	Douglas	46 38	92 03	658
Mason, Prof. R. Z.	Appleton	Outagamie	44 10	88 35	800
Park, Rev. Roswell	Racine	Racine	42 49	87 40	
Pickard, J. L., M. D.	Platteville	Grant	42 45	90 00	
Pomeroy, F. C.	Milwaukie	Milwaukie	43 04	87 59	658
Porter, Prof. Wm.	Beloit	Rock	42 30	89 04	750
Seibert, Samuel R.	Cascade Valley	Buffalo	44 30	92 00	
Schue, A., M. D.	Madison	Dane	43 05	89 25	892
Sterling, Prof. J. W.	Madison	Dane	43 05	89 25	892
Winkler, C., M. D.	Milwaukie	Milwaukie	43 04	87 57	593
Willard, J. F.	Janesville	Rock	42 42	89 91	768

CALIFORNIA.

Ayres, W. O., M. D.	San Francisco	San Francisco	37 48	122 23	115
Logan, Thos. M., M. D.	Sacramento	Sacramento	38 35	121 40	49
Reid, R. K., M. D.	Stockton	San Joaquin			

MINNESOTA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Brooks, Rev. Jabez	Red Wing	Goodhue	44 34	92 30	
Garrison, O. E	Princeton	Benton	45 50		
Odell, Rev. B. F	Cass Lake Mission				
Riggs, S. R	Hazlewood				

HUDSON'S BAY TERRITORY.

Gunn, Donald	Red River Settlement.		50 06	97 00	853

MEXICO.

Ervendberg, Prof. L. C.	Mexico		19 30	99 00	7,665

VENEZUELA.

Fendler, Aug	Tovar	Aragua Province	10 26	67 20	6,500

SURINAM.

Hering, C. T	Catharina Sophia				

SANDWICH ISLANDS.

Hillebrand, Wm., M.D.	Honolulu		21 19	157 52	

JAMAICA.

Sawkins, James G	Up Park Camp				

TRINIDAD.

Geological Surveyors	Port of Spain		10 39	61 34	16

PERSIA.

Rev. Mr. Stoddard	Oroomiah				

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee submit the following report of the state of the finances of the Smithsonian Institution, the expenditures during the year 1856, and an estimate of receipts and appropriations for 1857.

The whole sum appropriated for the current expenses of the Institution for the year 1856, including the remaining payment on the building, was thirty-nine thousand dollars. The actual expenditures for the several items do not materially differ from those specified in the estimate submitted by the committee and adopted by the Board. The whole sum expended was $38,158 90, which is less than the amount appropriated by $841 10.

A committee was appointed February 24, 1855, consisting of Messrs. English, Pearce, and Mason, to consider the best means of investing the extra fund, Mr. Corcoran having signified his intention to relinquish the charge of the money deposited with him. After due consultation, the committee concluded to recommend the purchase of State stocks. This being agreed to by the Board, at a subsequent meeting the Secretary was instructed to make the purchase under the direction of the Finance Committee. An account of the transaction under this resolution is given in the report of the Hon. Mr. English of that committee.

It will be recollected that the extra fund amounted to one hundred and twenty-five thousand dollars, and from the report of Mr. English it will be seen that of this sum one hundred and nineteen thousand four hundred dollars have been expended in the purchase of State stocks; that six hundred dollars remain in the hands of Messrs. Riggs & Co.; and that five thousand dollars of that fund, applied in 1855 to the payments on the building, is now in the treasury. There is, therefore, five thousand six hundred dollars of the extra fund uninvested. It is, however, not advisable to invest this immediately, because the half-yearly income of the Institution is not receivable until the first of July, and it is necessary to retain a sufficient sum in the treasury to meet the payments for paper, printing, &c., for the next volume of Contributions, which cannot be postponed.

The following is a general statement of the fund:

The whole amount of the Smithsonian bequest deposited in the treasury of the United States (from which an annual income, at 6 per cent., of $30,910 14 is derived) is		$515,169 00
Extra fund from unexpended income, now invested in State stocks, yielding an annual interest of $7,380	$119,400 00	
Extra fund deposited with Riggs & Co., to be invested	600 00	

REPORT OF THE SECRETARY FOR 1857.

To the Board of Regents:

GENTLEMEN: It again becomes my duty to present to you the history of the operations of another year of the Institution which the government of the United States has entrusted to your care. In an establishment of this kind, of which the policy has been settled and is strictly adhered to, there must of necessity be much sameness in the general form and character of the successive reports; but since the field of science is boundless, and new portions of it are continually presented for investigation, there will always be found in the details, facts of sufficient interest to relieve the routine of the statements relative to the condition of the funds and the scrutiny of the receipts and expenditures.

It might at first sight appear surprising that so constant a supply of materials for the Smithsonian Contributions and so many objects of interest, demanding the assistance of the Smithsonian fund, should be presented, but it will be evident, on reflection, that this results from the influence of the Institution itself in increasing the number of laborers in the field of science, as well as in accumulating the materials on which they are to be engaged. The tendency is constantly to expand the operations, and much caution and self-control are necessary to repress the desire to be more liberal in the assistance rendered to worthy objects, than the income will permit. Indeed, a charge is frequently made of illiberality for what is the result of restricted means. It must be evident that nothing is more important to the permanency and proper conduct of the Institution than the cautious and judicious management of its funds. Any embarrassment in this quarter would involve a loss of confidence in the directors, which would be fatal to the usefulness and efficiency of the establishment.

I have from the first expressed the regret that the original law of Congress directed the expenditure of so large a portion of the income on objects of a local character, and this feeling has been increased by the experience which time has afforded in regard to the good which could be effected by a more critical observance of the terms of the

bequest, as well as by the increasing expense of sustaining a large building, a library, and museum. It is to be hoped, however, that at least a partial relief will hereafter be afforded by an annual appropriation, which it is reasonable to expect government will make for the keeping and exhibition of the collections of the various exploring expeditions which have been entrusted to the care of the Regents.

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 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.

It was stated in the last report that the extra fund of the Institution, which had been saved from the accrued interest, was invested in State Stocks. This investment was made because the fund was at the time drawing no interest, and because, until action could be procured by Congress in relation to receiving said fund into the United States Treasury, it was deemed the safest disposition of the money. Though a temporary depreciation of these stocks took place during the last year, there is no reason to regret the investment. Their marketable value is at present about the same as it was at the time they were purchased.

By reference to the report of the Executive Committee it will be seen that the expenditures during the year, though less than the amount of receipts, have somewhat exceeded the estimates. This has been occasioned, first, by unexpected repairs which were found necessary to the building, in consequence of an unprecedented hail storm, which destroyed several thousand panes of glass and did considerable injury to the roof and other parts of the edifice; secondly, by an expansion of the system of foreign exchanges, rendered necessary by the large amount of material entrusted to the Institution by the

different agricultural and other societies of the country; and thirdly, the necessity we were under, on account of the financial pressure, of paying bills for publications which will appear during the present and the next year. The funds of the Institution are, however, still in a prosperous condition, but great care is required to prevent the accumulation of small expenses, which, individually, by reason of their insignificance, are allowed to occur, but which in the aggregate, at the end of the year, are found to have swelled into amounts of considerable magnitude.

Publications.—The ninth annual quarto volume of Contributions to Knowledge was completed and distributed during the first half of the year. It is equal in size and importance to the preceding volumes, and contains the following memoirs:

1. On the relative intensity of the heat and light of the sun upon different latitudes of the earth. By L. W. Meech.

2. Illustrations of surface geology, by Edward Hitchcock, LL.D., of Amherst College.

Part 1. On surface geology, especially that of the Connecticut valley, in New England.

Part 2. On the erosions of the earth's surface, especially by rivers.

Part 3. Traces of ancient glaciers in Massachusetts and Vermont.

3. Observations on Mexican history and archæology, with a special notice of Zapotec remains, as delineated in Mr. J. G. Sawkins' drawings of Mitla, &c. By Brantz Mayer.

4. Researches on the Ammonia Cobalt bases. By Professor Wolcott Gibbs and Professor F. A. Genth.

5. New tables for determining the values of the co-efficients in the perturbative functions of planetary motion, which depend upon the ratio of the mean distances. By J. D. Runkle.

6. Asteroid supplement to new tables for determining the values of $b\frac{(i)}{s}$ and its derivatives. By J. D. Runkle.

It was stated in the last report that Mr. L. W. Meech proposed to continue his interesting investigations relative to the heat and light of the sun, provided the Smithsonian Institution would pay the expense of the arithmetical computations. Though most of his time is necessarily occupied in other duties, he would cheerfully devote his leisure hours to the investigation with a view of extending the bounds

of knowledge. During the past year an appropriation has been made of one hundred dollars for the purpose here mentioned, and we are assured, from what Mr. Meech has already accomplished, that this sum will be instrumental in producing valuable results. He proposes to determine, from several elementary formulas, the laws of terrestrial temperature for different latitudes. The first formula has been pretty thoroughly applied, and the annual temperature computed by it compared with the result of actual observation. The diurnal temperatures have also been deduced and seem to agree with actual observation within the presumed errors of the latter. The temperature, however, of the surrounding medium, derived from the *annual* temperature, differs widely from the results obtained by the *diurnal* temperatures. The author is inclined to attribute this difference to a defect in the law of radiation as generally received, which, deduced from experiments in the laboratory, he thinks inapplicable to the phenomena of terrestrial temperature. The second formula takes into account another cause of the variation of temperature, namely, the cooling due to the contact of the air; and the third formula includes also the effect of the absorption of solar heat in its passage through the atmosphere. The investigation will include the consideration of—1st, terrestrial radiation; 2d, contact of air; 3d, the sun's intensity; 4th, atmospheric absorption; 5th, the difference in radiating power of luminous heat by day and non-luminous heat by night. Among other inferences to be deduced is the relative heating or radiating powers of sea and continent, when the land is covered with foliage and vegetation, and when it is covered with ice and snow. These researches are intimately connected with the extended series of observations on the climate of the United States, now carried on at the expense and under the direction of the Institution.

The paper of Professor Gibbs and Dr. Genth, which forms a part of the 9th volume, has been republished in the American Journal of Science and in the London Chemical Gazette, due credit being given to the Smithsonian Contributions, from which it was copied. We regret to be informed by the authors of this interesting paper that the sum appropriated by the Institution for assisting in defraying the expense of the materials and apparatus employed in their researches was scarcely sufficient to compensate for more than one-fourth of their outlay. Limited means, and not a want of proper appreciation of the labors of these gentlemen, prevented their entire reimbursement for the pecuniary loss in the prosecution of their valuable researches. They intend, notwithstanding this, to continue their investigations,

and to devote as much time to them as their other engagements and the means at their disposal will allow. Since this memoir has met the approval of the scientific world, it will be proper to make as liberal an appropriation as the demands on the limited income of the Institution will permit for the continuance of researches in the same line. The publication of the paper was of comparatively little expense, since it required no costly illustrations, and this may be an additional reason for granting a larger appropriation for further investigations in the same line.

The ninth volume also contains the supplement to the tables by J. D. Runkle, mentioned in the last report. The tables in this supplement are intended to facilitate calculations with reference to the asteroids. The search for these bodies has been prosecuted with so much vigor of late that their list now extends to more than fifty, and the mechanical labor required to calculate their places is so great that this can scarcely be expected to be accomplished, except by the use of general tables. The work of Gauss on the theory of the motion of the heavenly bodies leaves little to be desired, so far as the determination of their orbits is concerned; but this is by no means the case with regard to their perturbations by the larger planets. The tables therefore will afford an important means of facilitating the advance of our knowledge, particularly of this class of the members of our solar system.

The third part of the Nereis Boreali-Americana, by Dr. William H. Harvey, has been completed and will be included in the tenth volume of the Contributions. Two hundred extra copies of the text of the preceding parts having been struck off before the distribution of the types, and the drawings on the lithographic stones having been preserved, an equal number of plates from the latter have been printed and colored, so that we shall be enabled to make up two hundred copies of the complete work to be offered for sale, which will serve, it is hoped, to reimburse, in some degree, the heavy expense incurred in the publication of this interesting addition to the science of botany. It may be proper to mention that the work was published in numbers, in order that the whole expense should be defrayed by the appropriation of different years, as well as to furnish the author the opportunity of rendering the work more complete by more extended research.

For the purpose of classification, the sea plants have been grouped

under three principal heads which are readily distinguished by their general color.

They are as follows:

1. Melanospermeæ—plants of an olive-green or olive-brown color.
2. Rhodospermeæ, or plants of a rosy-red or purple color.
3. Chlorospermeæ, or plants of a grass, rarely of a livid purple color.

The numbers of the work already published relate to the first two divisions, and the third, now about to be issued, will contain the last, with an appendix describing new species discovered since the date of the former parts.

The text of the first part of the work on Oology, mentioned in preceding reports, has been printed; but the publication of the plates to accompany it will be so expensive that we were obliged to defer it until the present year. In the meantime the author will proceed with the preparation of the other parts of the memoir, and the whole will be completed as soon as the funds of the Institution will permit. From an accidental oversight in the preparation of the last Report, I neglected to mention the fact that the author of this interesting work is Dr. Thomas M. Brewer, of Boston. The omission of his name in the reports would not only be unjust to himself, but might also prevent him from receiving in some cases additional information relative to his labors from correspondents who are engaged in the same line of research. The announcement of the fact of the intended publication of this memoir has induced a number of persons to enter into correspondence with the Institution on the subject, and we doubt not that these remarks will tend to call forth other additions to our knowledge of this branch of natural history.

Since the date of the last Report a grammar and dictionary of the Yoruba language of Africa have been accepted for publication. Thi work is another contribution from the missionary enterprise of the present day, and has been prepared by the Rev. Thos. J. Bowen, of the Southern Baptist Missionary Board, from materials collected during a residence of six years in Africa, and revised and rewritten with the aid of W. W. Turner, esq., of Washington. The grammar and dictionary are prefaced by a brief account of the country and its inhabitants. The long residence of the author in this part of the interior of Africa has enabled him to gather more minute knowledge of its topography, climate, and productions, and of the political, social, and moral relations of its inhabitants than has before been obtained. He

has collected interesting information as to the habits of thought and action of the people, and their capacity for moral and intellectual culture, which would have escaped the casual notice of the mere traveller.

Yoruba is a country of Western Africa, situated to the east of Dahomey, and extending from the Bight of Benin, in a northerly direction, nearly to the Niger. It is between the countries explored by the distinguished travellers, Barth, on the north, and Livingstone, on the south. The author describes it as a beautiful and fertile region, densely inhabited by a population devoted to agricultural pursuits, who do not dwell on the lands they cultivate, but live clustered together in villages and towns, some of which contain from 20,000 to 70,000 inhabitants. The people are generally of a primitive, simple and harmless character, and governed by institutions patriarchal rather than despotic. In their appearance they resemble the Caucasian race, while their mental powers and general moral impulses are considerably advanced in the scale of intelligence. They have, indeed, already attained no inconsiderable degree of social organization, while they have escaped some of the more depraved incidents of an advanced civilization.

The language, which is said to be spoken by about two millions of people, is represented by Professor Turner to be very homogeneous in its structure, almost all of it being derived from some five hundred primitive words. "Its articulations are sufficiently easy to imitate, and there is a system of vocalic concords recurring through the whole, which, together with the multiplicity of vowels, renders it decidedly euphonious. The great difficulty is found in the tones and accents, which can be discriminated only by a good ear, and must be uttered correctly to make the speaker intelligible. The Yoruba has neither article nor adjective, properly so called, and it is almost wholly destitute of inflection. The verbal root remains unchanged through all the accidents of person, mood, and tense, which are indicated by separate pronouns and particles. The plurality of nouns is also indicated by the aid of a plural pronoun. The numerals are based on the decimal system, yet many of them are formed by subtraction instead of addition or multiplication, as with us. Thus 15 is literally $10 + 5$; but $16 = 20 - 4$, $17 = 20 - 3$, &c. Although this language is spoken by a rude people, it abounds in abstract terms, and the missionary finds no difficulty in expressing in it the ideas he desires to communicate."

It is believed that this work will be received by the student of ethnology as an interesting addition to this science, and that its publication will not only facilitate the labors of the missionary, but be productive of valuable commercial results. The country in which the language is spoken is rich in natural and artificial productions, and as the inhabitants are anxious to establish relations of trade with other parts of the world, it would seem to offer a new and tempting field to mercantile enterprise.

Under the head of publications, we may allude to the Appendix to the Annual Report of the Regents. Previous to 1853 this report was in a pamphlet form, and only in one or two cases were a few extra copies ordered. Since that date an annual volume has been presented to Congress, of which twenty thousand extra copies have been printed. The liberal distribution of this work has met with general approbation, the applications to the Institution for copies have been constantly increasing, and, in connexion with the Report of the Patent Office, no document has become more popular or is better calculated to advance the cause of knowledge among the people. The object is, as far as possible, to distribute this volume among teachers, and through them to diffuse precise scientific knowledge to the rising generation. It is made also the vehicle of instruction, in the line of observations, to all who are desirous of co-operating in the investigation of the natural history and physical geography of this country. The wide distribution of this report has tended, more than any other means, to make known the character of the Institution, and to awaken an interest throughout the whole country in its prosperity.

In order to render the series complete, the first volume—that for 1853—contained a reprint of the previous reports of the Secretary, from which a connected history of all the operations of the Institution from the beginning may be obtained. These volumes are illustrated by a large number of wood cuts, which have been provided at the expense of the Smithsonian fund. We have, however, to regret that, from the rapidity with which Congressional documents are hurried through the press, we have not been allowed in all cases revised copies of the proof. We cannot, therefore, be held entirely responsible for inaccuracies of the press any more than for the style of printing or the quality of the paper.

It is a part of the settled policy of the Institution to appropriate its funds, as far as the original law of organization will allow, to such objects only as cannot as well be accomplished by other means; and accordingly, in several instances, the printing of papers previously

accepted for publication has been relinquished because it was subsequently found that the works could be given to the public, under certain conditions, through other agencies. In such cases the favorable opinion expressed by the Institution as to the character of the work, or the assistance rendered by the subscription on the part of the Regents, for a number of copies to be distributed in exchange for other books among our foreign correspondents, has been sufficient to induce some liberal minded parties to undertake the publication, rather as an enterprise connected with the reputation of their establishments, than as a matter of profit.

Among the works of this class is the "Theory of the Motion of the Heavenly Bodies," by the celebrated Gauss, translated by Captain C. H. Davis, U. S. N., late superintendent of the Nautical Almanac, which was originally accepted by us for publication, but was afterwards relinquished to Messrs. Little & Brown, of Boston, who have shown in this instance, as well as in others of a similar character, a liberality which cannot be otherwise than highly appreciated by a discerning public. This book, which is essential to the advance of practical astronomy, was published in Latin, in Hamburg, in 1809, and is now of difficult access, as well as of restricted use, on account of the language in which it appeared. It gives a complete system of formulas and processes for computing the movement of a body revolving in an ellipse, or in any other curve belonging to the class of conic sections, and explains a general method of determining the orbit of a planet or a comet from three observations of the position of the body as seen from the earth. The essay was called for at the time it was produced by the wants of science. The planet Ceres, discovered on the first day of the present century by Piazzi, of Italy, had been lost to astronomers in its passage through the portion of the heavens illuminated by the beams of the sun, and could not be found by the means then known, when Gauss, from a few observations of its former place, calculated its orbit, and furnished an ephemeris by which it was readily rediscovered. The methods employed in this determination were afterwards given in a systematic form in the work now translated. The copies subscribed for by the Institution, on account of exchanges, and those paid for by the Navy Department, for the use of the computers of the Nautical Almanac, were sufficient to secure the publication of the work, which could not have been undertaken without these aids.

In accordance with the same policy the Institution has subscribed for a few copies of a work on "The Pleiocene Fossils of South Caro-

lina,'' by M. Tuomey and F. S. Holmes. This work received the commendation of some of the distinguished members of the American Association for the Advancement of Science, at its meeting in Charleston, in 1850, and its publication was undertaken at the risk and cost of the authors. The actual expense, however, far exceeded their estimate, and without the liberal aid of the legislature of South Carolina they could not have escaped heavy loss, or been enabled to complete the work in a proper style of art. To aid the same enterprise the Institution was induced to make the subscription above mentioned for copies to be distributed to foreign societies. We regret to state that before the work was fully completed the science of the country was called to mourn the loss of Professor Tuomey, of the University of Alabama, who, during the past year, was prematurely snatched away from his family and friends in the flower of his age. His works, however, will remain as an inheritance to the cause of knowledge and the best monument to his memory. We have been gratified to learn that, at the late session of the legislature of South Carolina, a resolution was passed authorizing a continuance of the patronage of the State to the publication of these researches, and consequently Professor Holmes has signified his intention to publish two additional volumes on the Eocene and the Post Pleiocene Fossils, to which the subscription of the Institution will also be extended.

Another work, belonging to the same class, is the series of "Contributions to the Natural History of the United States of America," by Professor Louis Agassiz. It has been mentioned in a previous report that this distinguished *savan* was preparing a series of papers to be presented to the Smithsonian Institution, and that the plates for some of these had been engraved. But the number of these contributions, and the cost of their illustration, would have absorbed a larger portion of the Smithsonian fund than could have properly been devoted to the labors of one individual. Fortunately, however, the reputation and popularity of Professor Agassiz have enabled his friends to procure subscribers for an independent work, containing the result of his valuable investigations, in numbers unprecedented in the annals of science of this or of any other country. In order to assist this enterprise in the beginning, and to relieve its own funds, the Institution subscribed for copies, to be distributed among foreign libraries, in exchange for rare works of a similar character, with which to enrich its own library.

The Institution has also facilitated the researches described in the first two volumes of the work in question, and I may quote the

following sentence containing the acknowledgment of the author for the services which have thus been rendered him: "Above all, I must mention the Smithsonian Institution, whose officers, in the true spirit of its founder, have largely contributed to the advancement of my researches by forwarding to me for examination not only all the specimens of Testudinata collected for the museum of the Institution, but also those brought to Washington by the naturalists of the different parties that have explored the western Territories, or crossed the continent with the view of determining the best route for the Pacific railroad. These specimens have enabled me to determine the geographical distribution of this order of reptiles with a degree of precision which I could not have attained without this assistance." Besides this, the Institution caused special collections of turtles to be made for Professor Agassiz, from those parts of the country from which no specimens had previously been obtained.

It was originally intended, as announced in the prospectus, to issue one volume a year, but the author found that the first volume was insufficient to contain all the matter which he had designed to give in it. Its publication was therefore delayed, that the whole of this part of his general subject might be presented at once, and hence two volumes have been issued together. The large subscription which has been obtained has enabled the publishers to extend the original plan, and to expend a much greater sum on the engravings than was at first thought possible. The work will serve to increase and extend the reputation of the illustrious author, as well as to afford a striking example of the liberality of our country and its growing appreciation of abstract science.

Under the head of publications, and in justice to the memory of a distinguished naturalist, a profound scholar, and a worthy man, the late Dr. Gerard Troost, of Tennessee, it ought to be stated in this Report, that after his death, several years ago, a memoir he had prepared on the organic remains known as Crinoidea, illustrated by a collection of specimens, was presented to the Smithsonian Institution for publication. It was submitted to two naturalists of high reputation, and found by them to be an important addition to knowledge, though left by its author in an unfinished condition. The gentlemen to whom it was referred generously offered to supply the deficiencies, and to prepare the work for the press. Their engagements, however, have since been such as to prevent up to this time the completion of the task which they undertook to accomplish. One of the gentlemen

to whom the paper was referred, Prof. James Hall, in whose possession the specimens now are, states that he had hoped long since to put the memoir in such a form as to do justice to the memory of Dr. Troost, and be in accordance with the latest views of the subject. To do this, however, required an examination of other specimens, and for this object he had never been able to find time. At present he is engaged in a geological report of Iowa, in which there are several plates of Crinoids, and any which may be identical with those described by Dr. Troost will be accredited to him. We regret exceedingly this long delay in the publication of the labors of one so highly esteemed in life and gratefully remembered in death. It has, however, been caused by circumstances over which we had no control, and which have given us considerable disquietude.

The new and extended series of Meteorological and Physical Tables, which has been in course of preparation for several years, is at length completed and ready for distribution. It forms a volume of 634 large octavo pages, which may be divided into separate parts, each distinct in itself. A copy of these tables will be sent to each of the meteorological observers, and it is believed that a considerable number may be sold in this country and Europe, from which something may be derived towards compensating the author, Prof. Guyot, for the unwearied labor and attention he has bestowed upon the work.

At the request of the Institution, Baron Osten Sacken, of the Russian legation, who has made a special study of Dipterous Insects has prepared a catalogue of the previously described species of this continent, analogous to that of Melsheimer's catalogue of the Cleoptera of the United States, which was published some years ago by this Institution.

It frequently happens that the same animal is described by different naturalists under different names, and there may be among the species enumerated in this catalogue some of this character, but in the present state of the knowledge of American Diptera the publication of a complete synonymical catalogue is impossible. Yet a list like the one just completed is an indispensable preparatory work for the future study of this branch of entomology. The catalogue includes the species inhabiting not only the North American continent in general, but also those in Central America and in the West Indies. It also gives the principal localities where each species has been found. In a list like this, says the author, completeness is the principal merit; the symmetrical arrangement is but of secondary importance.

The groups adopted by Meigen and Wiedemann are retained, avoiding the subdivisions introduced by modern authors.

The publication of this list, we trust, will very much facilitate the study of entomology, and it is a special object of this Institution to encourage individuals to devote themselves to particular subjects of research. The field of nature is so extended that unless it be minutely subdivided, and its several parts cultivated by different persons, little progress of a definite character can be anticipated. To collect the materials for wider generalizations, microscopic research is necessary in every direction, and men enthusiastically devoted to one object are required in every branch of knowledge in order that the whole may be perfected. It is true, before entering on an investigation of this kind, that it is desirable for the individual to have a general knowledge of the different branches of science, since they are all intimately connected; and the student can then narrow his field of view until it comes within the scope of his mental abilities, or the means which he may have at his disposal for its advancement. As a general rule, however, the ability to enlarge the bounds of science can only be obtained by almost exclusive devotion to a few branches.

It is scarcely possible to estimate too highly, in reference to the happiness of the individual as well as to the promotion of knowledge, the choice in early life of some subject to which the thoughts can be habitually turned during moments of leisure, and to which observation may be directed during periods of recreation, relative to which facts may be gleaned from casual reading, and during journeys of business or of pleasure. It is well that every one should have some favorite subject of which he has a more minute knowledge than any of his neighbors. It is well that he should know some one thing profoundly, in order that he may estimate by it his deficiencies in others.

In this connexion it may be proper to remark that the association of individuals in the same community, each with a special and favorite pursuit, each encouraging the others, each deferring to the others, and each an authority in his own specialty, forms an organization alike valuable to the individual, the community, and the public generally. To induce and encourage the establishment of such associations is one of the objects of the Institution. It is suprising what interest may be awakened, what amount of latent talents developed, and what dignity imparted to the pursuits of a neighborhood by a society in which the knowledge of each becomes common property,

and the labors of each one are stimulated by the appreciation and applause of his fellows.

I am acquainted with no plan of adult education better calculated to elevate the mental character of a community or to develop the local natural history of a district than that of a well organized and efficiently conducted association of this kind. Such establishments, I am happy to say, are now becoming common in every part of the United States. They have taken the place, in many cases, of the debating societies, which were formerly instituted for mental improvement. To the latter it might justly be objected that they tend to promote a talent of sophistical reasoning, rather than to engender an uncompromising love of truth. The habit of fluent speaking may undoubtedly be cultivated at the expense of profound thought, and however promotive at times of the temporary interests of the individual, can never be supposed to tend to the permanent advancement of the species.

Meteorology.—The system of meteorological observations under the direction of the Institution and the Patent Office has been so repeatedly described in previous reports that it will scarcely be necessary to give any more at this time than an account of the present state of the work. The system was commenced in 1849, and has since then been gradually improving in the number of observers, character of the instruments, and the precision with which the records are made. The Institution has awakened a wide interest in the subject of meteorology, and has diffused a considerable amount of information with regard to it which could not readily be obtained through other means. The manufacture of instruments, compared with standards furnished by the Institution from London and Paris, has been an important means of advancing the science. The work is still continued by James Green, 173 Grand street, New York, and during the past year an increasing number of full sets has been purchased by observers. The Institution has continued to distribute rain-gages, with which observations are now made on the quantity of aqueous precipitation in nearly every State and Territory of the Union.

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 further north, and more generally to the westward, they would furnish important information as to the ap-

proach 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.

The materials which have been collected relative to the climate of the North American continent are as follows:

1st. A miscellaneous collection of MSS. and other tables relative to the climate of the United States. This series will be enriched by a reference list to all the meteorological records, which are to be found in the extensive library of Mr. Peter Force, of this city, and other accessible sources of information.

2d. The observations made under the direction of this Institution since 1849.

3d. A series of observations made by Dr. Berlandier in Mexico.

4th. Observations made in the British possessions.

5th. The record of observations made by government and other exploring expeditions.

6th. Copies of the observations made under the direction of the Surgeon General at the military posts.

7th. Copies of the observations made at the expense of the States of New York, Massachusetts, Pennsylvania, Maine, and Missouri.

8th. A series of observations from Bermuda and the West Indies.

Besides these, the Institution is endeavoring to obtain, by means of its exchanges, a full series of all observations which have been made in foreign countries, and to form a complete meteorological library.

Complaint has been made on account of the delay in publishing deductions from the materials which have thus been collected, but, with the limited means of the Institution, it should be recollected that all objects enumerated in the programme of organization cannot be simultaneously accomplished. The reductions have been steadily pursued for the last five years, and all the funds, not otherwise absolutely required, have been devoted by the Institution to this object.

It will be a matter of astonishment to those not practically acquainted with the subject, to be informed as to the amount of labor required for the reduction of the returns made to this Institution for a single year. During 1856 the records of upwards of half a million of separate observations, each requiring a reduction involving an arithmetical calculation, were received at the Institution. Allowing an average of one minute for the examination and reduction of each

observation, the amount of time consumed will be nearly 7,000 hours, or, at the rate of seven hours per day, it will be 1,000 days or upwards of three years, or, in other words, to keep up with the reduction of the current observations the whole available time of three expert computers is required. This is independent of the labor expended in the correspondence, preparation and distribution of blank forms, and the deduction of general principles. The work has been prosecuted, therefore, as rapidly as the means at the disposal of the Institution would permit. Since the arrangement was made with the Patent Office, from twelve to fifteen persons, many of them females, have been almost constantly employed, under the direction of Prof. Coffin, in bringing up the arrears and in reducing the current observations.

All the materials collected at the Institution are in the process of being arranged and bound in accessible volumes, with proper indices, to be used by all who may be desirous of making special investigations on any point relative to the climate of this country.

During the past year the reductions for 1855 were printed in pamphlet form and distributed to observers for criticism and suggestions as to improvements which might be adopted in the subsequent publication of the entire series.

Exchanges.—The system of international exchange has been carried on during the past year with unabated zeal, and we trust with undiminished good results. A large amount of scientific material has passed through our hands in its transfer to and from societies and individuals in this and other countries. The returns made to the Institution during 1857 for its own publications consist of 555 volumes, 1,067 parts of volumes, and 138 charts. These works embrace most of the current volumes of scientific transactions, and are of the highest importance as aids in original research. The number would be very much increased if the contents of several large cases, which were accidentally delayed until the beginning of this year, were included.

The importance of the exchanges is not to be estimated by the commercial value alone of the books received. In addition to this we must consider the effect which it produces in bringing into immediate communication the cultivators of literature and science in this country with those abroad, of distributing among our societies publications of a class, the existence of which would scarcely otherwise be known, and of facilitating the diffusion of knowledge which, by the ordinary modes of transmission, would not be attained, except, perhaps, in the course of years.

The system has now attained a great development, and increases measurably every year. The expenses hitherto have been principally borne by the Institution, but their amount has now become so great as seriously to interfere with other operations, and I therefore think it advisable that a charge be made, to the parties receiving a certain amount of packages annually, sufficient to reimburse some of the outlay of the Smithsonian funds. What would not be felt by each one individually would, in the aggregate, materially lessen the burden of expense connected with this part of the operations, which amounted, in 1857, to about $3,000.

The expenses of the Smithsonian exchanges would be considerably greater than they are but for the liberality of various transportation companies in carrying packages free of cost. No charge on freight is made by the United States Mail Steamship Company, the Panama Railroad, or the Pacific Mail Steamship Company, forming the mail line from New York to San Francisco, while the agents of the line in these two cities, Messrs. I. W. Raymond and A. B. Forbes, serve the Institution in various ways. The California Express Agency of Wells, Fargo & Co., has also acted with the greatest liberality, and the same should be stated of the old line of Bremen and New York steamers. None of the domestic agents of distribution—namely, Hickling, Swan & Brewer, of Boston; D. Appleton & Co., New York; J. B. Lippincott & Co., Philadelphia; John Russell, Charleston; B. M. Norman, New Orleans; Dr. Wislizenus, St. Louis; H. W. Derby, Cincinnati; and Henry P. B. Jewett, of Cleveland—make any charge for services; and the same may also be said of Messrs. Oelrichs & Lürman, of Baltimore.

The amount of labor involved in the exchanges is, of course, very great, as will be readily inferred from an examination of the tables of receipts and transmissions during the past year, given by Professor Baird. The entries in the several record books fill over 700 pages; the circulars, invoices, and acknowledgments, exceed 4,300, in addition to over 600 receipts for packages. For a detailed account of all the operations of the exchanges I would refer to the accompanying report of Professor Baird.

Explorations, researches, &c.—It was stated in the last report that the magnetic instruments belonging to the Institution were given in charge of Baron Müller, for investigations in Mexico and Central America. Two series of records of observations have been received, but for nearly a year past nothing further has been heard from the expedition. We should regret the loss of the instruments, although

the cost of them has been more than repaid by the services they have rendered to science in the Arctic expedition under Dr. Kane, and in the results which have already been obtained from them in Mexico.

The self-registering apparatus in the observatory on the Smithsonian grounds, established at the joint expense of the Coast Survey and the Institution, has continued to record the variations in the horizontal direction of the magnetic force during a considerable portion of the past year. The interruptions which have taken place have been principally caused by the impurities of the city gas, the exhalations from which have interfered with the photographic process. The records obtained, however, will furnish valuable data for studying, in connexion with similar observations in other parts of the globe, the character of the magnetic force, and to assist in determining how far the changes are merely local, or to what extent they affect the whole earth.

Laboratory.—During the past year the laboratory has been under the charge of Dr. E. W. Hilgard, recently appointed State geologist of Mississippi. Among others, a series of experiments was made by him, under direction of the Secretary, at the expense of the Navy Department, relative to the vapor from a modification of bi-sulphuret of carbon as a substitute for steam applied to mechanical purposes. The result of these investigations was unfavorable to the substitution of this material in the way proposed. Although a greater amount of pressure is produced at the same temperature than in the case of steam, yet the amount of work relative to the absolute quantity of heat employed is by no means in accordance with this, the density of the vapor and its greater specific heat require a corresponding amount of fuel, and when we consider the fact that the bi-sulphuret of carbon is not a natural but a factitious substance, of which the vapor, when combined with air, is highly explosive and extremely offensive on account of its odor and the greater complexity of the engine required for its use, its application in the place of steam would be far from advantageous.

Another series of investigations was conducted in the laboratory relating to the prevention of counterfeiting bank notes, particularly by photography; but as this was intended especially for private use, the expenses were paid by the parties interested.

The Institution does not consider it a part of its duty to volunteer an opinion as to the practicability of the new projects with which the public mind is frequently agitated; but when directly called upon by the government or other parties of influence to pronounce a judgment

on any point of practical or applied science, it does not shrink from the responsibility, but, after diligent and cautious inquiry, gives the conclusions, whatever they may be, at which it has arrived.

Library.—Extensive alterations are in the process of being made in the wing of the building appropriated to the library, for the better accommodation of the books. The shelving has been arranged in two stories of alcoves, thereby more than doubling the space. Each lower alcove is separately secured by a door; a precaution which has been found necessary in the library of the Institution as well as in that of Congress. It is a fact to be regretted, but which it is necessary to mention in order to vindicate the restrictions imposed upon an indiscriminate access to the books, that there is in some quarters a lamentable want of honesty with regard to the use of property of a public character. Not only are works in many cases mutilated, merely to avoid the labor of copying a few pages, but valuable sets are sometimes broken by actual theft.

The appropriation for the library must not alone be measured by the sum assigned for the "cost of books;" it must be recollected that the library is principally increasing by means of the exchanges; that every year the Institution sends abroad, besides all the public documents which it can procure, some hundreds of copies of the quarto volumes of its transactions, the marketable value of which is several thousand dollars. It therefore ought to be distinctly understood that the library is constantly increasing by the addition of the most valuable series of the transactions of literary and scientific societies in all parts of the world, and that this is at the expense of what are denominated the active operations of the Institution. It is true the number of books directly purchased is comparatively small, but indirectly procured in the way stated the annual addition is valuable.

Among the numerous donations received during the past year it is of course impossible in this report to particularize more than a few of the most important. The Academies of Science of Vienna, St. Petersburg, and of Brussels, have all contributed largely both of their older and more recent issues. The Real Sociedad Economica, of Havana, has been particularly liberal in this respect, furnishing nearly complete series for many years back, as have also the Horticultural societies of Paris and Berlin. The most extensive single gift during the year has been that of the Dictionnaire des Sciences Naturelles, in 72 volumes, and the Histoire Naturelle des Mammirfèes, of Buffon and Daubenton, in 15 volumes, from the Herzogliche Bibliothek der

Friedensteinschen Sammlungen, Gotha. The British Admiralty has contributed a full set of all the charts published by it during the year. We may also mention, as an object of special interest of this class, a valuable set of historical maps, presented by Justus Perthes, the celebrated geographical publisher of Gotha, exhibiting the political condition of Europe from the beginning of the third century down to the time of the crusades. The limits of the several empires are exhibited by different colors, and the whole are on such a scale as to be adapted for instruction in schools or academies. To render this interesting work more generally known in this country, it is proposed to exhibit the maps in the reading room and to translate and print the pamphlet of explanations for the use of the visiters to the Institution.

Among the curiosities of the library received during the past year the most prominent is an ornamental album, presented through the Department of State, from Miss Contaxaki, a native of the isle of Crete. This work was designed as a contribution to the universal exhibition at Paris in 1855, where it received a diploma for the artistic merit displayed in its execution. The "Classical Bouquet," as it is called, consists of illustrations of the principal monuments and places in Greece, to which are added a few from the author's native isle of Crete. These illustrations are accompanied by quotations from the most illustrious Greek authors, beautifully illuminated, while many of the pages are adorned with pressed flowers culled from the places which the drawings represent. The book itself is a large quarto, covered with blue velvet heavily embroidered, and lettered with silver. It is inclosed in a case, made of olive wood of the country, about a foot and a half square, richly carved and ornamented with appropriate devices. This work was transmitted to the United States through Charles C. Spence, esq., and affords a favorable specimen as well of the present state of the arts in that country, which was the birthplace of the true and the beautiful, as of the talents, the taste, and the unwearied industry of the lady who devised and principally executed it.

The library possesses an extensive collection of pamphlets, including the separate theses of the candidates for graduation or honors at the German universities; also a series of the annual reports of the public institutions and societies in this country. During the past year these have been classified, a large number of them bound, and the remainder arranged in pasteboard boxes, labeled and placed on the shelves as volumes.

The binding of the books received through exchange continues to be a large item of expense, and we have devoted the remainder of the appropriation for the library, not expended in the purchase of books or for clerical service, to this object.

In relation to the books received by the copyright law, I have but little to say in addition to what has been stated in preceding reports. The provisions of the act are still disregarded, to a considerable extent, by the larger publishers, and, as a general rule, works are received of but little value in themselves and inconsistent with the character of the library of the Institution. Though the cost of postage has been diminished by the law of Congress authorizing the free transmission of copyrights, yet it has by no means exempted the Institution from a large item of expense on this account. The publishers frequently inclose within the packages letters relating to the proper direction of the certificates and other matter pertaining to the copyright, and by a decision of the Post Office Department all such communications are charged with letter postage. Though the sum in each case appears insignificant, yet in the aggregate it may amount, in the course of a year, to several hundred dollars; and since the system from the beginning has been of no real benefit to the Institution, we have addressed a circular to each publisher who forwards a copyright and neglects to pay the postage on the accompanying letters, apprising him of the fact.

In conclusion, I may state that though the copyright law was undoubtedly intended to enrich the library of the Institution, yet the non-compliance with it of some of the principal publishers, and the reception of a large amount of worthless matter involving expense in its transportation and care has entirely defeated this object. The cost of the system has been at least ten times greater than the value of the books received; nor is this all; a compliance with the act has constantly subjected the Institution to unmerited censure. We have therefore been a loser both in funds and in the friendly feeling of an influential portion of the community, and it is to be hoped that Congress will, at its present session, essentially modify the existing law. The deposit of a single copy of each article in the Patent Office, instead of the three now sent to Washington, would be sufficient to secure the rights of the author, and answer all the objects of a complete collection of this class of American publications.

Museum.—The general plan and objects of the collections which have been assiduously formed through the agency of the Smithsonian

Institution have been given in several of the preceding reports, and it will be sufficient, at this time, to repeat that they are intended to exhibit the distribution and development of the plants and animals, as well as to illustrate the geological and mineralogical character of the North American continent. The number of specimens required for these purposes is great, since all the varieties from every locality require attention. During the past year specimens have been collected by ten government expeditions and six private exploration parties. Some of the returns from these are now on the way, and will greatly enhance the number and value of the materials before received. According to the statement of Professor Baird, hereto appended, the catalogued specimens of animals at the end of the year 1857, amounted to: mammals, 3,200; birds, 8,766; skeletons and skulls, 3,340; reptiles, 239; fishes, 613.

During the year several persons have availed themselves of the use of the collections and library in the prosecution of original researches, and, as usual, several government expeditions, which have been sent out for surveys, the construction of roads and for military purposes, have been provided with instructions as to the mode of collecting specimens and observing meteorological and other natural phenomena. No opportunity of adding to our store of information, in regard to the physical geography and natural history of the western portion of this continent, has been suffered to pass without being improved, and I may safely say, that since the establishment of the Institution more has been done to ascertain and make known the character of the less inhabited portion of our continent than all which had been previously accomplished in this line. The survey of routes from the Gulf of Mexico to the Pacific has served of late to add much to our knowledge of Central America, and during the past year the British government has sent out a party for the exploration of the country north of the limits of the United States and between the great lakes and the Pacific ocean. This survey, in connexion with that along the 49th parallel of latitude, now in progress for determining the boundary line between the United States and the British possessions, will add to the natural history of the northern portion of our territory, and will furnish the data necessary to delineate more accurately the great mountain system which determines the climate and physical peculiarities of the western portion of this continent.

Smithson's personal effects.—The bequest of James Smithson included all his personal effects, and these were obtained by Hon. Richard Rush,

The following is a list of the lectures which were delivered during the winter of 1857–'58:

Seven lectures by Professor John LeConte, of the South Carolina College, on "The Physics of Meteorology."

One lecture by Hon. H. W. Hilliard, of Alabama, on the "Life and Genius of Milton."

Two lectures by Dr. I. I. Hayes, of Philadelphia, on "Arctic Explorations."

One lecture by Rev. T. J. Bowen, of Yoruba, Africa, on "Central Africa—the Country and People."

One lecture by D. K. Whitaker, esq., of Charleston, S. C., on the "Genius and Writings of Sir Walter Scott."

Two lectures by Professor C. C. Felton, of Harvard College, Cambridge, Mass., on "Modern Greece."

Four lectures by Dr. James Wynne, of New York, on the "Duration of Life in Various Occupations."

Three lectures by Professor J. P. Espy, on "The Law of Storms."

Five lectures by Rev. J. H. McIlvaine, of Rochester, N. Y., on "Comparative Philology in some of its bearings upon Ethnology, and embracing an account of the Sanscrit and Persian Arrowhead Languages."

Three lectures by G. Gajani, on "The Catacombs, the Coliseum, and the Vatican of Rome."

One lecture by Professor Schele de Vere, of the University of Virginia, on "John Law and the Celebrated Mississippi Speculation."

From the foregoing statements we think it will be generally acknowledged that the Institution is steadily pursuing a course of usefulness well calculated to make the name of its founder favorably known and the results of his bequest highly appreciated in every part of the civilized world, that its funds are in a good condition, and that the prospect of its future influence in the promotion of knowledge is even more cheering than at any period of its past history.

Respectfully submitted.

JOSEPH HENRY,
Secretary S. I.

WASHINGTON, *January*, 1858.

APPENDIX TO THE REPORT OF THE SECRETARY.

SMITHSONIAN INSTITUTION,
Washington, December 31, 1857.

SIR: I have the honor, herewith, to present a report, for 1857, of the operations you have entrusted to my charge, namely, those which relate to the printing, to the exchanges, and to the collections of natural history.

Respectfully submitted.

SPENCER F. BAIRD,
Assistant Secretary Smithsonian Institution.

JOSEPH HENRY, LL.D.,
Secretary Smithsonian Institution.

PUBLICATIONS.

The publications of the Institution for the year consist of the ninth volume of Smithsonian Contributions to Knowledge, embracing 484 pages of quarto text and 22 plates, and of the annual report to Congress, an octavo volume of 468 pages. Considerable progress has also been made with the printing of the tenth volume of Smithsonian Contributions, 136 pages and five plates being finished.

The catalogue of North American Diptera, by Baron Ostensacken, is nearly through the press and will include 112 octavo pages.

EXCHANGES.

The system of international exchanges so successfully prosecuted by the Institution since its establishment has been carried on during the year with the happiest results. A large amount of scientific material has passed through its hands and has been promptly transmitted to its destination. The general details of the system will be presented hereafter.

The returns made to the Smithsonian Institution for its own donations will be found in the following table:

A.—*Receipt of books, &c., by exchange in* 1857.

Volumes—Octavo	404	
Quarto	146	
Folio	5	
		555
Parts of volumes and pamphlets—		
Octavo	775	
Quarto	255	
Folio	37	
		1,067
Charts and maps		138
		1,760

The works received embrace most of the current volumes of scientific transactions, with some back series, and are of the highest importance as materials of scientific research.

In the following tables are exhibited the chief statistics of exchange during both 1856 and 1857. The last annual report did not fully cover the subject, owing to the fact that a supplementary sending was required in January, 1857, to complete that of July, 1856, and a report for 1856 could not reasonably include what was actually not performed till the ensuing year. In presenting the series of tables throughout, those of transmissions for 1856 are to be understood as embracing parcels forwarded in January 1857. This will explain the apparent disproportion in amount for the two years, as much of what was sent in the beginning of 1857 would otherwise not have gone until the ensuing summer.

B.

Table showing the statistics of foreign exchanges of the Smithsonian Institution in 1856.

Distributed through—	Principal addresses of parcels.	Addresses of sub-parcels inclosed.	Total of addresses.	Number of principal packages.	Number of sub parcels inclosed.	Total of parcels.	Number of boxes used.	Bulk of boxes in feet.	Weight of boxes in pounds.
1. *Dr. F. Flügel, Leipsic.*									
Sweden	8	21	.....	22	25	.....	.....	.....	.....
Norway	5	7	.....	13	7	.....	.....	.....	.....
Iceland	1	.....	.....	3	.....	.....	.....	.....	.....
Denmark	6	19	.....	17	25	.....	.....	.....	.....
Russia	25	29	.....	73	32	.....	.....	.....	.....
Holland	17	17	.....	46	18	.....	.....	.....	.....
Germany	155	193	.....	414	240	.....	.....	.....	.....
Switzerland	15	20	.....	39	21	.....	.....	.....	.....
Belgium	9	15	.....	29	18	.....	.....	.....	.....
Total	241	321	562	656	386	1,042	42	340	10,428
2. *H. Bossange, Paris.*									
France	79	120	.....	187	142	.....	.....	.....	.....
Italy	42	33	.....	95	33	.....	.....	.....	.....
Spain and Portugal	6	1	.....	14	1	.....	.....	.....	.....
Total	127	154	281	296	176	472	13	126	4,129
3. *The Royal Society and H. Stevens, London.*									
Great Britain and Ireland	117	231	348	260	253	513	9	94	2,914
4. *Other channels*	26	10	36	39	10	49	6	26	800
Grand total	511	716	1,227	1,251	825	2,076	70	586	18,271

C.

Table showing the statistics of foreign exchanges of the Smithsonian Institution in 1857.

Distributed through—	Principal addresses of parcels.	Addresses of sub-parcels inclosed.	Total of addresses.	Number of principal packages.	Number of sub parcels inclosed.	Total of parcels.	Number of boxes used.	Bulk of boxes in cubic feet.	Weight of boxes in pounds.
1. *Dr. F. Flügel, Leipsic.*									
Sweden	9	15	.....	22	23	.....	.....	.....	.....
Norway	5	4	.....	10	7	.....	.....	.....	.....
Iceland	1	.....	.....	3	.....	.....	.....	.....	.....
Denmark	6	10	.....	12	16	.....	.....	.....	.....
Russia	25	20	.....	47	37	.....	.....	.....	.....
Holland	17	9	.....	32	12	.....	.....	.....	.....
Germany	142	160	.....	293	232	.....	.....	.....	.....
Switzerland	15	20	.....	28	26	.....	.....	.....	.....
Belgium	7	16	.....	18	29	.....	.....	.....	.....
Total	227	254	481	465	382	847	19	183	6,928
2. *H. Bossange, Paris.*									
France	69	63	.....	114	77	.....	.....	.....	.....
Italy	32	24	.....	51	32	.....	.....	.....	.....
Spain	5	.....	.....	10	.....	.....	.....	.....	.....
Portugal	2	1	.....	3	1	.....	.....	.....	.....
Total	108	88	196	178	110	288	6	63	2,410
3. *The Royal Society and H. Stevens, London.*									
Great Britain and Ireland	121	108	229	232	158	390	10	118	3,910
4. *Other channels*	49	10	59	90	10	100	5	20	1,000
Grand total	505	460	965	965	660	1,625	40	384	14,248

D.—*Packages received by the Smithsonian Institution for foreign distribution in* 1856 *and* 1857.

	No. of packages.	
Albany, N. Y.—	1856.	1857.
New York State Agricultural Society	5	43
New York State Medical Society	6	----
Prof. James Hall	8	----
Baltimore, Md.—		
Philip R. Uhler	25	----
Baton Rouge, La.—		
Institution for Mutes and Blind	18	----
Boston, Mass.—		
American Academy of Arts and Sciences	392	98
Boston Society of Natural History	65	56
Historic-Genealogical Society	1	----
Prison Discipline Society	32	----
Dr. Warren	5	----
B. Homer Dixon	----	7
W. H. Dixon	5	----
Ed. Jarvis	----	84
Ed. Tuckerman	----	10
W. H. Prescott	8	----
Heirs of Amos Binney, M. D	----	49
Cambridge, Mass.—		
American Association for Advancement of Science	28	----
Cambridge Observatory	----	210
J. D. Runkle	50	----
Prof. Asa Gray	1	32
Prof. D. Treadwell	200	----
Charleston, S. C.—		
Dr H. W. Ravenel	2	----
Chicago, Ill.—		
Col. J. D. Graham, U. S. A	----	66
Cincinnati, Ohio—		
M. L. Knapp, M. D	24	----
D. Vaughan	24	----
Columbus, Ohio—		
Ohio State Board of Agriculture	----	274
Frankfort, Ky.—		
Geological Survey of Kentucky	----	50
Georgetown, D. C.—		
Georgetown College	2	----
Granada, Nicaragua—		
President Rivas	100	----
Hartford, Conn.—		
Hon. Henry Barnard	283	----
Mr. Potter	22	----
Lansing, Mich.—		
Michigan State Agricultural Society	50	----
Lebanon, Tenn.—		
Prof. Safford	----	6
Lowell, Mass.—		
James B. Francis	16	----
Madison, Wis.—		
Wisconsin State Agricultural Society	----	14
Historical Society of Wisconsin	----	40
New Brunswick, N. J.—		
Prof. Geo H. Cook	----	5

D—Continued.

	No. of packages.	
New Haven, Conn.—	1856.	1857.
American Journal of Science	48	20
American Oriental Society	4	-------
Prof. D. Olmsted	10	7
New York—		
American Geographical and Statistical Society	-------	57
New York Lyceum of Natural History	86	-------
Prof. W. Gibbs	-------	90
Philadelphia, Pa.—		
American Philosophical Society	42	79
Academy of Natural Sciences	300	173
Central High School of Philadelphia	100	100
Historical Society of Pennsylvania	4	-------
Pennsylvania Institute for the Blind	45	53
Philadelphia Library Company	19	-------
Dr. Horner, U. S. N	100	-------
Isaac Lea	171	178
Dr. Joseph Leidy	134	47
Dr. J. A. Meigs	-------	44
Providence, R. I—		
State of Rhode Island	-------	6
St. Louis, Mo—		
St. Louis Academy of Science	-------	161
Dr. B. F. Shumard	12	-------
San Francisco, Cal—		
California Academy of Natural Sciences	50	-------
Santiago, Chile—		
University of Chile	140	-------
Savannah, Ga—		
Dr. Jos Jones	50	-------
Toronto, Canada—		
Canadian Institute	-------	17
Washington, D. C.—		
U. S. Patent Office	250	250
Ordnance Bureau	46	-------
U S Coast Survey	67	497
National Observatory	-------	73
Light-House Board	3	-------
Secretary of War	120	114
Surgeon General	-------	50
Major W. H. Emory, U. S. A	96	-------
W. P. Blake	50	-------
Dr. J. S. Newberry	20	-------
Lieut. J. C. Ives, U. S. A	18	-------
Lieut. G. K. Warren, U. S. A	20	-------
Lieut. J. M. Gilliss, U. S. N	-------	25
Wm. Stimpson	-------	50
J. C. G Kennedy	-------	50
W. J. Rhees	-------	100
Miscellaneous	133	120
Total	3,510	3,397
Supposing each parcel to contain an average of one and a half pieces, the number of these would be	5,265	5,095
Add of Smithsonian volumes and memoirs, about	2,500	2,500
Add volumes of public documents obtained and distributed, about	1,500	1,000
Approximate total of volumes and pamphlets sent abroad by the Institution	9,265	8,595

E.—*Addressed packages received by the Smithsonian Institution from Europe, for distribution in America.*

	No. of packages.	
Albany, N. Y.—	1856.	1857.
New York State Library	9	9
Boston, Mass.—		
American Academy of Arts and Sciences	42	53
Boston Society of Natural History	30	39
Bowditch Library	1	
Cambridge, Mass.—		
American Association for Advancement of Science	7	7
Cambridge Astronomical Journal	24	19
Cambridge Observatory	9	9
Harvard College	22	19
Charleston, S. C.—		
Literary and Philosophical Society	2	
Columbus, Ohio—		
Ohio State Board of Agriculture	14	24
Georgetown, D. C.—		
Georgetown College	3	
Lansing, Mich.—		
Michigan State Agricultural Society	8	13
Madison, Wis —		
Wisconsin State Agricultural Society	22	22
New Haven, Conn.—		
American Journal of Science	5	5
American Oriental Society	1	
New Orleans, La.—		
New Orleans Academy of Natural Sciences	12	16
New York—		
American Geographical and Statistical Society	24	19
New York Lyceum of Natural History	24	25
Philadelphia, Pa.—		
American Philosophical Society	74	55
Academy of Natural Sciences	57	62
Franklin Institute	9	7
San Francisco, Cal.—		
California Academy of Natural Sciences	4	19
Santiago Chile—		
University of Chile	1	6
Observatory	2	7
Washington, D. C.—		
U. S. Patent Office	37	57
National Institute	3	3
Bureau of Ordnance and Hydrography	1	3
U. S. Coast Survey	27	24
National Observatory	23	63
Surgeon General	1	
United States Agricultural Society	2	
Library of Congress	17	10
Worcester, Mass —		
American Antiquarian Society	1	
Miscellaneous addresses, institutions	437	330
Individuals	318	320
Total	1,245	1,273

In addition to the above, 142 volumes were received from five European institutions for distribution to such addresses as might be selected by the Smithsonian.

DETAILS OF THE SYSTEM OF EXCHANGES.

As the system of international exchange now carried on by the Smithsonian Institution has attained a very great development, a sketch of the mode of conducting it may not be amiss at the present time. The subject may be considered under two heads, one relating to the parcels received from parties in the United States for transmission to foreign countries, and the other having reference to receipts from abroad for institutions and individuals in America. In connexion with this subject, it may be stated that a large room in the Institution, measuring 70 feet by about 25, is devoted to the department of exchanges, and, besides containing the stock on hand of Smithsonian publications and of miscellaneous documents, is fitted up on one side with a series of large binns, each one devoted to a particular portion of the world, and appropriately labelled. The floor of the room is occupied by a series of long tables, five feet wide, on which parcels are made up or unpacked. Printed addresses are arranged in small pigeon holes, and include nearly all the correspondents of the Institution, domestic and foreign, amounting, at the present time, to nearly one thousand names.

Operations connected with transmissions from the United States.—The transmissions of the Smithsonian Institution are regulated, in a measure, by the time when the annual volume of Smithsonian Contributions is completed. One or two months before this time, a circular letter of advice is transmitted to all the institutions and individuals in the United States and the Canadas known or supposed to have a desire to avail themselves of the facilities of the Smithsonian system of exchanges, and the conditions stated upon which parcels will be received. If any society or individual have published a work likely to be of interest to the scientific and literary world abroad, and no indication is given of an intention to distribute copies, a special application is made for them, and no effort left untried to secure to the foreign investigators the benefit of all original and useful American material. Such appeals are generally responded to very favorably, and very many publications of the different bureaus of the government, of States, and of State agricultural and historical institutions, of societies, and of individuals, have thus been obtained.

In nearly all cases, in the first instance, at least, the Smithsonian Institution is called on to furnish lists of suitable foreign recipients for the publications just referred to, or the volumes are sent in bulk, to be addressed here. After the first sending, the exchange is usually more directly between the parties corresponding, the Institution preferring to have the parcels properly addressed before forwarding to Washington. In all cases great care is taken to secure the credit of the donation to the proper party, and to prevent it being supposed to come directly from the Institution.

To facilitate the selection of suitable recipients for donations or exchanges, the Institution publishes once in two years a carefully prepared list of foreign institutions for general distribution. The last one issued contains over 570 names, but manuscript additions bring

the number up to about 700. The list of individuals is nearly as large as that of institutions.

To facilitate the selection of recipients for particular works, of which a limited number of copies only may be available for distribution, classified lists of institutions are kept, as of academies of science generally, and of societies devoted to special subjects, as geography, geology, zoology, botany, ethnology, statistics, &c., and these are arranged from No. 1 upwards, in the order of relative importance, or of equable distribution among the centres of learning; thus six copies of any work on hand would be assigned to the first six names on the list of institutions most interested in it.

The parcels, as received from the different portions of North America, are placed, after being addressed, (if not so already,) in their appropriate receptacles, and the list entered specifically in a record book. To facilitate such entry, a detailed invoice of each transmission is required, and the failure to furnish it puts the institution to the great trouble of making it from the books themselves.

When the parcels have all been received, a list of the different donors is printed, together with the titles of the various works which the institution has for distribution at the time. On the day assigned for commencing the labor of making up the packages, the binns are emptied successively, the contents arranged carefully on the counters, so as to bring everything for one address together, the Smithsonian donations are added, and each particular piece is checked off in the printed blank just referred to. This rough invoice is numbered and handed to the packers, who make up the volumes into one or more bundles, and mark them with the number of the invoice, by which means they are easily identified and labelled. When parcels or books are addressed to individuals, these are usually inclosed in the bundles of the societies to which they belong, the number and addresses of such sub-packages being marked on the rough invoices. A correct copy is made of these lists, and forwarded by mail or otherwise to the parties, in which is also stated the nature and time of the transmission. These invoices are finally posted, to the debit of the party addressed, in a large ledger, which shows what each has had, and what return has been made to the Institution. The record of each package is, therefore, made four times.

In sending the invoice of the package for each address, a circular is added explaining the objects of the transmission, and the conditions on which the exchange will be continued.

The time occupied in invoicing and making up the packages varies with the occasion, although a month is usually required to finish the work. After the bundles are all made up, those for each agent are brought into one heap, and they are then packed into boxes, a check list being kept of the numbers placed in each box.

There are three principal agents in Europe who have charge of the Smithsonian exchanges in their respective regions: Dr. Felix Flügel, resident in Leipsic, has charge of continental Europe, with the exception of France, Italy, Spain, and Portugal, (which are supplied by Hector Bossange, of Paris,) and of Greece and Turkey. Henry Stevens, of London, is agent for Great Britain and Ireland. Greece

and Turkey are usually reached through the American minister at Constantinople and the consul at Alexandria. Most of the points in Asia and Africa are supplied through the Presbyterian Board of Foreign Missions in New York, and the American Board in Boston, Australia through Mr. I. W. Raymond, of New York, and South America through a variety of channels.

The boxes for the agents above mentioned, containing the different parcels, are then sent from the Institution; those for Dr. Flügel being shipped from Baltimore, through Oelrichs & Lürman, direct to Bremen, thence by railroad to Leipsic. The boxes for Messrs. Bossange and Stevens are shipped by packet from New York.

The governments of Europe to whose ports shipments are made by the Institution have all authorized their admission free of duty, on filing an invoice with the customs authorities some time in advance of the arrival of the boxes. After being received by the agents, these boxes are unpacked, and the different parcels distributed to their destination through the channels selected by the intended recipients, accompanied by circular advices from the agents. In Germany the parcels are usually transmitted through the booksellers of Leipsic, as they may have occasion to send to correspondents in the various towns.

Exchanges from foreign countries for America.—The system of operations in this case is similar in principle to that just described, although the steps take place in inverse order. The packages are sent to the agents of the Institution, who inclose them in boxes, which are forwarded monthly, or oftener. On being received in Washington they are unpacked, an entry made of their contents, and the parcels placed temporarily in the binns assigned to their respective addresses. They are then assorted, those for each party made up into one bundle, and thus forwarded, by express or otherwise, accompanied by a blank receipt, which is to be signed and returned.

MUSEUM.

A.—*Increase of the Museum.*

The collections in natural history received during the year 1857 have been of great extent, and embrace many important additions to the material on hand for extending the knowledge of the animal, vegetable, and mineral productions of America. The specimens received have been from the usual variety of sources; the most important being, as heretofore, those brought in by the different government expeditions, as follows:

1. *Survey of the northwestern boundary line, Archibald Campbell, esq., commissioner.*—The expedition left in April, 1857, for Puget Sound, and during the year had its main camp for the most part at Simeahmoo bay, near the mouth of Frazer's river. Large collections of the animals and plants of the Sound have been made by Dr. Kennerly, surgeon and naturalist of the expedition; and of minerals and fossils by Mr. George Gibbs, the geologist.

2. *Exploration of the Black Hills and Loup Fork, under Lieutenant G. K. Warren, U. S. A.*—Lieutenant Warren made his third visit to the Upper Missouri and Yellowstone region, accompanied, as on previous expeditions, by Dr. Hayden as geologist and naturalist. Very large collections in all branches of natural history were made and brought home, tending, in great measure, to complete our knowledge of the distribution of species over the high plains of the west.

3. *Wagon road to Bridger's Pass, under Lieutenant F. T. Bryan, U. S. A.*—During his second year's work on this road to Utah Territory, Lieutenant Bryan, as before, was accompanied by Mr. Wm. S. Wood, who continued and completed the collections of the preceding year, in securing many species not previously obtained. Dr. Wm. A. Hammond, U. S. A., who accompanied the party as surgeon, also made a separate and independent collection of much interest, not only on the route, but while stationed at Fort Riley. In this he was for a time assisted by Mr. J. Xantus de Vesey.

4. *Wagon road to California via South Pass, under Wm. M. Magraw.*—This party, accompanied by Dr. James G. Cooper, as surgeon and naturalist, aided by C. Drexler, reached Fort Laramie during the autumn. The collections in all departments were large and important, and were accompanied by copious notes on the species observed.

5. *Survey of the southern boundary of Kansas, under Lieutenant Colonel Johnston, U. S. A.*—A valuable collection of specimens in alcohol was made during the survey by J. H. Clark, esq., astronomer of the expedition.

6. *Survey of the Isthmus of Darien, under Lieutenant N. Michler, U. S. A.*—This expedition, accompanied by Mr. A. Schott and Messrs. Wm. S. and Charles Wood, sailed for Carthagena in October, proceeding thence to the isthmus. While at Carthagena a collection of birds and shells was made and sent to Washington, and others are on their way.

Among government expeditions fitted out in 1857, but from which no collections have yet been received, are the following:

7. *Wagon road route to California via El Paso and Fort Yuma, under Colonel Leech.*—This expedition was accompanied by Dr. McCay and Mr. Hays, both of whom were prepared to make collections in natural history.

8. *Exploration of the La Plata and its tributaries, under Captain Page, U. S. N.*—Christopher Wood doing duty as zoological collector.

9. *Artesian well expedition, on the Llano Estacado, under Captain Pope, U. S. A.*—This is the third expedition to the sterile regions of western Texas, conducted by Captain Pope.

10. *Exploration of the Colorado river, under Lieutenant J. C. Ives.*—This expedition started in September, accompanied by Dr. J. S. Newberry, surgeon and geologist, and H. B. Möllhausen, artist and zoologist. Several collections made by these gentlemen about San Diego are on their way, but have not yet been received.

The more important private explorations from which specimens have been received are as follows:

11. *Region around Fort Tejon, California, by J. Xantus de Vesey.*—The collections made by Mr. Vesey will compare favorably with any obtained under government auspices, and embrace complete series of the animals and plants of the vicinity of Fort Tejon, as far as met with; they also include quite a number of new species.

12. *Southern Illinois and Northern Red river, by R. Kennicott.*—Mr. Kennicott, under a commission from the Northwestern University, at Evanston, Illinois, to procure for its museum a collection of specimens of the natural history of the northwest, visited southern Illinois in the spring, and after exploring the vicinity of Cairo and New Madrid for several months, proceeded to the Red river of the North, within the British possessions, and nearly to Lake Winipeg. The collections made cover all branches of zoology.

13. *Coast of Florida, by G. Wurdemann, United States Coast Survey.*—Mr. Wurdemann's collections were in continuation of those of previous years, and included a great variety of species, among them several birds new to the fauna of the United States.

14. *Red river of the North and of Nelson's river, H. B. Territory, by Donald Gunn, esq.*—A large collection of birds and mammals made in these regions by Mr. Gunn, assisted by Mr. John Isbister, have added much to our knowledge of the distribution of species.

A collection of about 150 species of birds of Arctic America, Mexico, and Guatemala, presented by John Gould, esq., of London, has furnished very important data for comparison and determination of species of the United States.

Of the numerous other collections made it is impossible to give an account here. The detailed list of contributions and donations will, however, furnish additional information on the subject.

In conclusion it may be proper to state, that of the government expeditions mentioned above, that under Mr. Campbell was organized by the State Department; those under Lieutenant Warren, Lieutenant Bryan, Colonel Johnston, Captain Pope, and Lieutenant Ives, by the War Department; those under Mr. Magraw and Mr. Leech, by the Department of the Interior; and those under Captain Page and Lieutenant Michler, by the Navy Department.

In the reception of collections from the California coast, the Institution is under great obligations to the California Mail Steamship Line, composed of the United States Mail Steamship Company, the

Panama Railroad Company, and the Pacific Steamship Company, as also to Messrs. Wells, Fargo, Co., for free transportation of very many boxes and packages. The expense of what has been thus received, if charged for at the usual rate, would have been entirely beyond the means of the Institution, and if in an unprecedentedly short time our knowledge of the natural history of California has been carried to a point fully equal to that of any of the older States, it is unquestionably owing in very great measure to the liberality of the companies above mentioned in so generously seconding the efforts of the Institution.

The following table exhibits the additions made to the record books of the museum in 1857, *in continuation of previous years:*

	1851.	1852.	1853.	1854.	1855.	1856.	1857.
Mammals	None.	114	198	351	1,200	2,046	3,200
Birds	----	----	----	4,353	4,425	5,855	8,766
Skeletons and skulls	911	1,074	1,190	1,275	2,050	3,060	3,340
Reptiles	----	----	----	----	----	106	239
Fishes	----	----	----	----	----	155	613

Present condition of the museum.

The remarks in the last annual report of the Institution in relation to the richness and extent of its collections are strengthened by the additions of the past year, and they are confidently believed to be beyond competition in the field of American zoology. The precise statistics cannot now be given for the different classes and orders, as the cataloguing is not yet completed. In one department, however, some idea of the facts may be realized by the statement, that on the first of July, 1857, the Institution possessed—

	Species.	
Of skins or alcoholic specimens of North American mammals	205	
Of skins or alcoholic specimens of South American mammals	18	
Of skins or alcoholic specimens of European mammals	60	
		283
Of skulls or skeletons of North American mammals	221	
Of skulls or skeletons of South American mammals	17	
Of skulls or skeletons of European mammals	48	
		286

This was entirely exclusive of Cetacea, Pinnipedia, Cheiroptera and Quadrumana, of which there were many species. Since the first of July, the number of species of all orders has received a large increase. The species of North American mammals in the museum of the Institution, not mentioned in the great work of Audubon and Bachman, exceeds 80. Of birds, the North American species are believed to exceed 600; of reptiles, 400; of fishes, probably 800 or more. As all these classes are in process of elaboration, accurate statistics can probably be presented in the next report.

Work done in the museum.

The systematic registration of the Smithsonian collections has been carried on as rapidly as other duties would admit. The number of species labeled and entered during the year amounted to 5,271; most of them in three different series of records, making nearly 15,000 entries. It may be proper to state that all collections, as received, are entered in a general record book, of which the alphabetical list of donations appended to this report is a transcript. The different specimens are next labeled and then entered on the record for the class, or particular order, and from this posted in a ledger consisting of separate sheets, one for each species, systematically arranged, and each sheet containing an enumeration of all the specimens of its species, with the localities, sex, date, measurements and other memoranda, making the third time of writing out the name and statistics. In this way not only can information be obtained of the number of species of each class or order, but also of the separate specimens, with the locality and general character of each one. The posting up is complete for the mammals, birds, and osteological specimens, and well under way for the reptiles and fishes, and some orders of invertebrates.

During the past year the general report on the mammals of the Smithsonian collection has been completed and printed, forming volume VIII of the Report of the Pacific Railroad Survey. That on the birds is far advanced, and will be finished in the course of the ensuing year, which will also, it is hoped, witness the completion of reports on the reptiles and fishes.

Distribution and use of the Smithsonian collections.

As in previous years, the Smithsonian specimens have been freely used by students and investigators in natural history, in preparation of Monographs and other researches. Duplicates have also been distributed to a considerable extent, and as the collections become better arranged and other circumstances allow, it is hoped to make such distribution on a very extensive scale.

List of Donations during the year 1857.

C. Bellmann.—Fishes, &c., in alcohol, from Mississippi.

J. and A. Brakeley.—Fresh deer and otter from Virginia; jar of birds, mammals and reptiles from the Alleghenies of Virginia.

J. Mason Brown.—Cast of the skull of Daniel Boone, taken previous to the re-interment of his remains.

Lieutenant F. T. Bryan, U. S. A.—Three boxes of zoological specimens collected by William S. Wood on the wagon-road expedition from Fort Riley to Bridger's Pass.

Archibald Campbell.—One box of dried skins, and one chest of alcoholic specimens collected on Puget Sound by Dr. Kennerly, on the northwest boundary survey.

J. H. Clark.—Chest with two cans filled with reptiles, fishes and

mammals in alcohol; specimens of salt from the salt plains of the Pewsa, on the southern boundary of Kansas.

Mr. Cook.—Copper ores from Arizona.

Dr. J. G. Cooper.—Collections made near Fort Laramie, and thence to Independence; four bottles of Salamanders from New Jersey; one hundred skins of birds from California and Washington Territory.

L. Coulon.—Box of Swiss mammals.

Dr. S. Wylie Crawford, U. S. A.—Thirty-two jars of reptiles and mammals from Texas and New Mexico.

Benjamin Cross.—Golden eagle in the flesh (length 36¼ inches; extent, 86 inches; wing, 25 inches.)

J. P. Cunningham.—Box of Kaolin earth from Virginia.

John Day.—Snake from Virginia.

T. C. Downie.—*Coluber couperi* and *Geomys pinetis*, in alcohol, from Georgia.

C. Drexler.—Skins of six birds and three mammals from near Philadelphia.

Dr. J. Evans.—Ten boxes and one bundle of collections of geological survey of Oregon; skins and skull of *Felis concolor* (panther;) six skulls of Flathead Indians, from Oregon.

James Fairie.—25 skins of *Lepus aquaticus* (marsh hare) and *Sciurus ludovicianus* (Fox squirrel;) birds, reptiles in alcohol, from Louisiana.

A. B. Forbes.—*Viviparous* fish (*Ennichthys megalops*) from California.

Professor C. G. Forshey.—Cast skin of *Scotophis*, and skin of mouse, from Texas; specimens of supposed equine fossil foot-marks; jar of alcoholic specimens; skins of serpents; dried plants; skin of Ocelot and of Raccoons from Fayette county, Texas.

W. H. Gantt, M. D.—Infusorial earth from Texas.

O. E. Garrison.—Six packages Infusorial earth; skins of *Putorius richardsonii* and *Spermophilus* 13-*lineatus* from Minnesota.

Dr. W. Gesner.—Jar of *Geomys pinetis* and *Arvicola;* mammals and reptiles in alcohol; two jars of mammals from Georgia.

George Gibbs.—Box and barrel containing skeleton of large shark, from Port Townsend, W. T.; keg of fishes, from Puget Sound; keg of fishes from Columbia river.

Dr. J. B. Gilpin.—Skins of mammals from Nova Scotia; fifteen skins of *Putorius* and *Sciurus* from Labrador and Nova Scotia; jar with 12 mammals, in alcohol, from Nova Scotia.

W. R. Goodman.—Diatomaceous earth from Anne Arundel county, Maryland.

John Gould.—160 skins of birds of Mexico and Guatemala; skins of humming birds, (*Campylopterus delattrii, Trochilus heteropogon* and *Eriopus luciani;*) skins of *Apternus hirsutus* and *arcticus.*

Donald Gunn.—Skins of mammals and birds; skeletons; specimens in alcohol from Red river. Skeletons of male and female wolverine from Red river, H. B. T.

Dr. W. A. Hammond, U. S. A.—Box of skins of birds and mammals from Kansas. Chest and two cans of zoological specimens collected during Lieut. Bryan's wagon-road expedition to Bridger's Pass.

Dr. W. A. Hammond and *J. X. de Vesey.*—Skins of twenty-four birds and of two prairie wolves from Kansas.

Dr. E. W. Harker.—Skin of Salamander (*Geomys pinetis?*) from Georgia.

F. V. Hayden.—Six boxes of fossils collected in the Upper Missouri prior to 1856.

C. J. Heistand.—Specimens in alcohol of squirrels, moles, &c., from Pennsylvania.

Dr. E. W. Hilgard.—Specimen of *Carocolla* from Spain.

John S. Hittel.—Human skulls and bones encrusted in stalagmite, from a cave in Calaveras county, Cal.

Col. Hoffman, U. S. A.—Concretions from Cannon-Ball river, Nebraska.

B. A. Hoopes.—Can of *Menobranchus* and small mammals from Lake Superior.

Robert Howell.—Two cans of mammals, in alcohol, from Tioga county, N. Y.

Lieut. J. C. Ives, U. S. A.—Fossil *Dendrechinus excentricus*, Point Lobas, Cal.; miscellaneous fossils from California; fossils from Gatun, N. G.—all collected by Dr. J. S. Newberry.

Dr. R. W. Jeffrey, U. S. N.—Collection of fishes of Norfolk.

Col. E. B. Jewett.—Reptiles from Texas.

Dr. C. B. Kennerly.—Jar of mammals in alcohol, and skins of *Sciurus cinereus*, from Clark county, Va.

Robt. Kennicott.—Six boxes zoological collections made in southern Illinois, and in Minnesota to Lake Winipeg. (Deposited.) Gopher (*Geomys bursarius*) from Illinois; thirty skins of *Arvicola* and *Sorex* from Illinois; two living squirrels, (*Sciurus ludovicianus.*)

Major Jno. Leconte.—*Astacus latimanus* from Georgia.

J. MacMinn.—Skins of five mammals from Pennsylvania.

Wm. M. Magraw.—Box of skins of birds and mammals; plants from Independence; three boxes zoological collections, plants, &c., gathered between Fort Leavenworth and Fort Laramie during the South Pass wagon-road expedition. Collected by Dr. J. G. Cooper.

Geo. P. Marsh.—Minerals from Europe.

C. C. Martin.—Keg of reptiles, fish and mammals, from Pennsylvania and New York.

W. Massenburn.—Collections of serpents and crustacea from Florida.

Maximilian Prinz Von Wied.—Wild boar (*Sus scrofa*) from Germany, and skins of chamois (*Capella rupricapra*) and of female ibex (*Capra ibex*) from Mont Blanc.

Dr. E. Michener.—Mounted original of *Emberiza townsendii.* (Deposited.)

D. Miller, jr.—Thirty small mammals, in alcohol, from Pennsylvania.

Robt. O. Milton.—Box of fossils from Michigan.

H. B. Möllhausen.—Skin of head and skull, with horns, of European stag, (*Cervus elaphus.*)

W. E. Moore.—Skins of monkeys from Bolivia

Henry Moores.—Star fishes from California. (Deposited.)

H. M. Neisler.—Shells, reptiles, fishes, &c., in alcohol, from Georgia.

Dr. J. S. Newberry.—Box of shells, Acapulco; specimens of coals from Ohio.

New Orleans Academy of Sciences.—Skin of pouched rat (*Geomys pinetis*) from Florida.

B. M. Norman.—Three living turtles from New Orleans, (*Emy mobilensis?*)

B. F. Odell.—Mammals and reptiles from near Lake Winnibigoshish, Minnesota.

John Oliphant.—*Falco sparverius,* in flesh, from Maryland.

Capt. T. J. Page, U. S. N.—Two packages of maté and six bottles of water from the Rio Negro and Mato Grosso.

Dr. D. W. C. Peters.—Skins, birds, and mammals; reptiles and fishes, in alcohol, from New Mexico.

Thos. M. Peters.—Bottle of reptiles; skin of *Abastor erythrogrammus* from Alabama.

Prof. Poey.—Two living *Emys decussata;* living boa or maja, (*Epicrates angulifer;*) collection of reptiles, in alcohol, from Cuba.

J. P. Postell.—Two living Gophers, (*Testudo polyphemus;*) skull of *Geomys pinetis;* box of shells, and other invertebrata, from Georgia.

John Potts.—Skins of *Bassaris astuta, Putorius frenatus* and *Didelphys californica,* from the city of Mexico.

Francis B. Ray.—Bottle containing *Ophibolus eximius* from Missouri.

E. Raymond.—Fossil wood from Neuse river, North Carolina.

J. W. Raymond.—Skin of white raccoon from North Carolina, and of *Bassaris astuta* from California.

Peter Reid.—Fresh water sponge, in alcohol, from near Lake Champlain.

Rev. Jos. Rowell.—Monkeys and other mammals, fishes, &c., in alcohol.

H. de Saussure.—Four bats, *Sorex alpinus, Myoxus glis, Mus sylvaticus,* and *musculus,* and *Arvicola nivalis* from the St. Gothard, Switzerland; other small mammals of Switzerland.

S. H. Scudder.—Can of mammals, in alcohol; box of insects from Massachusetts.

Lieut. Semmes, U. S. N.—Syenite from North Greenland.

J. D. Sergeant.—Jar of mammals from Pennsylvania.

James Shoemaker.—Snakes and fishes from Roanoke county, Va.

Col. Wm. B. Slaughter.—Peat from Wisconsin.

J. Stauffer.—Can of mammals, in alcohol, from Pennsylvania.

J. J. Steenstrup, Director of Zoological Museum, Copenhagen.—Six jars of invertebrates from Greenland

J. H. Sternberg.—Four turtles; two boxes of shells, and of reptiles and invertebrates, in alcohol; box of living plants from Isthmus of Panama.

William Stimpson.—Two kegs and numerous jars of marine invertebrates and fishes from Massachusetts; living marine animals for aquarium.

Dr. George Suckley.—Hunters' skin of elk and of mountain goat,

Aplocerus montanus, from Washington Territory; box of birds from California; skins of mammals, birds; fishes, shells, minerals, and Indian relics, from Washington Territory; box with skins of mammals and birds; plants, &c., from Steilacoom; box of birds, shells, &c., Port Townsend.

A. S. Taylor.—Jar of vertebrates and crabs from California; California minerals.

Mr. Tufts.—Living actinia and other marine animals for aquarium.

Colonel A. Vaughan.—Skins of *Vespertilio noctivagans* and *noveboracensis* from Yellowstone river.

J. X. de Vesey and *Dr. W. A. Hammond, U. S. A.*—Skins of birds and mammals from Kansas.

Dr. D. S. Wall, U. S. A.—Skull of Indian and fragments of pottery from a mound near Fort Capron, Florida; skins of birds; skin of manatee, or sea-cow, and of *Lynx;* also two birds from Florida.

William D. Wallach.—Copper ores and native copper from Bayfield, Wisconsin.

Robert B. Waller.—Bottle of Cyprinodonts from Alabama.

Lieutenant G. K. Warren.—Two boxes fossils from Blackbird Hill, collected by Dr. F. V. Hayden; collections made by Dr. F. V. Hayden during the exploration of the Black hills in 1857, consisting of 5 boxes zoological specimens; 21 boxes fossils and plants, &c.

C. W. Welch.—Troupial (*Icterus vulgaris*) from Laguayra.

D. Welch.—*Menobranchus maculatus* from Lake Champlain.

Samuel Wheat.—Living black snake (*Scotophis allegheniensis*) from Ohio.

Mr. Wheeler.—*Storeria dekayi* from Washington.

Thomas Whelpley—Fossils from Michigan.

Dr. D. D. Whitehurst.—Box of specimens and cask of fishes, &c., in alcohol, from Gulf of Mexico; specimens of fishes (crustacea) from Tortugas.

Dr. S. W. Wilson.—Four living alligators from Georgia; skeleton and skins of otter and deer; skins of *Lepus palustris;* 24 small mammals, in alcohol, from Georgia.

Dr. C. F. Winslow.—Box of lavas from Sandwich Islands; fossil bones from California. (Deposited.)

W. S. Wood.—Bald eagle, *Haliaetus leucocephalus*, mounted; mammals, in alcohol, from Philadelphia.

C. Wright.—Jar mammals and reptiles from Connecticut; fishes from Cuba, said to be viviparous; jars of reptiles, fishes, and invertebrates from Cuba.

G. Würdemann.—Box of invertebrates and skins of birds from Indian Key, Florida; box of bird skins from south Florida; box of birds, crustacea, corals, &c., from Key Biscayne, Florida.

J. E. Younglove.—Bottle of blind fish, (*Amblyopsis,*) taken in a well in Bowling Green, Kentucky.

Unknown.—Box iron ores, St. Louis, Missouri.

Hesperomys cognatus, in alcohol.

Hammerhead shark from Norfolk.

Living raccoon and great horned owl.

LIST OF METEOROLOGICAL STATIONS AND OBSERVERS

FOR THE YEAR 1857.

BRITISH AMERICA.

Name of observer.	Station.	N. lat.	W. long.	Height
		° ′	° ′	*Feet.*
Baker, J. C	Stanbridge, Canada East	45 08	73 00	
Craigie, Dr. W	Hamilton, Canada West	43 15	79 57	
Delany, jr., John	Colonial Building, St. John's, Newfoundland.	47 35	52 38	
Gunn, Donald	Red river Settlement, Hudson's Bay Territory.	50 06	97 00	853
Hall, Dr. Archibald	Montreal, Canada East	45 30	73 36	57
Hensley, Rev. J. M	King's College, Windsor, Nova Scotia.	44 59	64 07	200
Magnetic Observatory	Toronto, Canada West	43 39	79 21	108
Smallwood, Dr. Charles	St. Martin, Isle Jesus, Canada East.	45 32	73 36	118
Steuart, A. P. S	Horton, Nova Scotia	45 06	64 25	95

MAINE.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Bell, John J	Carmel	Penobscot	44 47	69 00	175
Dana, W. D	Perry	Washington	45 00	67 06	100
Gardiner, R. H	Gardiner	Kennebec	44 11	69 46	90
Guptill, G. W	Cornishville	York	43 40	70 44	800
Parker, J. D	Steuben	Washington	44 44	67 58	50
West, Silas	Cornish	York	43 40	70 44	784
Willis, Henry	Portland	Cumberland	43 39	70 15	87
Wilbur, Benj. F	Monson	Piscataquis	43 11	69 35	

NEW HAMPSHIRE.

Bell, Samuel N	Manchester	Hillsborough	42 59	71 28	300
Bixby, A. H	Francestown	Hillsborough	42 59	71 45	
Brown, B. Gould	Stratford	Coos	44 08	71 34	1,000
Freeman, F. N	Claremont	Sullivan	43 29	72 22	535
Hanscam, R. F	North Barnstead	Belknap	43 38	71 27	
Mack, R. C	Londonderry	Rockingham	42 53	71 20	
Odell, Fletcher	Shelburn	Coos	44 23	71 06	700
Prescott, Dr. Wm	Concord	Merrimack	43 12	71 29	374
Purmort, Nath	West Enfield	Grafton	43 30	72 00	
Root, Dr. Martin N	Francestown	Hillsborough	43 00	71 46	
Sawyer, Henry E	Great Falls	Strafford	43 17	70 52	
	Concord	Merrimack	43 12	71 20	

VERMONT.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Bliss, George	Shelburn	Chittenden	44 23	73 00	150
Bliss, L. W	West Fairlee	Orange	43 55	72 15	
Buckland, David	Brandon	Rutland	43 45	73 00	
Fairbanks, Franklin	St. Johnsbury	Caledonia	44 25	72 00	540
Marsh, Charles	Woodstock	Windsor	43 36	72 35	716
Jackman, A	Norwich	Windsor	43 42	72 20	
Paddock, James A	Craftsbury	Orleans	44 40	72 30	1,100
Parker, Joseph	Rupert	Bennington	43 15	73 11	750
Petty, McK	Burlington	Chittenden	44 29	73 11	346

MASSACHUSETTS.

Bacon, William	Richmond	Berkshire	42 23	73 20	1,190
Bond, Prof. W. C	Cambridge	Middlesex	42 22	71 07	71
Brooks, John	Princeton	Worcester	42 28	71 53	1,113
Darling, L. A	Bridgewater	Plymouth	42 00	71 00	142
Davis, Rev. Emerson	Westfield	Hampden	42 06	72 48	
Ellis, D. H	Canton	Norfolk	42 12	71 08	90
Fallon, John	Lawrence	Essex	42 42	71 11	35
Holcomb, Amasa	Southwick	Hampden	42 02	72 10	265
Lyons, Curtis J MaGee, Irving	Williamstown	Berkshire	42 43	73 13	720
Metcalf, Jno. G., M. D.	Mendon	Worcester	42 06	72 33	
Mitchell, Hon. Wm	Nantucket	Nantucket	41 16	70 06	30
Perkins, Dr. H. C	Newburyport	Essex	42 47	70 52	46
Rice, Henry	North Attleboro'	Bristol	41 59	71 22	175
Rodman, Samuel	New Bedford	Bristol	41 39	70 56	90
Sargent, John S	Worcester	Worcester	42 16	71 48	536
Schlegel, Albert	Taunton	Bristol	41 49	71 09	
Shaw, Francis	Plainfield	Hampshire	42 30	72 56	
Smith, E L	Boston	Suffolk	42 22	71 03	
Snell, Prof. E. S	Amherst	Hampshire	42 22	72 34	267
Tirrell, Dr. N. Quincy	Weymouth	Norfolk	42 10	71 00	150
Whitcomb, L. F	Florida	Berkshire	42 42	73 10	2,500

RHODE ISLAND.

Caswell, Prof. A	Providence	Providence	41 49	71 25	120

CONNECTICUT.

Edwards, Rev. T , D.D.	New London	New London	41 21	72 12	90
Harrison, Benj. F	Wallingford	New Haven	41 26	72 50	133
Hull, Aaron B	Georgetown	Fairfield	41 15	73 00	300
Hunt, D	Pomfret	Windham	41 52	72 23	596
Rankin, James	Saybrook	Middlesex	41 18	72 20	10
Scholfield, N	Norwich	New London	41 32	72 03	50
Yeomans, William H	Columbia	Tolland	41 42	72 16	

NEW YORK.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Alba, Dr. E. M	Angelica	Alleghany	42 15	78 01	1,500
Arden, Thomas B	Beverly	Putnam	41 22	72 12	180
Bowman, John	Baldwinsville	Onondaga	43 04	76 41	
Byram, Ephraim N	Sag Harbor	Suffolk	41 00	72 20	40
Chickering, J. W	Ovid	Seneca	42 41	76 52	800
Dayton, E. A	Madrid	St. Lawrence	44 43	75 33	280
Denning, William H	Fishkill Landing	Dutchess	41 34	74 18	42
Dewey, Prof. Chester Palmer, F. B	Rochester	Monroe	43 08	77 51	516
Fellows, Henry B	Sennett	Cayuga	43 00	76 55	
French, John R	Mexico	Oswego	43 27	76 14	423
Gorton, J. S	Westfarms	Westchester	40 53	74 01	150
Greene, Prof. Dascom	Troy	Rensselaer	42 44	73 36	58
Guest, W. E	Ogdensburgh	St. Lawrence	44 43	75 26	
House, J. Carroll	Lowville	Lewis	43 46	75 38	
House, John C	Waterford	Saratoga	42 47	73 39	
Howell, R	Nicholls	Tioga	42 00	76 32	
Ingalls, S. Marshall	Pompey	Onondaga	42 56	76 05	1,745
Johnson, E. W	Canton	St. Lawrence	44 38	75 15	304
Landon, Anna S	Eden	Erie	42 30	79 07	700
Lefferts, John	Lodi	Seneca	42 37	76 53	1,000
Malcolm, Wm. S	Oswego	Oswego	43 28	77 34	232
Morehouse, A. W	Spencertown	Columbia	42 19	73 41	800
Morris, Prof. O. W	New York	New York	40 43	74 05	159
Norton, J. H	Plainville	Onondaga	43 00	77 15	
Paine, H. N., M. D	Clinton	Oneida	43 00	75 20	500
Pernot, Prof. Claudius	Fordham	Westchester	40 54	74 03	147
Reed, Edward C	Homer	Cortland	42 38	76 11	1,100
Reid, Peter	Lake	Washington	43 15	73 33	
Riker, Walter H	Saratoga	Saratoga	43 06	74 00	960
Sanger, Dr. W. W	Blackwell's Isl'd.	New York	40 45	73 57	29
Sartwell, Dr. H. P	Penn Yan	Yates	42 42	77 11	740
Sheerar, H. M	Wellsville	Alleghany	42 07	78 06	1,480
Sias, Prof. Solomon	Fort Edward	Washington	43 13	73 42	
Smith, J. Metcalf	McGrawville	Cortland	42 34	76 11	1,450
Spooner, Stillman	Wampsville	Madison	43 04	75 50	500
Taylor, Jos. W	Plattsburgh	Clinton	44 40	73 26	156
Titus, Henry Wm	Bellport	Suffolk	40 44	72 54	
Tourtellot, Dr. L. A	Utica	Oneida	43 07	75 15	500
Van Kleek, Rev. R. D	Flatbush	Kings	40 37	74 01	54
White, Aaron	Cazenovia	Madison	42 55	75 46	1,260
Williams, Dr. P. O	Watertown	Jefferson	43 56	75 55	
Wilson, Rev. W. D	Geneva	Ontario	42 53	77 02	567
Woodward, Lewis	West Concord	Erie	43 00	79 00	2,000
Yale, Walter D	Houseville	Lewis	43 40	75 32	
Zaepffel, I	West Morrisania	Westchester	40 53	74 01	150

NEW JERSEY.

Cooke, Robert L	Bloomfield	Essex	40 49	74 11	120
Schmidt, Dr. E. R	Burlington	Burlington	40 00	75 12	26
Sergeant, John T	Sergeantsville	Hunterdon	40 29	75 03	
Simpson, B. F. Willis, O. R	Freehold	Monmouth	40 15	74 21	
Whitehead, W. A	Newark	Essex	40 45	74 10	30

PENNSYLVANIA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Brown, Samuel	Bedford	Bedford	40 01	78 30	
Baird, John H.	Tarentum	Alleghany	40 37	79 19	950
Brickenstein, H. A.	Nazareth	Northampton	40 43	75 21	
Brugger, Samuel	Fleming	Centre	40 55	77 53	780
Coffin, Selden, J.	Easton	Northampton	40 43	75 16	320
Comly, John	Byberry	Philadelphia	40 06	74 58	
Darlington, Fenelon	Pocopson	Chester	39 54	75 37	218
Edwards, Joseph	Chromedale	Delaware	39 55	75 25	196
Eggert, John	Berwick	Columbia	41 05	76 15	588
Friel, P.	Shamokin	Northumberland	40 45	76 31	700
Hance, Ebenezer	Morrisville	Bucks	40 12	74 53	30
Heisely, Dr. John	Harrisburg	Dauphin	40 16	76 50	
Hickok, W. O.	Harrisburg	Dauphin	40 16	76 55	
Hoffer, Mary E.	Mount Joy	Lancaster	40 08	76 70	
Jacobs, Rev. M.	Gettysburg	Adams	39 51	77 15	
James, Prof. Charles S.	Lewisburg	Union	40 58	76 58	
Kirkpatrick, Prof. J. A.	Philadelphia	Philadelphia	39 57	75 11	60
Kohler, Edward	North Whitehall	Lehigh	40 40	75 26	250
Martin, William	Pittsburg	Alleghany	40 30	80 00	
Mowry, George	Somerset	Somerset	40 02	79 02	2,180
Ralston, Rev. J. Grier	Norristown	Montgomery	40 08	75 19	153
Schreiner, Francis	Moss Grove	Crawford	41 40	79 51	
Smith, Prof. Wm.	Canonsburg	Washington	40 25	80 07	936
Smyser, Rev. B. R.	Pottsville	Schuylkill	40 41	76 09	
Stewart, Thos. B.	Murrysville	Westmoreland	40 28	79 35	960
Swift, Dr. Paul	West Haverford	Delaware	40 00	75 21	
Thickstun, T. F.	Meadville	Crawford	41 39	80 11	1,088
Wilson, Prof. W. C.	Carlisle	Cumberland	40 12	77 11	500
Wilson, W. W.	Pittsburg	Alleghany	40 32	80 02	1,026

DELAWARE.

Craven, Thos. J. Porter, Mrs. E. D.	Newark	New Castle	39 38	75 47	120
Martin, R. A.	Milford	Kent	39 55	75 27	25

MARYLAND.

Baer, Miss H. M.	Shellman Hills	Carroll	39 23	76 57	700
Cofrau, L. R.	Oakland	Alleghany	39 40	79 00	
Goodman, Wm. R.	Annapolis	Anne Arundel	38 58	76 29	20
Hanshew, Henry E.	Frederick	Frederick	39 24	77 18	
Lowndes, Benj. O.	Bladensburg	Prince George	38 57	76 58	
Mayer, Prof. Alfred	Baltimore	Baltimore	39 18	76 37	
Pearce, James A., jr.	Chestertown	Kent	39 14	76 02	
Stagg, T. G.	Ridge	St. Mary's	38 05	76 18	

DISTRICT OF COLUMBIA.

Smithsonian Institution.	Washington	Washington	38 53	77 01	30

VIRGINIA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Astrop, Col. R. F.	Crichton's Store	Brunswick	36 40	77 46	500
Couch, Samuel	Ashland	Putnam	38 38	81 57	
Dickinson, George C.	Rougemont	Albemarle	38 05	78 21	450
Ellis, Col. D. H.	Crack Whip	Hardy	39 30	78 31	1,750
Fauntleroy, H. H.	Montrose	Westmoreland	38 07	76 54	200
Fraser, James	Mustapha	Wood	39 20	81 41	
Hallowell, Benjamin	Alexandria	Alexandria	38 48	77 01	56
Hoff, Josiah W.	Wirt C. H.	Wirt	39 05	81 26	
Hotchkiss, Jed	Mossy Creek	Augusta	38 20	79 05	
Johnson, Enoch D.	Sisterville	Tyler	39 34	80 56	540
Kendall, James E.	Charleston	Jefferson	38 20	81 21	
Kownslar, Miss Ellen	Berryville	Clark	39 09	78 00	575
Marvin, John W.	Winchester	Frederick	39 15	78 10	
Offutt, J. J., M. D.	Capon Bridge	Hampshire	39 16	78 29	
Patton, Thomas, M. D.	Lewisburg	Greenbrier	38 00	80 00	2,000
Purdie, John R.	Smithfield	Isle of Wight	36 50	76 41	100
Ruffin, Julian C.	Ruthven	Prince George	37 21	77 33	
Ruffner, David L.	Kanawha	Kanawha	38 53	81 25	
Slaven, James	Meadow Dale	Highland	38 23	79 35	
Upshaw, George W.	Rose Hill	Essex	38 00	76 57	250
Webster, Prof. N B.	Portsmouth	Norfolk	36 50	76 19	34
Wells, J. Carson	Salem	Roanoke	39 20	80 01	1,100
Wickline, Thomas J.	Longwood	Rockbridge	37 30	79 31	800

NORTH CAROLINA.

Johnson, Dr. W. M.	Warrenton	Warren	36 30	78 15	
McDowell, Rev. A.	Murfreesboro'	Hertford	36 30	77 06	
McDowell, W. W.	Asheville	Buncombe	35 37	82 29	2,250
Moore, Geo. F., M. D.	Gaston	Northampton	36 32	77 45	
Morelle, Daniel	Goldsboro'	Wayne	35 20	77 51	
Phillips, Rev. Jas., D. D.	Chapel Hill	Orange	35 54	79 17	

SOUTH CAROLINA.

Cornish, John H.	Aiken	Barnwell	33 32	81 34	565
Dawson, John L., M. D.	Charleston	Charleston	32 46	80 00	
Fuller, E. N., M. D.	Edisto Island	Colleton	32 34	80 18	23
	Mount Pleasant	Laurens	32 47	79 55	
Glennie, Rev. Alex'r.	Waccaman	All Saints	33 40	79 17	20
Johnson, Joseph, M. D.	Charleston	Charleston	32 46	80 00	30
Young, J. A., M. D.	Camden	Kershaw	34 17	80 33	275

GEORGIA.

Anderson, Jas, M. D.	The Rock	Upson	32 52	84 23	833
Arnold, Mrs. J. T.	Zebulon	Pike	33 07	84 26	
Easter, Prof. John D.	Athens	Clarke	33 58	83 80	850
Gibson, R. T.	Whitemarsh Is'd.	Savannah	32 04	81 05	18

GEORGIA—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Glover, Eli S	Hillsboro'	Jasper	33 13	83 45	566
Haines, William	Augusta	Richmond	33 20	81 54	1,470
Pendleton, E. M., M. D.	Sparta	Hancock	33 17	83 09	550
Posey, John F	Savannah	Chatham	32 05	81 07	42
Reid, James M	Philomath	Oglethorpe	33 45	83 15	
Simpson, F. T	Factory Mills	Wilkes	33 40	84 46	

FLORIDA.

Bailey, James B	Gainesville	Alachua	29 35	82 26	184
Baldwin, A. G., M. D.	Jacksonville	Duval	30 30	82 00	13
Batchelder, F. L	Hibernia	Duval	30 15	81 30	15
Dennis, Wm. C	Salt Ponds	Key West	24 33	81 48	
Fry, Joseph Hester, Lieut. J. W., U. S. N	Pensacola	Escambia	30 20	87 16	12
Ives, Edward R	Alligator	Columbia	30 12	82 37	174
Mauran, P. B., M. D.	St. Augustine	St. John's	29 48	81 35	8
Steele, Judge Aug	Cedar Keys	Levy	29 07	83 02	12
Whitner, Benj. F	Belair	Leon	30 24	84 20	70

ALABAMA.

Alison, H. L, M. D	Carlowville	Dallas	32 10	87 15	300
Barker, Thomas M	Ashville	St. Clair	33 52	86 20	
Darby, Prof. John	Auburn	Macon	32 37	85 34	821
Tutwiler, Henry	Greene Springs	Greene	32 50	87 46	
Waller, Robert B	Greensboro'	Greene	32 40	87 34	350

MISSISSIPPI.

Elliott, Prof. J. Boyd	Port Gibson	Claiborne	31 50	91 01	100
Lull, James S	Columbus	Lowndes	33 30	88 29	227

LOUISIANA.

Barton, Dr. E. H.	New Orleans	Orleans	29 57	90 00	
Kilpatrick, A. R., M. D.	Trinity	Chatahoula	31 30	91 46	108
Merrill, Edward, M. D.	Trinity	Chatahoula	31 37	91 47	68
Taylor, Lewes B	New Orleans	Orleans	29 57	90 00	

TEXAS.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Brightman, John C.	Goliad	Goliad	28 30	97 15	50
	Helena	Karnes	29 00	97 56	600
Forke, J. L.	New Wied	Comal	29 42	98 15	
Forke, A. / Friedrick, Otto	New Braumfels	Comal	29 41	98 15	
Gantt, Dr. Wm. H.	Union Hill	Washington	30 30	96 31	540
Jennings, S. K., M.D. / Van Nostrand, J.	Austin	Travis	30 20	97 46	650
Rucker, B. H.	Washington	Washington	30 26	96 15	

TENNESSEE.

Bean, James B.	Walnut Grove	Greene	36 00	82 53	1,350
Stewart, Prof. Wm. M.	Glenwood	Montgomery	36 28	87 13	481
Tuck, W. J., M. D.	Memphis	Shelby	35 08	90 00	262
Wright, Dr. Dan'l F.	Memphis	Shelby	35 08	90 00	262

KENTUCKY.

Beatty, O.	Danville	Boyle	37 40	84 30	950
Ray, L. G., M. D.	Paris	Bourbon	38 16	84 07	810
Savage, Rev. Geo. S.	Millersburg	Bourbon	38 20	84 20	804
Young, Mrs. Lawrence	Springdale	Jefferson	38 07	85 34	570

OHIO.

Abell, B. F.	Welchfield	Geauga	41 23	81 12	1,115
Allen, Prof. Geo. N.	Oberlin	Loraine	41 20	82 15	800
Ammen, J.	Ripley	Brown	38 47	83 31	
Anthony, Newton	Mount Union	Stark	41 20	81 01	
Atkins, Rev. L. S.	Madison	Lake	41 49	81 10	
Benner, J. F.	New Lisbon	Columbiana	40 45	80 46	
Bennett, Henry	Collingwood	Lucas	41 49	83 34	
Binkerd, J. S.	Germantown	Montgomery	39 39	84 11	
Bosworth, Prof. R. S.	College Hill	Hamilton	39 19	84 25	800
Cunningham, Miss A.	Unionville	Lake	41 52	81 00	650
Dayton, Lewis M.	Lancaster	Fairfield	39 40	82 40	
Gilmor, Moses	Jackson	Jackson	39 10	82 32	666
Hannaford, Ebenezer	Cheviot	Hamilton	39 07	84 34	
Harper, George W.	Cincinnati	Hamilton	39 06	84 27	150
Herrick, James D.	Jefferson	Ashtabula	42 00	81 00	
Hollenbeck, F. & D. K.	Perrysburg	Wood	41 39	83 40	
Holston, J. G. F., M. D.	Zanesville	Muskingum	39 58	82 01	700
Hurt, Francis W.	Cincinnati	Hamilton	39 06	84 34	
Hyde, Gustavus A.	Cleveland	Cuyahoga	41 30	81 40	665
Ingram, John, M. D.	Savannah	Ashland	41 12	82 31	
Janes, C. C.	Hillsborough	Highland.			
Luther, S. M.	Hiram	Portage	41 20	81 15	675

OHIO—Continued.

Name of observer.	Station.	County.	N. lat.	W. long	Height.
			° ′	° ′	*Feet.*
Mathews, Joseph McD.	Hillsborough	Highland	39 13	83 30	1,000
McCarty, H. D.	West Bedford	Coshocton	40 18	82 01	876
Peck, W. R., M. D.	Bowling Green	Wood	41 27	83 45	700
Poe, James H.	Portsmouth	Scioto	38 50	82 49	468
Roger, A. P.	Gallipolis	Gallia	39 00	82 01	520
Sanford, Prof. S. N.	Granville	Licking	40 03	82 34	995
Sanford, Smith	Edinburg	Portage	41 20	81 00	520
Schenck, W. L., M. D.	Franklin	Warren	39 30	84 10	
Shaw, Joseph	Bellefontaine	Logan	40 21	83 40	1,031
Shaw, Joseph	Sidney	Shelby	40 21	84 11	
Shields, Robert Smith, John C.	Bellecentre	Logan	40 28	83 45	1,170
Treat, Samuel W.	Windham	Portage	41 10	81 05	
Ward, L. F.	Medina	Medina	41 07	81 47	1,206
Williams, Prof. M. G.	Urbana	Champaign	40 06	83 43	1,015

MICHIGAN.

Allen, James	Port Huron	St. Clair	42 53	82 24	606
Andrews, Seth L., M. D.	Romeo	Macomb	42 44	83 00	730
Campbell, Wm. M., M. D.	Battle Creek	Calhoun	42 20	85 10	750
Crosby, J. B.	New Buffalo	Berrien	41 45	86 46	600
Currier, Alfred O.	Grand Rapids	Kent	43 00	86 00	752
Streng, L. H.	Grand Rapids	Kent	43 00	86 00	852
Walker, Mrs. Octavia C.	Cooper	Kalamazoo	42 40	85 31	
Whelpley, Miss H	Monroe	Monroe	41 56	83 22	590
White, Peter	Marquette	Marquette	46 32	87 41	630
Whittlesey, Chas. S.	Copper Falls	Houghton	47 25	88 16	1,230
Winchell, Prof. A	Ann Arbor	Washtenaw	42 16	83 44	891
Woodruff, Lum	Ann Arbor	Washtenaw	42 16	83 30	850

INDIANA.

Barnes, C.	New Albany	Floyd	38 17	85 45	
Chappellsmith, John	New Harmony	Posey	38 08	87 50	320
Crisp, John F.	Evansville	Vanderburgh	38 08	87 29	390
Lasselle, Charles B.	Logansport	Cass	40 45	86 13	600
Moore, Joseph	Richmond	Wayne	39 47	84 47	800
Smith, Hamilton	Cannelton	Perry	37 58	86 40	450
Woodard, C. S.	Michigan City	La Porte	41 41	86 53	622

ILLINOIS.

Babcock, Andrew J.	Aurora	Kane	41 40	88 15	600
Babcock, E.	Riley	McHenry	42 08	88 33	650
Baker, Frank	South Pass	Union	37 28	89 14	
Bowman, Dr. E. H.	Edgington	Rock Island	41 25	90 46	
Brendel, Fred'k, M. D.	Peoria	Peoria	40 36	89 30	
Eldredge, William V.	Brighton	Macoupin	39 00	90 13	

ILLINOIS—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Grant, John	Manchester	Scott	39 33	90 34	683
Hall, Joel	Athens	Menard	39 52	89 56	
Harris, J. O., M. D.	Ottawa	La Salle	41 20	88 47	500
Hiscox, G. D.	Chicago	Cook	41 53	87 41	600
James, Anna	Upper Alton	Madison	39 00	89 36	
Jenkins, J. L.	Granville	Putnam	41 14	89 21	
Mead, S. B, M. D.	Augusta	Hancock	40 12	89 45	200
Mead, Thompson	Batavia	Kane	41 52	88 20	636
Riblet, J. H.	Pekin	Tazewell	40 36	89 45	
Rogers, O. P.	Marengo	McHenry	42 14	88 38	650
Smith, Isaac H.	Fremont Centre	Lake	42 18	88 06	736
Swain, John, M. D.	West Urbana	Champaign	40 09	88 17	550
Titze, Henry A.	West Salem	Edwards	38 30	88 00	
Wallace, Samuel Jacob.	Carthage	Hancock	40 23	90 17	
Whitaker, Benjamin	Warsaw	Hancock	40 20	91 31	

MISSOURI.

Wislizenus, A., M. D.	St. Louis	St. Louis	38 37	90 16	461

IOWA.

Beal, Dexter Beal, Willard W.	Franklin	Buchanan	42 45	87 16	
Beeman, Carlisle D.	Rossville	Allamakee	43 10	91 21	1,400
Fory, John C.	Bellevue	Jackson	42 15	90 25	
Goss, William K.	Border Plains	Webster	42 36	94 05	
Hobart, Edward F.	Maquoketa	Jackson	42 04	90 41	
Horr, Asa, M. D.	Dubuque	Dubuque	42 30	90 52	1,258
McConnell, Townsend.	Pleasant Plain	Jefferson	41 07	91 54	
McCready, Daniel	Fort Madison	Lee	40 37	91 28	
Parker, Nathan H.	Clinton	Clinton	41 48	90 15	
Parvin, T. S.	Muscatine	Muscatine	41 26	91 05	586
Reynolds, W.	Iowa City	Johnson	41 39	91 33	
Saville, Dr. J. J.	Sioux City	Woodbury	42 31	96 25	
Shaffer, J. M., M. D.	Fairfield	Jefferson	41 01	91 57	940
Smith, Prof, B. Wilson	Mount Vernon	Linn	42 00	91 00	

WISCONSIN.

Bean, Prof. S. A. Slye, L. C., M. D.	Waukesha	Waukesha	42 50	88 11	833
Breed, J. Everett	New London	Waupacca	44 21	88 45	
Chandler, Marine T. W.	Falls of St. Croix	Polk.	45 30	92 40	660
Durham, W. J.	Racine	Racine	42 49	87 40	
Ellis, Edwin	Bay City	La Pointe	46 33	91 00	658
Gridley, Rev. John	Kenosha	Kenosha	42 35	87 50	600
Hillier, Spencer L.	Prescott	Pierce	44 56	92 40	800
Himoe, John E.	Norway	Racine	42 50	88 10	753

WISCONSIN—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Lapham, Increase A.	Milwaukie	Milwaukie.	43 03	87 57	593
Lüps, Jacob	Manitowoc	Manitowoc	44 07	87 37	
Mason, Prof. R. Z.	Appleton	Outagamie	44 10	88 35	800
Pickard, J. L., M. D.	Platteville	Grant	42 45	91 00	
Pomeroy, F. C.	Milwaukie	Milwaukie	43 04	87 59	658
Porter, Prof Wm.	Beloit	Rock	42 30	89 04	750
Schue, A., M. D.	Madison	Dane	43 05	89 25	892
Sterling, Prof. J. W.	Madison	Dane	43 05	89 25	892
Struthers, R. H.	Lind	Waupacca	44 20	89 00	
Underwood, Col. D.	Menasha	Winnebago	44 13	88 18	
Winkler, C., M. D.	Milwaukie	Milwaukie	43 04	87 57	593
Willard, J. F.	Janesville	Rock	42 42	89 91	768

MINNESOTA.

Garrison, O. E.	Princeton	Benton	45 50	93 45	
Hillier, Spencer L.	Wabashaw	Wabashaw	44 30	92 15	850
Odell, Rev. Benj. F.	Lake Winnibigoshish.		47 30	94 40	
Riggs, S. R.	Hazlewood		45	95 30	
Walsh, Stephen	Buchanan		47 33	92 00	
Wright, E. M.	Lapham	Pembina	46 10	96 00	850

NEBRASKA.

Byers, Wm. N.	Omaha	Douglas	41 15	96 10	
Hamilton, William	Bellevue	Sarpy	41 08	95 50	

KANSAS.

Brown, G. W.	Lawrence	Douglas	38 58	95 12	800
Fish, Edmund	Council City	Shawnee	38 42	95 50	
Goodnow, Isaac T.	Manhattan	Riley	39 13	96 45	
Himoe, S O., M. D.	Mapleton	Bourbon	38 04	94 51	
McCarty, H. D.	Leavenworth City	Leavenworth	39 20	94 33	1,342

UTAH.

Phelps, Henry E.	Great Salt Lake City.		40 45	111 26	4,250

CALIFORNIA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Ayres, W. O., M. D.	San Francisco	San Francisco	37 48	122 23	115
Belcher, W. C.	Marysville	Yuba	39 12	121 42	
Logan, Thos. M., M.D.	Sacramento	Sacramento	38 35	121 40	49

GUATEMALA.

CANUDUS, ANTONIO COLLEGE.

SOUTH AMERICA.

Name of Observer.	Station.	Lat.	Lon.	Height.
		° ′	° ′	*Feet.*
Fendler, A.	Colonia Tovar, Venezuela	10 26	67 20	6,500
Geological Surveyors	Port of Spain, Trinidad	10 39	61 34	16
Hering, C. J.	Plantation, Catharina Sophia, Colony of Surinam, Dutch Guiana	5 48	56 47	
Uricoschea, Dr. E.	Bogota, New Granada	4 36	74 14	8,863

BERMUDA.

Arnold, James B.	Shelby Bay	32 28	64 32	
Royal Gazette				

AZORES.

Dabney, S. W.	Honta, Fayal Island	38 30	28 42	80

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee respectfully submit to the Board of Regents the following report of the receipts and expenditures of the Smithsonian Institution during the year 1857, with estimates for the year 1858:

RECEIPTS.

The whole amount of Smithson's bequest deposited in the treasury of the United States is $515,169, from which an annual income, at 6 per cent., is derived, of		$30,910 14
Extra fund from unexpended income invested as follows:		
In $75,000 Indiana 5 per cent. bonds, yielding	$3,750 00	
In $53,000 Virginia 6 per cent. bonds, yielding	3,210 00	
In $7,000 Tennessee 6 per cent. bonds, yielding	420 00	
In $500 Georgia 6 per cent. bonds, yielding	30 00	
In $100 Washington 6 per cent. bonds, yielding	6 00	
		7,416 00
		38,326 14
Balance in hands of Treasurer January 1, 1857		7,164 32
Total receipts		$45,490 46

GENERAL STATEMENT OF EXPENDITURES.

For building, furniture, and fixtures	$4,062 65	
For items common to the different objects of the Institution	13,035 18	
For publications, researches, and lectures.	11,051 52	
For library, museum, and gallery of art..	6,999 81	
		$35,149 16
Balance in the hands of the Treasurer January 1, 1858, of which $5,000 belongs to the extra fund.		10,341 30

REPORT OF THE SECRETARY FOR 1858.

To the Board of Regents of the Smithsonian Institution:

GENTLEMEN: The principal event of importance in the history of the Institution during the past year is the transfer of the government collections from the Patent Office to the large room of the Smithsonian building.

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 inexpedient 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 his-

tory 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 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 Thos.

U. Walter, esq., architect of the United States Capitol extension, for the beautiful design of the cases, and to Edw. 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 had 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.

Among the specimens many duplicates occur which might be advantageously distributed, perhaps to the principal societies of natural history in this and other countries; and I respectfully ask the Board of Regents to determine, regarding this point, whether, in their judgment, the Institution can venture to make such distribution without further instruction from Congress. If within its power, this measure would seem evidently calculated to further one of the legitimate ends of the Institution in diffusing more widely the materials of science and the means of education.

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 continually 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.

It is a matter of congratulation to be able to announce to the Board the continued prosperous financial condition of the Institution. The investment of the extra fund in State stocks has proved to be judicious. They now yield the Institution an annual income of upwards of seven thousand dollars. It may also be mentioned in this place, as a fact of interest to the friends of the Institution, that from the report of the governor of Arkansas it appears that the original fund received by the United States from Smithson's bequest, and lent by the government to that State, will in due time be repaid, and that the general government will in no respect be a loser by having accepted the charge and administration of this trust.

The income of the Institution being payable periodically on the 1st January and 1st July, it is obvious that the current expenses, which are continuous, cannot all be met as they accrue. An effort has therefore been made for the last two years so to curtail the expenditure as to accumulate in the treasury a half year's interest. This object will be fully accomplished during the next year. For the future, therefore, we shall be enabled to pay cash for printing, paper, &c., and thus save a considerable per centage on the cost of these articles.

Comparatively few repairs have been required during the past year on the building, though the changes which have been necessary to accommodate the increasing operations of the Institution have involved considerable expense. The corridors, which were entirely open to the northwest wind, have been enclosed with glazed sashes; a large amount of space has thus been rendered available, and a considerable portion of the interior of the building protected from the inclemency of the weather.

The heating of the building is a heavy item of expense, and must continue to be so until double windows can be furnished, particularly on the north side, and a more economical as well as efficient method of warming be adopted. The whole length of the building is four hundred and fifty feet, one-third of which, at least, is occupied by a series of windows, through which the heat of the air within so rapidly escapes by contact with the cold glass that the cost of inner windows would be saved in the course of a few years.

The smaller rooms are mostly heated by stoves, and the larger ones by furnaces. Estimates have been procured for substituting hot water

apparatus, but the expense of introducing this method is so great that we would hesitate to advise its adoption at present.

It may be proper again to mention the fact that the grounds on which the Smithsonian building stands, are under the charge of the Commissioner of Public Buildings, and that, though several thousand dollars of the income of the Smithsonian fund were originally expended for their improvement, the Institution has surrendered all control over them. It is believed, however, that Congress will in due time make a more liberal appropriation for the improvement of the public Mall, of which the Smithsonian reservation, as it is sometimes called, forms a part, and for carrying out the original design of the lamented Downing, which connects in one common plan a succession of enclosed parks, extending from the Capitol to the Potomac.

The proposition to supply the public grounds with a complete series of American trees has long been contemplated, but as no appropriation has been made by Congress for this purpose, the Patent Office, conjointly with this Institution, has taken the preliminary steps by issuing a circular asking for seeds of every species of our forest trees and shrubs that would be likely to thrive in this latitude. This circular has been widely distributed, and it is hoped will meet with a favorable response from all who are interested in making more generally known, and in introducing into more extensive cultivation, the natural ornamental products of our own soil. The seeds are to be sent by mail to the Commissioner of Patents, and placed in charge of the officers having the care of the public grounds.

It may be mentioned in this connexion that the original plan of Captain Meigs for the supply of the city with water contemplates a series of fountains to ornament the public reservations. To the same valuable improvement we shall also owe the introduction, probably during the present year, of a full supply of Potomac water into the Smithsonian building.

Publications.—The publications of the Institution may at present be divided into three classes: 1st, the "Contributions to Knowledge," in quarto form; 2d, the annual report to Congress, printed at the expense of government; 3d, irregular series, such as the meteorological and physical tables, directions for observations, special reports, &c., in octavo, to which has been given the name of "Smithsonian Miscellaneous Collections."

The tenth volume of the Contributions has been printed, and is

now ready for distribution. It contains the third and concluding part of the Nereis Boreali Americana, a Grammar and Dictionary of the Yoruba Language, and the magnetic observations made under the direction of Dr. Kane during his last Arctic expedition.

The issuing of this volume has been delayed on account of the interruption in the printing of the Yoruba Grammar, caused by the absence of the author, the Rev. Mr. Bowen. It was, however, essentially completed within the year 1858, and will bear that date.

The articles which the volume contains have been described in previous reports, with the exception of the magnetic observations made by Dr. Kane.

1. It will probably be recollected that the plan of exploration proposed by Dr. Kane for his last voyage was recommended to the favorable attention of the Secretary of the Navy by the Smithsonian and other institutions, and that the expedition was furnished with magnetic and meteorological instruments jointly by the Coast Survey and this Institution. The observations above mentioned are a part of those which were made with these instruments. They were reduced and prepared for publication at the expense of the Institution, under the direction of Professor Bache, by Charles A. Schott, esq., and form additions to our knowledge of the direction and intensity of the magnetic force in the inhospitable regions of the north, of sufficient value to fully justify the interest which was taken in promoting the organization and the fitting out of the expedition.

The following extracts from the remarks of Professor Bache to the American Association will serve to exhibit the light in which these observations were regarded by him, nor can they be otherwise than acceptable as the expression of an opinion in which all will concur who were acquainted with our lamented fellow countryman, or who are capable of appreciating his labors:

"The scientific reader of the narrative of the second Arctic expedition would be struck by the fact that while in the preface Dr. Kane disclaimed all pretensions of a scientific character for his work, it contained, nevertheless, some of the most important contributions to our knowledge of the natural history and physical phenomena of the interesting regions visited by the intrepid explorers. Dr. Kane appreciated highly all the relations, direct and indirect, which science has to an exploring expedition. He was ever careful to surround himself with those who could, in their special departments, make valuable

observations, while his own rare administrative capacity always gave them opportunity for the exercise of their abilities. Himself an admirable observer and well trained in the use of instruments, he was always at hand to direct or to assist, as the occasion might require. The labors in physical observation of Dr. Kane and his associates had few parallels when the difficulties to be surmounted and the results produced are considered."

The magnetic observations were properly placed in the hands of Mr. Schott for discussion, as he had been selected for similar service by Dr. Kane himself, and felt a strong interest in the work. The principal magnetical results were obtained on the coast of Greenland during the years 1853-'54-'55, and in regard to the high magnetic and geographical latitudes in which the observations were made, as well as the completeness of the observations for diurnal changes of the horizontal needle at a station before unknown to geography, "they deserve," says Professor Bache, "the attention of those engaged in the study of the law of the changes of the magnetic elements in the Arctic regions." At a late meeting of the British Association resolutions were passed making application to the English government to send a vessel to the vicinity of Mackenzie river to institute observations with special reference to the determination of the laws now known to govern the magnetic storms. The resolutions also insist on the importance of observations in the northern regions. Captain Younghusband, of the royal navy, remarks, in his discussion of those of Sir John Richardson, that "so few observations of the diurnal variation of the declination in high latitudes are up to this time at command, that not even an approach can be made towards indicating a general law of the phenomena in such localities."

The Winter Quarters at Van Rensselaer Harbor, where most of the observations of Dr. Kane were made, is in latitude 78° 37′, to the northward and eastward of Cape Alexander, beyond Smith's sound.

The following is an outline of the discussion and of the results obtained by Mr. Schott from Dr. Kane's magnetic observations at Van Rensselaer Harbor. The *diurnal ranges of the declination* were deduced from observations on seventeen days in January, February, and March, 1854. The mean diurnal range or motion of the needle was found equal to 2° 29′, and the greatest range observed amounted to 4° 52′. The results were compared with similar ones at Lake Athabasca, Fort Simpson, and Port Bowen. A classification was made of the observed ranges according to their frequency and magnitude. The

values of the *diurnal inequality of the declination* were deduced for every hour (mean local time) and also compared with similar values for the same period observed at Greenwich. This inequality at these two stations presents, in general, the same characteristic features, namely: the principal deflection of the needle to the west shortly after noon, and the opposite eastern deflection about midnight. The extreme westerly position at Van Rensselaer Harbor is attained at noon; the easterly extreme is reached at 2 a. m. A small disturbance is noted at the hours of 4 and 5 p. m. While the diurnal variation agrees with that observed at Lake Athabasca, Fort Simpson, Sitka, Toronto, &c., it shows no trace of that marked deviation exhibited at Reikiavik, in Iceland, and Fort Confidence. The results were further compared with similar ones at Whalefish islands and Port Bowen. The range of the mean diurnal inequality was 1° 7′.

The mean disturbance of the declination for each hour was found greater than at Lake Athabasca and Fort Simpson. The disturbing force is least from 10 a. m. to 7 p. m., and greatest and equally regular from 8 p. m. to 8 or 9 a. m. At noon, as at Lake Athabasca, Toronto, and Sitka, an increase in the mean disturbance is noticed. The minimum disturbance takes place at 5 p. m. The mean monthly disturbance was greatest in February. The recognition and separation of the disturbed observations was effected by application of a method proposed by Professor Peirce, according to which, one in every eighteen of the whole number was found disturbed, that is, differing more than 1° 38′ from the mean, while at Toronto the disturbance was one in every seventeen. The *aurora borealis* was carefully noted, and in no case did the needle show any special deviation during its occurrence—a remarkable circumstance, in consideration of the fact of the great disturbances noted during the appearance of this phenomenon farther south.

The term-day observations, made once in each month, from January to July, 1854, were exhibited graphically, and compared with corresponding observations at Washington and Greenwich. The observations are marked by the absence of any considerable disturbance, and by the small diurnal range at the time of the equinox. The *absolute declination* was determined on three days in June, 1854, and found to be 108° 12′ west. The *magnetic inclination* was obtained at ten stations, which gave for Van Rensselaer's Harbor a dip of 84° 45′.8 from observations between January, 1854, and May, 1855.

The magnetic intensity was derived from observations of deflections and vibrations made between January, 1854, and May, 1855, the magnetic moment of the magnet having been determined at Washington. From twenty-three separate values the horizontal intensity was found equal to 1.139, corresponding to the epoch of June, 1854. The total force was 12.48. In the summer of 1855 the horizontal intensity at Hakluyt island was found to be 1.344, and at Cape York 1.573.

The remaining series of the Arctic observations under the direction of Dr. Kane are still in process of reduction; though a portion of the tabular matter has been sent to the printer to avoid delay in the publication, and will be included in the eleventh volume of Smithsonian Contributions. They relate to temperature, winds, moon culminations, twilight, halos, moisture, atmospheric pressure, and tides. The mere enumeration of the objects which engaged the active mind of the distinguished explorer, is sufficient, when we consider his feeble physical powers, to account for the untimely loss which science and humanity have been called on to deplore.

2. Another paper shortly to be put to press consists of an account of the results of a series of physical observations by Dr. Luis Berlandier, the notice of which may perhaps be best introduced by a statement of the following facts given in my Report to the Regents for 1854. Dr. Luis Berlandier, a member of the Academy of Geneva, visited Mexico in 1826 for the purpose of making a scientific examination of the country. Soon after his arrival he was appointed one of a commission, organized by the then new republic, with the object of defining the boundaries, extent, natural resources, &c., of the northern or frontier States. The position gave him unusual facilities for observation relative to the character of the country, and for making collections to illustrate its natural history. He, however, never returned to his native country, but married and settled in Mexico, and there continued his researches until the period of his death in 1851. In the year 1853 Lieutenant Couch, U. S. A., made a scientific exploration in Mexico under the auspices of the Institution, and was so fortunate as to procure the manuscripts and collections of Dr. Berlandier. He presented to this Institution all of those which related to meteorology and natural history, and offered to sell to the government at a low price the remainder, containing historical and geographical information, chiefly pertaining to the States of the old republic which lay between the Sabine and the Sierra Madre. It is to be regretted that this proposition was not accepted, since in

order to reimburse himself for the original cost of the manuscripts he was induced to dispose of them to a private individual.

The portions of the manuscripts relating to meteorology were placed in the hands of Professor Coffin for reduction. They consist, either in summary or in detail, of the results of a series of nearly three hundred and fifty thousand observations commenced at Havre, France, October 14, 1826, and continued during the voyage of Dr. Berlandier to Tampico, and afterwards at intervals in various parts of Mexico, chiefly at Matamoras, till April 26, 1851; also, of a series taken at the city of Mexico, in 1827, by General Teran, and at Goliad, Texas, in 1832 and 1833, by Dr. Raphael Chowell. The whole had been collected and arranged with care by Dr. Berlandier, preparatory to a thorough reduction, which was intended to show not only the mean results, but all the more important relations existing between different atmospheric phenomena, when death closed his labors, and put an end to his interesting and useful investigations.

3. The family of the lamented Dr. Hare has presented to the Institution a paper describing an instrument denominated by its author a cycloidegraph. It is intended to illustrate the motions of particles of air when subjected to a gyratory or whirling motion, combined with one of translation. This instrument, of which a drawing will be given, evinces the ingenuity and power of mechanical combinations, of which Dr. Hare gave so many manifestations during the long course of his industrious and successful scientific career.

The paper is accompanied by engraved illustrations of the curves produced by the machine, and contains a series of propositions intended to demonstrate the centripetal theory of storms. As the last contribution to physical science of one of the patrons of the Smithsonian Institution, and its first honorary member, it is proper that it should find a place in the Smithsonian Contributions to Knowledge.

4. The next communication to be mentioned, is an account of observations made on the great solar eclipse of September 7, 1858, in which the total shadow of the moon passed obliquely over South America, a few degrees south of the equator. Accurate observations of the phenomena presented during the total obscuration of the sun afford such important means of enlarging our knowledge of the physical character of that luminary, and the event is of such rare occurrence, that the opportunity to study the phenomena should never be neglected. The Smithsonian Institution, therefore, readily agreed to a proposition made by Lieutenant Gilliss, to undertake the observation

of the eclipse, if an appropriation could be made sufficient to pay at least a portion of his expenses and his free passage procured. In accordance with this proposition letters were addressed to the British Pacific Steam Navigation Company, to the United States Mail Steamship Company, to the Pacific Mail Steamship Company, and to the Panama Railroad Company, setting forth the objects of the expedition, and asking for free transportation for Lieutenant Gilliss and his instruments, and for such other facilities as it might be in their power to bestow. This request was generously complied with; not only were free passages granted to himself and his companion, but every other facility was proffered which it was in the power of the officers of the companies to afford.

The British Pacific Steam Navigation Company not only furnished with great cordiality free transport, but so instructed their agents on the coast, that when an accident on the Panama railroad separated Lieutenant Gilliss from his instruments, and caused a delay in their arrival, the steamer bound to Payta waited in port several hours for them. When returning home, the commander of another steamer of the same line was instructed to make all possible speed in reaching Panama, so as to save Lieutenant Gilliss the detention of two weeks which passengers coming to the United States from the South Pacific frequently experience. For the acts of enlightened liberality on the the part of the above-mentioned companies in facilitating the advance of science, special acknowledgment by resolution immediately from the Board of Regents is due.

The necessary meteorological instruments were furnished by the Institution; the astronomical by the National Observatory, the Coast Survey, and Mr. Henry Fitz, of New York.

Lieutenant Gilliss, though highly favored with the necessary means of accomplishing the desired result, encountered many difficulties in reaching the proper spot at which to make the observations. Accompanied by Mr. C. H. Raymond, of New York, he arrived at Payta, Peru, on the 21st of August, 1858. The French admiral commanding in the Pacific placed the war steamer Mégére at his disposition, should it be desirable to proceed to any other point on the coast. Information, however, obtained from residents, and his own experience during the ensuing eight days, convinced him that there was little probability of a clear sky in the morning near the sea. But, in order to obtain observations from a second party, should clear weather occur there, he arranged with the commandant of the Mégére to pro-

ceed with the vessel to a point south of Payta, where the eclipse would be total, and furnished him with a telescope and a special chronometer for the use of the officers selected to make the observations on shore. The accounts of these gentlemen are embraced in the report of Lieutenant Gilliss to the Institution.

Leaving Payta, on the morning of August 29, with such instruments as it was possible to transport on mules across the desert in the northern part of Peru, Lieutenant Gilliss proceeded to Olmos, a small town within the outer range of the Andes, and in approximate latitude 6° south, longitude 80° 10′ west. Illness prevented his reaching the summit of the Andes, as he intended, and on the 5th of September he encamped on an eminence one mile southeast from Olmos, and almost on the central line traversed by the moon's shadow. From August 21 until the day of the eclipse, there had been but two clear mornings. On all the other days the sky was obscured until after 9 a. m., before which time the eclipse terminated. It was also cloudy at sunrise of the 7th, and until after the eclipse had commenced; but as it progressed the thin masses of vapor rapidly rolled from a portion of the sky, and for some time before and after total obscuration only a delicate film of mist intervened between the observer and the moon. The observations, though unpromising at the beginning, were highly successful.

The different astronomical phases of the eclipse were determined with accuracy, and thus afford data for the improvement of the solar and lunar tables. Interesting facts were also obtained in regard to a phenomenon which has attracted much attention during later eclipses, and is known under the name of the pink-colored protuberances or flame-like appearances projecting from the sun beyond the limb of the moon. Simultaneously with the total obscuration of the sun, Lieutenant Gilliss observed four marked protuberances of this character beyond the lunar disk, one of them being more than 30° of the sun's circumference in extent. Their elevation did not exceed 1′ or 1′ 10″ of the celestial arc, the largest one being scarcely half that altitude. They resembled clouds, the thinner portions of which transmitted the sunlight, but were wholly destitute of the rose color hitherto observed in total solar eclipses, and seen on this occasion by the French officers at Sechura bay. Those to the west and north continued visible for one or two seconds after the sun's limb was uncovered. These prominences were plainly visible to the unassisted eye, and their proximate position and the absence of expected red color

were also noted by Mr. Raymond, who had been charged with the meteorological observations. The total eclipse lasted 60½ seconds. A corona light appeared at the same time as the solar clouds, extending from the sun farthest in radial lines drawn from the centre, and passing through the clouds, but was nowhere traceable more than 15′ or 16′ from the solar disk. There was no appearance of fasces or bundles of rays, but only a uniformly diminishing and slightly orange tinted light, whose brightness and extent were apparently influenced by the film of mist. It vanished with the first appearance of the sun.

As already stated, Lieutenant Gilliss was accompanied by Mr. Carrington H. Raymond, of New York, who rendered him essential assistance during the whole expedition, as well as at the time of the eclipse.

The communication of Lieutenant Gilliss will be accompanied by a drawing of the appearance of the eclipse at the time of greatest obscuration, and will form a part of the eleventh volume of the Smithsonian Contributions.

5. The investigations of Mr. Meech relative to the heat and light of the sun have been continued during the past year and are still in progress. The memoir containing the result of these investigations obtained previous to September, 1855, was published as a part of the ninth volume of the Smithsonian Contributions, and has received the approbation of the scientific world. It is noticed with credit to the Institution in the proceedings of the Astronomical Society of London, and in a letter on the subject from Sir John Herschel.

The memoir already published contains a discussion of solar heat in all its astronomic phases at the exterior of the earth's atmosphere. The labors of Mr. Meech have since been directed to the partial absorption or extinction which the rays experience in passing through the atmosphere to the earth's surface. The phenomenon is one of special interest, and various instruments have been devised for its measurement; among which the pyrheliometer of Pouillet, and the actinometer of Herschel, may be mentioned. The observations with these instruments, says Mr. Meech, are certainly valuable and instructive, but, with one very doubtful exception, they fail to exhibit any distinct law. The law of absorption not being obvious directly from observation, the simple hypothesis has generally been adopted that equal thicknesses or strata of the medium absorb equal proportions of the light or heat incident upon each stratum. Lambert, Laplace, Pouillet, and others, have expressed this assumption in an

analytic form, which applies very correctly at higher altitudes and near the zenith. For low altitudes, Laplace combined the same assumption with his theory of refraction, and derived an approximate expression for the relative amounts.

But the inquiry arises how far the fundamental assumption is sustained by experiments. During the trigonometric survey of India, the astronomer, Jacob, observed the extinction of light reflected through an extent of sixty miles of horizontal atmosphere. His results were found to correspond very nearly with the law that "as the first differences of distance increases in arithmetical progression, the intensity of light diminishes in geometrical progression." The experiments of Delaroche and Melloni also indicate that the hypothesis of equal thicknesses absorbing equal portions of the incident heat, is only an approximation, which, in extended media, will differ widely from the truth; indeed, their experiments show an increasing facility of transmission through equal strata in the direction in which the rays proceed.

The necessity of a change, therefore, in the theory of atmospheric absorption to render it conformable to such experiments being obvious, the greater part of Mr. Meech's time available during the past year has been devoted to this object. The remaining discussions relative to the theory of climatic heat, of which this forms a part, are yet in progress. It may here be stated, however, that on computing by this method the observations given in the translation of Kaemtz's Meteorology, p. 150, Mr. Meech shows that out of 100 rays descending vertically from the zenith, 22 rays are lost or absorbed in the atmosphere, and 78 are transmitted to the earth's surface. The same process applied to the mean of observations made with Herschel's actinometer on the Faulhorn and at Brientz, in Switzerland, leads to precisely the same result when reduced to the sea level.

6. A proposition was made to the Institution in 1856 by Dr. James Deane, of Greenfield, Massachusetts, to publish a memoir containing a series of illustrations of his researches relative to the celebrated fossil foot-prints in the sandstone of the Connecticut valley. It is now well established that these foot-prints consist of impressions made by gigantic birds and other animals, and were first brought to the attention of the scientific world by the ardent and persevering efforts of Dr. Deane and the critical investigations of Professor Hitchcock. The number of plates required to illustrate the memoir, as originally proposed, would have involved too great an expense to be met in one or even

two years by the portion of the income of the Institution which could be appropriated to any single publication. It was therefore concluded that Dr. Deane should continue his investigations, and endeavor, by means of photography, to produce representations of all the most important specimens, and that from these a selection should be made sufficient to illustrate the characteristics of the different species of animals by which the impressions had been left. Dr. Deane enthusiastically devoted all the time to this object that he could spare from a laborious practice, on which the support of his family depended, until his career was suddenly terminated by death. To assist in the experiments of photography and in lithographing the illustrations a small appropriation was made, with which about fifty drawings were finished on stone by Dr. Deane himself. The work, however, is in such an unfinished condition that it cannot be published unless some person well acquainted with the subject will undertake the task of its completion.

7. The Annual Report to Congress for the year 1857, together with the appendix, forms a volume of 438 pages. Of this Report the Senate ordered 10,000 and the House of Representatives 7,000 extra copies, of which 5,000 of the first and 2,000 of the latter were given to the Institution for distribution. The volume was restricted in size to 440 pages, and the wood-cuts were furnished, as usual, at the expense of the Smithsonian fund. The statement may be again repeated that the Institution is not responsible for the quality of the paper, nor for all the errors which may be found in the text, since the whole work is set up by a large number of different compositors, and is driven through the press without sufficient time being allowed for revision and proper correction. The distribution, however, of the copies of the Reports has done much to make the Institution favorably known throughout the country. The applications for them are constantly increasing, and even the number liberally furnished by Congress at its last session has been found scarcely sufficient to supply the demand. They are presented to the meteorological observers, and to all libraries and educational establishments. Besides furnishing a kind of knowledge not readily accessible through any other channel, these Reports serve to gratify a laudable public desire for information as to the management and operations of the Institution.

The important truth has now become known in every part of the world, that the property of Smithson was not given for the support of a local establishment, but in trust to the United States for the promo-

tion of knowledge, for the discovery of new truths, and for the diffusion of these among men ; that the honor of the government is pledged for the faithful administration of the trust in accordance with the expressed will of the donor, and that consequently every intelligent citizen is interested in all which relates to the administration of the bequest.

8. The collection of the meteorological and physical tables prepared for the Institution by Professor Guyot, has been stereotyped and the first issue has been distributed to the meteorological observers and to foreign institutions. It has been received by the scientific world with warm acknowledgments and special commendation. The Institution has not lost sight of the proposition mentioned in the Report for 1856, to prepare other series of tables for facilitating scientific calculations, and to present in a convenient form the "Constants of Nature and Art." In order, however, fully to realize all the good which will result from this work, it may be necessary to solicit the aid of foreign institutions; and we think it probable that the co-operation of the British Association, as well as that of some of the academies on the continent of Europe, may be secured.

9. Among the miscellaneous publications of the past year should be mentioned a pamphlet, accompanied by a map of the solar eclipse of March 15, 1858, with an account of an instrument by which the latter was projected. This instrument was invented in 1842 by Rev. Thomas Hill, has since been improved, and now affords a ready means of delineating the general phases of an eclipse, as exhibited over a large portion of the earth, with sufficient accuracy for a first approximation. It consequently saves much labor, and obviates, to a considerable extent, the liability to larger errors in the numerical calculations. The eclipse here mentioned was visible throughout Europe, Greenland, and the North of Africa; also partly visible in the northern part of South America and the eastern part of North America. The map exhibits the time of beginning and ending and the different phases of the eclipse over the greater portion of North America in which there was any probability of observations being made. Unfortunately, however, the face of the sky in the United States on the day of the eclipse was overcast, and few if any observations of value were obtained. The projection of the map, however, illustrates the use of the ingenious mechanical contrivance of Mr. Hill, and will serve to make it generally known to practical astronomers.

10. A new and revised edition of "Directions for Meteorological Observations" has been stereotyped and distributed. To the directions

given in the first edition there have been added instructions for noting periodical phenomena, earthquakes, auroras, &c., and special remarks suggested by the experience of previous years. This publication forms an octavo pamphlet of seventy pages, and is now, perhaps, the most convenient and complete work for the purpose to be found in the English language.

The catalogue of the Dipterous Insects of North America, prepared by Baron Ostensacken, described in the last Report, has been published. It forms an octavo pamphlet of ninety-two pages, and constitutes a portion of a series of works which will be alluded to in a subsequent part of this Report.

11. It was mentioned in the last Report that the Institution had subscribed for a few copies of a treatise on the Fossils of South Carolina, which was commenced by Professors Tuomey and F. S. Holmes, and, after the death of the former, continued by the latter. Copies of five parts of the continuation have been received, and will be distributed in exchange for other works of foreign authors of the same class. This work has been patronized by the State, and is alike creditable to the industry, talents, and knowledge of the author, the skill of the artist, and the intelligent liberality of the government of South Carolina.

Another publication to which a subscription has been made is Peirce's Analytic Mechanics. This is not an elementary compilation, but consists principally of original solutions of many of the most important problems of theoretical astronomy and pure physics. The author at first offered to present this work as a series of memoirs to the Institution, but by means of the subscriptions which have been obtained for it, the publication has since been undertaken by private enterprise. The copies subscribed for by the Institution will be distributed to some of the first class learned societies in Europe, and will doubtless be regarded as an important contribution of new truths, as well as of methods of establishing some of those which have been previously discovered, alike indicative of the genius of the author and of the enlightened and liberal appreciation of the country.

A subscription has also been made for a number of copies, for foreign distribution, of the Mathematical Monthly, edited by J. D. Runkle, of Cambridge, a journal intended to promote the study of mathematics in this country. The plan and execution of this work are such as to commend it to all who are interested in the advance of the important branch of knowledge to which it pertains; and it is gratifying to learn that the patronage which it has received, as well as the number and

character of the articles furnished, are such as to insure its entire success.

12. In accordance with the plan mentioned in the last Report of directing attention to departments of knowledge needing special stimulus, the Institution has made arrangements for the preparation of a series of works on the different orders of insects found in North America, with a view of identifying the species and of systematizing the study of their relations and habits. This is a subject not only of much scientific interest, but also of great practical importance in regard to its connexion with agriculture. When it is considered how much loss is annually caused to this country by the ravages of the Hessian fly, the army and cotton worms, the curculio, the grasshopper, and numerous other species of insects, it must be evident that anything that may tend in however slight a degree to throw light upon the means of preventing such ravages is of great commercial importance. But before we can make use of the experience of other countries on this subject, it will be necessary to identify the insects, since, in regard to them as well as other objects of natural history, the same name is often popularly applied to widely different species.

The greatest deficiency in American natural history is to be found in the department of entomology, there being no original treatise in reference to this country applicable to the wants of the present day. The Institution has therefore made arrangements with eminent entomologists for the preparation of the following series of reports on the different orders, in the form of systematic lists, of all the North American species hitherto described, and an account of the different families and genera, and, whenever practicable, of the species of each order:

Coleoptera, (Beetles, &c.,) by Dr. John L. Le Conte, Philadelphia.

Neuroptera, (Dragon flies, &c.,) by Dr. Hagen, Königsberg.

Hymenoptera, (Wasps, bees, &c.,) by H. De Saussure, Geneva.

Diptera, (Flies, mosquitoes, &c.,) by Baron Ostensacken, of the Russian legation at Washington.

Lepidoptera, (Butterflies, moths, &c.,) by Dr. J. G. Morris, Baltimore, and by Dr. B. Clemens, Easton, Pa.

Hemiptera, (Chinches, roaches, &c.,) by P. R. Uhler, Baltimore.

Catalogues of the Coleoptera and Diptera have been already published, while the descriptions of these orders by Dr. Le Conte and Baron Ostensacken, and of the Neuroptera, by Dr. Hagen, are in an ad-

vanced state of preparation. Moreover, it has been thought desirable as introductions to these catalogues to give an account of the best methods of capturing the insects and preserving them for the cabinet as well as for breeding the larvæ with a view of studying the habits and peculiarities of the species, and with this object arrangements have been made with gentlemen particularly acquainted with different orders for articles relating to them.

A commencement has already been made in the preparation of materials for these works, a part of which will be given in an article to be found in the appendix to this report.

The description of the method of capturing insects and preserving them will be widely distributed, and it is to be hoped that the different correspondents of the Institution interested in this branch of natural history will assist in completing the collections.

Specimens of Neuroptera were last year referred to Dr. Hagen, consisting chiefly of those collected by Captain Pope's expedition, in New Mexico as well as by Baron Ostensacken in the District of Columbia and elsewhere, together with various series from other sources. Three-fourths at least of all the specimens of the collection sent to Dr. Hagen have never before been described. For example, among thirty-four species of *Odonata* (dragon flies) twenty-seven were found to be new. "The materials for study which I have thus received from the Smithsonian Institution," says Dr. Hagen, "are the richest I have ever obtained at one time before."

Meteorology.—The arrangement between the Patent Office and this Institution in relation to the collection of meteorological statistics still continues, and is, we think, producing good results. The number of observers now reporting is about three hundred, and it is only in regard to the want of persistency on the part of some of these that there is room for the expression of regret. Incomplete and irregular records, however, are of importance in furnishing data for the general investigation of the subject—an investigation which is based, as was stated in a former report, upon the preparation of a series of maps of the United States for each day in the year, on which are represented with different colors the portions of the country over which the sky is clear, cloudy, snowing, raining, &c., and, by arrows, the direction of the wind. These maps indicate the place of commencement, the successive stages of development, the changes and the final disappearance of storms. Any person, therefore, who may furnish a daily record of the face of the sky, of the beginning and ending of rain, snow, hail, and

storms, and the direction and intensity of the wind, (which can be done without instruments,) will render valuable service in advancing a knowledge of the laws of the atmospheric disturbances to which we are constantly subjected, and which exercise so important an influence on our health, comfort, and occupation. To induce persons to furnish this simple but valuable information a blank form has been prepared for more general distribution than the one required by those who are provided with instruments. If sufficient data of this kind could be obtained to complete a series of maps, comprising one for each day in a single year, over the whole United States, the laws of the general phenomena of our storms could be determined. For this purpose observations are particularly desirable from regions west of the Mississippi river, and every traveller over the plains would render important service by making a record of the weather at least three times a day, viz: at 7 a. m., 2 and 9 p. m., and transmitting a copy to the Commissioner of Patents. The principles which have been already determined in regard to the development and progress of storms fully demonstrate the importance of the information to be derived from daily telegraphic despatches as regards probable changes of weather in the eastern portions of the United States. The Institution and the public generally are indebted to the Morse telegraph line for the gratuitous reports which its operators have daily furnished.

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. It is to be hoped that reports may hereafter be received from all parts of the country to which telegraphic lines extend. The value of the information thus received would be much enhanced if a brief record of the direction of the wind and the indications of the thermometer were in all cases added.

At the last meeting of the American Association for the Advancement of Science a committee was appointed, on motion of Major Lachlan, of Cincinnati, to petition the several States of the Union and the governments of other portions of the continent to co-operate with the Smith-

sonian Institution and the Patent Office in establishing systems of stations for observations furnished with standard instruments. Though this committee, consisting of Major Lachlan, Dr. Hough, Professor Coffin, and myself, have not had an opportunity of fully discussing the several points to be recommended, yet it is thought they will adopt the following suggestions, which have been considered and approved by a majority of the members:

1. That stations for observation be established not over sixty miles apart.

2. That at each station the pressure, temperature, and humidity of the air, the direction and velocity of the winds, (both upper and lower currents,) and the kind and amount of cloudiness be observed three times a day—at 7 o'clock a. m., 2 p. m., and 9 p. m.; also the date of the commencement and termination of each rain or snow, with the amount of water that falls, and any other atmospheric phenomena that the observer may deem of interest to note and record.

3. That each station be furnished with a barometer having a zero adjustment, a pair of thermometers carefully compared with each other throughout their entire range, and a rain-gage.

4. That a superintendent be appointed in each State, who shall select the stations and instruments, secure reliable observers, keep himself informed as to the condition of the instruments and observations, and report annually to the legislature of the State, and also to the Smithsonian Institution.

5. That the superintendent be furnished with standard instruments with which the others may be compared when necessary.

6. That these standard instruments be themselves compared with some common standard.

7. That each observer publish his observations monthly in some neighboring newspaper, as an item of local interest, and have, perhaps, five hundred extra slips of the same printed for exchange with other observers; these slips to be sent to the Smithsonian Institution for distribution.

8. That monthly and annual abstracts of these observations be published in a uniform style throughout the United States, and the continent if possible; and that, for the sake of securing such uniformity as well as reducing the cost, they be prepared and published by the Smithsonian Institution, each State contributing a sum sufficient to defray the expense of its own observations; and the whole being combined in a single volume.

9. That each State receive for distribution within its own limits a number of copies of the above-mentioned volume of abstracts, equal to perhaps twenty-five times the number of stations in the State: two for the State library, six for each observer, one for each incorporated college within the State, and the remainder to be distributed at the discretion of the superintendent.

10. That to carry the foregoing provisions into effect, each State appropriate per station $40 for the supply of instruments, and $36 a year afterwards; the latter item to be distributed as follows, viz: $20 to each observer to pay for the printing and postage of the slips containing his monthly observations, $5 per station to the superintendent for his expenses, and $14 per station for preparing and publishing the abstracts.

It gives me pleasure to state that a system of twenty-five stations for minute and accurate observations, with standard instruments, has been established along the northwestern lakes, under the direction of Captain Meade, of the Topographical Engineers, U. S. A. The records are to be made four times a day, and to be reported to the bureau in charge of Colonel Abert, at Washington, and will thus be accessible for investigation by the Institution. In this connexion, I am also pleased to be able to state that the meteorological system contemplated for some years past in Upper Canada has been actually commenced, and that twelve stations have been established at the senior county grammar schools, from most of which reports have been received during the past year. Copies of these observations will be of much value in enabling the Institution to extend the area now included in the field of its meteorological investigations. The report relative to this system presented to the Canadian legislature will be found in the appendix. It is also proper to mention that Doctor Shumard, State geologist, has established a system of stations, furnished with standard instruments, at three important points in Texas. In this he has followed the example of Professor Swallow, who instituted a similar system in connexion with his geological survey of Missouri.

The reductions of all the observations which have been made under the direction of the Institution and the Patent Office are now completed, and will be printed as rapidly as the means necessary for the purpose can be appropriated. A large number of maps have been constructed for the investigation of storms, and considerable additions have been made to the material previously collected relative to the climate of this continent.

One of the most important operations with which the Institution has been connected during the past year is the construction of a map to represent at one view the arable and forest land of the United States. This work has been intrusted to Dr. J. G. Cooper, a young naturalist, who has paid particular attention to botany, has been engaged in government explorations in the western part of the United States, and has critically examined all the authorities to be found on the subject. The facts presented at once to the eye by this map are in striking accordance with the deductions from the meteorological materials which have been collected at this Institution, and serve to place in a clear point of view, the connexion of climate with the natural productions of different parts of the earth.

No appropriation has been made for the last two years for the purchase and distribution of instruments other than rain-gages and thermometers. The attempt to furnish barometers to important stations at a distance has not been successful. In the majority of cases they have been broken before they arrived at their place of destination, and we find from experience that this instrument cannot be safely transported, except by hand or by water.

Magnetic Observatory.—From the date of the last report the declination needle of the magnetic observatory, established at the expense of the Coast Survey and the Smithsonian fund, was in continued operation until October, 1858, when the introduction of a large iron pipe for the supply of the grounds with the Potomac water made a new adjustment of the apparatus necessary, and interrupted the continuity of the record. Up to that time the remaining instruments had not been received from London, though they were ordered by Professor Bache before the erection of the building, several years ago. The delay, we have since learned, was occasioned by death in the family of the inventor, who had kindly undertaken to superintend their construction, and especially to make the adjustments for the compensation for changes of temperature. The instruments have at length been received, and will be put in operation early in the spring of the present year. They were completed and forwarded under the direction of Mr. Charles Brooke, the author of this ingenious and truly valuable mode of automatic registration.

The importance of putting this observatory in full operation will be manifest by a reference to a communication in the appendix to this report from General Sabine to the Secretary, in which it is stated that it is in contemplation to establish similar observatories at Pekin, the

Falkland Isles, Newfoundland, and Vancouver's Island, and in which the hope is expressed that the magnetic observatory on the Smithsonian grounds may be in a condition to co-operate in the efforts that are thus about to be made to determine the laws of the perturbations of the intensity and direction of the magnetic force in a continuous belt encircling the globe.

Laboratory.—During the past year the laboratory has been under the charge of Professor Shaeffer, late of the United States Patent Office, and Dr. Craig, of this city. These gentlemen have reported to the Institution on all articles of public interest which have been referred to them for examination, and have made a series of investigations on a large number of specimens of guano, which were submitted to the Smithsonian Institution by the general government. The policy adopted in regard to the specimens of various kinds referred to the Institution for examination, is to furnish a report free of cost to the parties making the reference, provided the information is of general interest or immediately connected with the advance of science, but if the examination is required principally to promote the interest of individuals or companies, a charge is made sufficient to cover the expense of the investigation. By the adoption of this plan the laboratory is kept in operation by means of a small appropriation for chemicals and apparatus from the Smithsonian fund.

Exchange —The system of international exchanges continues to be highly successful, and the amount of material transmitted abroad and that received in return is constantly increasing. Few, if any, American Institutions publishing transactions or reports have any other means of effecting exchanges with foreign societies, and although the income of the Institution will not warrant a much greater extension of this part of the operations, yet we trust that nothing will interfere to lessen its present efficiency and usefulness.

It will be seen from the report of Professor Baird that during the year there were 913 packages sent abroad by the Institution, weighing 22,674 pounds. The number of parcels received by the Institution from other parties for foreign distribution was 4,425.

Library.—The fact has been repeatedly mentioned in preceding reports that the principal object aimed at in the collection of the library is to procure as perfect and extensive a series as possible of the transactions and proceedings of all the learned societies which now exist or have existed in different parts of the world. It is to works of this character that the student of science is obliged to refer for the minute

history of the progress of any special branch to which he may be devoted, and to ascertain accurately what has been published on his particular subject previous to commencing his own labors, or at least before he gives the results to the world, in order that he may do justice to those who have preceded him in the same path, and have due regard to his own reputation in not publishing facts and principles as new discoveries which have long since been recorded in the annals of science.

Principally by means of the system of exchange, which has been so successfully prosecuted by the Institution, the library is now richer in this class of books than perhaps any other in the country, and every year it is increasing in value, not only from the current publications of the various societies of the world, but by almost constant additions of series and of volumes to complete sets which had before been imperfect.

The value of this library to the country will be much enhanced, first, by the publication of a list or catalogue of the different series of transactions and proceedings of which it is now actually in possession; and secondly, by a general index or list of titles of the various memoirs or papers contained in the whole collection. The first of these objects will soon be accomplished by a complete catalogue of the whole collection, which has been prepared under the direction of Professor W. W. Turner, and is now in the press, and will be distributed to all the correspondents of the Institution in the course of a few months. This catalogue will not only serve to make known to the men of science in this country what the library actually contains in the line of transactions, but will also indicate to the foreign contributors its deficiencies, and thus enable them, from their store of duplicates, to complete imperfect sets, as well as to increase the series.

The second desideratum is one which is felt as such by the whole scientific and literary world, and it will be recollected that in the report for 1855 I mentioned the fact that, in behalf of this Institution, I had addressed a letter to the British Association, setting forth the importance of the publication of a list of the titles of the different memoirs or papers contained in all the transactions of the learned societies of the world, and offering to co-operate in the important enterprise by furnishing a list of the contents of the volumes of transactions and proceedings of the different societies of this country. I am now much gratified in being able to inform the Board of Regents that this proposition was favorably considered by the Association, and

that the great work has actually been commenced at the expense and under the direction of the Royal Society of London. It is estimated that the whole number of titles will amount to 250,000, the cost of printing which will probably exceed even the income of the endowment of the Royal Society; but the hope is entertained that other institutions of Great Britain, as well as those of other countries, will contribute towards defraying the expense.

At the last session of Congress a bill* passed the House of Representatives in reference to the present copyright law, which was in accordance with the views presented in the several reports of the Board of Regents.

The requirement that three copies of every original work secured by copyright should be forwarded to Washington, to be deposited respectively in the Libraries of Congress, the Department of State, and this Institution, has been found as oppressive to the author, in the case of valuable and costly works, as it was burdensome to the libraries intended to be benefited, in the case of trifling and ephemeral ones. The change in the law, by which this requirement will be in future limited to the archives of the Interior Department at the Patent Office, while it affords relief on the one hand, will on the other furnish ample security in case of contested title; and, being more easily and constantly complied with, will insure to those who feel an interest in the progress of American literature at least one entire and connected series of these publications.

The additions to the library of the Smithsonian Institution by exchange during 1858 have been large and important, the total being considerably greater than in 1857. They consist of the following items, viz: 553 octavo volumes, 156 quarto, 14 folio; also, 1,695 pamphlets and parts of volumes, and 122 charts and maps, making in all 2,540; being an excess of 780 volumes and parts of volumes over 1857. Many of the receipts for the year consist of series of transactions of societies more or less complete, tending to add greatly to the resources of the library. Among these may be mentioned the Memoirs of the Academie des Sciences of Dijon, 30 volumes; of the Haarlem Society of Sciences, 41 volumes; of the Royal Netherlands Institute at Amsterdam, 14 volumes quarto; of the Academy of Sciences of Montpelier, 9 volumes quarto; a full series of the publications of the Hydro-

* Since the date of this report, the bill referred to having passed the Senate also, has become a law, and henceforth it will be requisite for the author to deposit only a single copy with the clerk of the district court from whom the certificate of copyright is obtained.

graphical Department of St. Petersburg, in many volumes; the charts of the British Admiralty Board for the year; the Allgemeine Deutsche Bibliothek, in 77 volumes, from the library at Cassel ; the Memoirs of the Landwirthschaftliche Gesellschaft at Klagenfurt, in 14 quarto volumes; and many others.

Alexander S. Taylor, esq., of Monterey, California, sent to the Smithsonian Institution, for examination and use, a manuscript which he had borrowed from the library of the Right Rev. Bishop of Monterey; and of which he gives the following account: "This manuscript containing 94 pages, is a vocabulary of the Mutsun tribe of California Indians, living in the country around the mission of San Juan Bautista, in Monterey county, and now nearly extinct. It was written in 1815, by P. Felipe Arroyo, an old missionary of great natural talents, and, as I am informed, very learned in the Indian languages of this country. He died at the mission of Santa Inez about 1842." This manuscript, on examination, proved of so interesting a character in its relation to American philology and ethnography, that to afford to American scholars opportunities for its study and to lessen the chances of loss of the work, it was thought advisable to have it copied. This accordingly has been done, the labor being performed by a Cuban gentleman, under the supervision of Alexander J. Cotheal, esq., of New York, who has added an English translation of some portions. The number of pages in the transcript corresponds to those of the original. The first seventy-seven pages, after the title and preface, (which, as well as some of the explanatory matter, are in Latin,) are occupied with a collection of Mutsun words and phrases, ranged somewhat irregularly, under the letters of the alphabet, accompanied by a Spanish translation. The Indian words and phrases are written in black, and the Spanish in red ink. The remaining pages contain hymns, prayers, and catechetical exercises composed by the priests, and some specimens of the music used in the native songs and dances. The original, of course, has been returned, and the copy is placed in the library of the Institution.

The extensive alterations in the wing of the building appropriated to the library, mentioned in the last report, have been completed, and the additions have been found not only of importance in the better arrangement and accommodation of a larger number of books, but also in increasing the general architectural effect of the apartment.

Museum.—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

lectures, it is evident, from the interest which they still continue to excite, must tend to promote the intelligence and morality of the citizens, and the various scientific operations which are carried on in connexion with the Institution diversify the objects of interest to the public generally in what pertains to the national metropolis. The following is a list of the lectures delivered at the Institution during the winter of 1858–'59:

Two lectures by Dr. JOHN RAE, of Canada, on "Arctic Explorations and the Probable Fate of Sir John Franklin."

One lecture by J. G. SAXE, esq., of Vermont, on "Poetry and Poets."

One lecture by Professor G. W. GREENE, of New York, on "The Artistic Life of Thomas Crawford."

One lecture by Professor J. D. DANA, of Yale College, on "Coral Islands."

Two lectures by THOMAS CLEMSON, esq., of Maryland, on "Water" and "Nitrogen."

Two lectures by Professor P. A. CHADBOURNE, of Williams College, on "Natural History as related to Intellect, Taste, and Wealth."

Four lectures by Rev. H. J. COMINGO, of Ohio, on "Rome, its Historical Reminiscences; its Antiquities and Ruins; its Architectural Monuments; its Fine Arts."

Four lectures by Professor A. CASWELL, of Brown University, on "The Magnitude and Figure of the Earth;" "The Law of Gravitation;" "The Dimensions of the Solar System, or the Extent of our Knowledge of Planetary Distances;" and "Sidereal Astronomy."

Five lectures by Professor J. P. COOK, of Harvard College, on "Atmospheric Air," "Oxygen and Ozone," "Nitrogen," "Water," "Carbon," &c., &c.

The lectures of Professor Caswell will be inserted in the Appendix to this report, and, it is believed, will be found interesting to the teacher, as well as to the general reader, on account of the information given relative to many points not usually dwelt upon in popular works on the subject.

Respectfully submitted.

JOSEPH HENRY.

APPENDIX TO THE REPORT OF THE SECRETARY.

SMITHSONIAN INSTITUTION,
Washington, December 31, 1858.

SIR: I have the honor herewith to present a report, for 1858, of the operations you have entrusted to my charge, namely, those which relate to the printing, to the exchanges, and to the collections of natural history.

Very respectfully, your obedient servant,

SPENCER F. BAIRD,
Assistant Secretary Smithsonian Institution.

JOSEPH HENRY, L. L. D.,
Secretary Smithsonian Institution.

PUBLICATIONS.

The publications of the Institution during the year are as follows:

Annual Report of the Board of Regents for 1857. One volume, 8 vo., pp. 438.

Catalogue of the Described Diptera of North America, prepared for the Smithsonian Institution by R. Osten Sacken. 8vo., pp. 112.

Map of the Solar Eclipse of March 15, 1858, by Rev. Thomas Hill, of Waltham, Massachusetts. 8vo., pp. 8.

Directions for Meterological Observations and the Registry of Periodical Phenomena. 8vo. pp. 70.

Tables, Meteorological and Physical, prepared for the Smithsonian Institution, by Arnold Guyot. 8vo. pp. 634.

Nereis Boreali Americana, or Contributions to a History of the Marine Algae of North America, by William Henry Harvey, M. D., M. R. I. A. Part III, Chlorospermeae. 4to, pp. 142, and fourteen plates.

Magnetical Observations in the Arctic Seas, by Elisha Kent Kane, M. D., United States navy, reduced and discussed by Charles A. Schott. 4to. pp. 72, and two plates.

A Grammar and Dictionary of the Yoruba Language, by the Rev. T. J. Bowen. 4to. pp. 232.

The following publications are in an advanced state and will be completed early in the year:

Catalogue of Transactions and Periodicals in the Library of the Smithsonian Institution. 8vo.

Catalogue of North American Birds, by S. F. Baird.

EXCHANGES.

The system of international exchanges organized by the Smithsonian Institution a few years ago continues to be highly successful, and is rapidly developing to an enormous magnitude. Every year witnesses a great increase in the amount of material transmitted abroad and received in return, and it is not too much to say that any abrupt termination of the undertaking on the part of the Institution would be felt as a great public calamity. Few, if any, American institutions of note, publishing transactions or reports, have any other medium of exchanging them with foreign correspondents.

The details of operations in this department will be found in the following tables, all of which exhibit a marked increase as compared with 1857:

A —*Receipt of books, &c., by exchange in* 1858.

Volumes—Octavo	553	
Quarto	156	
Folio	14	
		723
Parts of volumes and pamphlets:		
Octavo	1,187	
Quarto	451	
Folio	57	
		1,695
Maps and charts		122
Total		2,540

B.

Table showing the statistics of foreign exchanges of the Smithsonian Institution in 1858.

Agent and country.	Number of addresses.	Number of packages.	Number of boxes.	Bulk of boxes in cubic feet.	Weight of boxes in pounds.
1. Dr. FELIX FLUGEL, *Leipsic.*					
Sweden	10	14	----	----	----
Norway	4	7	----	----	----
Denmark	6	10	----	----	----
Russia	23	30	----	----	----
Holland	18	25	----	----	----
Germany	200	310	----	----	----
Switzerland	19	27	----	----	----
Belgium	9	17	----	----	----
Total	289	440	28	336	11,060
2. H. BOSSANGE, *Paris.*					
France	78	122	----	----	----
Italy	37	64	----	----	----
Portugal	2	5	----	----	----
Spain	5	8	----	----	----
Total	122	199	11	132	4,525
3. H. STEVENS, *London.*					
Great Britain and Ireland	96	250	17	204	6,445
4. *Rest of the world.*	18	24	----	----	644
Total	525	913	56	672	22,674

C.—*Packages received by the Smithsonian Institution for foreign distribution in* 1858.

	No. of packages.
Albany, N. Y.—	
New York State Agricultural Society	20
Boston, Mass.—	
American Academy of Arts and Sciences	251
Boston Society of Natural History	36
Public Library of City of Boston	3
Cambridge, Mass.—	
American Association for Advancement of Science	64
Cambridge Observatory	139

	No. of packages.
Charleston, S. C.—	
Prof. F. S. Holmes	2
Chicago, Ill.—	
Col. J. D. Graham, U. S. A	188
Cincinnati, Ohio.—	
Dr. M. L. Knapp	6
Columbia, Mo.—	
Prof. G. C. Swallow	20
Columbia, Pa.—	
Prof. S. S. Haldeman	1
Georgetown, D. C.—	
Georgetown College	5
New Haven, Conn.—	
American Journal of Science	16
American Oriental Society	9
W. P. Blake	14
Prof. J. D. Dana	6
Yale College	4
Philadelphia, Pa.—	
Academy of Natural Sciences	151
American Philosophical Society	41
Central High School of Philadelphia	100
Historical Society of Pennsylvania	52
Isaac Lea	47
C. M. Wetherill	22
Providence, R. I.—	
State of Rhode Island	10
St. Louis, Mo.—	
St. Louis Academy of Sciences	141
Dr. B. F. Shumard	8
Toronto, Canada.—	
Canadian Institute	4
Washington, D. C.—	
U. S. Patent Office	1,403
U. S. Coast Survey	919
National Observatory	73
Secretary of War	360
Surgeon General	300
Capt. Charles Wilkes	10
Total	4,425

D.

Addressed packages received by the Smithsonian Institution from Europe for distribution in America in 1858.

	Number of packages.
Albany, N. Y.—	
New York State Library	18
New York State Agricultural Society	7
New York State Medical Society	1
Amherst, Mass.—	
Amherst College	11
Ann Arbor, Mich.—	
Observatory	10
Boston, Mass.—	
American Academy of Arts and Sciences	59
Boston Society of Natural History	46
Bowditch Library	10
Historic Genealogical Society	2
Statistical Society	10
Bowdoin, Me.—	
Bowdoin College	8
Cambridge, Mass.—	
American Association for Advancement of Science	12
Cambridge Astronomical Journal	9
Cambridge Observatory	27
Harvard College	22
Professor L. Agassiz	16
Professor Asa Gray	13
Professor Peirce	11
Charleston, S. C.—	
Elliott Society of Natural History	8
Cincinnati, Ohio.—	
Observatory	10
Columbia, Mo.—	
Professor G. C. Swallow	5
Columbus, Ohio.—	
Ohio State Board of Agriculture	22
Dartmouth, Me.—	
Dartmouth College	26
Georgetown, D. C.—	
Georgetown College	22
Lansing, Mich.—	
Michigan State Agricultural Society	17
Madison, Wis.—	
Wisconsin State Agricultural Society	25
Historical Society of Wisconsin	4
New Haven, Conn.—	
American Journal of Science	17
American Oriental Society	5
Professor J. D. Dana	19
Yale College	8
New Orleans, La.—	
New Orleans Academy of Natural Sciences	23
New York.—	
American Geographical and Statistical Society	29
New York Lyceum of Natural History	38
American Ethnological Society	3

D—Continued.

	Number of packages.
New York—Continued.	
New York University	7
Philadelphia, Pa.—	
Academy of Natural Sciences	86
American Philosophical Society	65
Central High School of Philadelphia	1
Pennsylvania Institute for the Blind	11
Wagner Free Institute	4
Isaac Lea	8
Dr. John L. Le Conte	4
Dr. Joseph Leidy	12
Providence, R. I.—	
Brown University	5
San Francisco, Cal—	
California Academy of Natural Sciences	17
St. Louis, Mo.—	
St. Louis Academy of Sciences	26
Santiago, Chili.—	
University of Chili	6
Springfield, Ill.—	
Illinois State Agricultural Society	1
Washington, D. C.—	
United States Patent Office	68
Ordnance Bureau	3
United States Coast Survey	41
National Observatory	73
Secretary of War	3
National Institute	2
State Department	1
Congress Library	15
Lieutenant J. M. Gilliss, United States navy	16
West Point, N. Y.—	
Military Academy	3
Worcester, Mass.—	
American Antiquarian Society	6
Miscellaneous institutions	261
Miscellaneous individuals	221
Total	1,539

MUSEUM.

Additions to the museum.—Independently of the collections of the Patent Office, transferred in 1858, and of which a more detailed notice will be found on another page, the additions to the Smithsonian museum during 1858 have been of great magnitude and importance, in many respects exceeding those of any previous year, occupying, as they did, more than 200 boxes, 20 kegs or barrels, and numerous single packages of greater or less size. It is impossible within my present limits to mention the contents of these in detail, and a general

statement at the end of this report is all that can be given for most of them. A portion, however, of the collections received belong to public or private explorations of such interest as to require a further notice.

EXPLORATIONS UNDER THE WAR DEPARTMENT.

1. *Exploration of the valley of the Platte river, especially of the Loup Fork, under Lieutenant Warren, U. S. A.*—This exploration was conducted in 1857, but the collections (filling 21 boxes) did not reach Washington until 1858. The chief features of the collections consisted of the fossil remains of animals and plants, gathered by Dr. Hayden, geologist of the expedition; but a large and valuable series of recent species was also procured, embracing several new to science.

2. *Exploration of the Colorado river of California, under Lieutenant J. C. Ives, U. S. A.*—Dr. J. S. Newberry, geologist and botanist, Mr. B. Mollhausen, artist and zoologist. Large collections were made in all departments on the Colorado and across to Albuquerque.

3. *Wagon road over the 35th parallel, under Lieutenant Beale.*—A valuable geological collection was made by this party.

UNDER THE STATE DEPARTMENT.

4. *Survey of the northwest boundary, under Archibald Campbell, esq.*—Dr. C. B. Kennerly, surgeon and naturalist, George Gibbs, geologist. The collections of animals and plants, minerals and fossils, made on Puget Sound and on the boundary line, were very full.

UNDER THE NAVY DEPARTMENT.

5. *Survey of the Atrato ship canal route of the Isthmus of Darien, by Lieutenant Craven, U. S. N., and Lieutenant Michler, U. S. A.*—The natural history operations were conducted by Mr. Schott, assisted by Wm. S. and Charles Wood, under the supervision of Lieutenant Michler. A valuable collection of animals and plants of the Isthmus was brought back by this party.

UNDER THE INTERIOR DEPARTMENT.

6. *Wagon road construction through the South Pass, under Wm. M. Magraw.*—This expedition was fitted out in the spring of 1857, with Dr. J. G. Cooper as surgeon, and Mr. C. Drexler as hospital steward and taxidermist. Dr. Cooper returned to Washington before the beginning of the year, bringing large collections with him. Mr. Drexler continued with Mr. Magraw's party, and wintered on Wind river. In March he crossed to Camp Scott, near Fort Bridger, where, remaining until June, he made a very extensive collection of birds, illustrating very fully the ornithology of the Rocky mountain region, and throwing much light on the geographical distribution of the species. His success in this was mainly due to the protection and aid afforded by General A. E. Johnston, in command of the forces, by whose direction every facility was afforded him.

EXPLORATIONS UNDER THE AUSPICES OF THE SMITHSONIAN INSTITUTION.

7. *Exploration of the vicinity of Fort Tejon, California, by Mr. John Xantus.*—During the year 1858 a natural history exploration, commenced in 1857, has been nearly completed by Mr. Xantus, while connected with the military post at Fort Tejon, which, for extent and thoroughness, has perhaps scarcely a parallel on our continent, considering the fact that it was made in about sixteen months by one person, almost constantly occupied in official duties, and under various discouragements. The collections of Mr. Xantus filled 24 large boxes, and included nearly 2,000 birds, 200 mammals, many hundreds of birds' nests and their eggs, with large numbers of reptiles, fishes, insects, plants, skulls, skeletons, &c., all in the highest condition of preparation and preservation, and furnishing such accurate and detailed information of the zoology and botany of Fort Tejon as we possess of but few other points in the United States. Mr. Xantus also made copious notes of the habits and characters of the species, with numerous drawings.

8. *Other points on the west coast.*—Valuable collections from the vicinity of Fort Umpqua, Oregon, have been received from Dr. Vollum, from about San Diego, made by A. Cassidy, and from Monterey, made by A. S. Taylor. A collection of shells, &c., made by Captain Stone in the Gulf of California, assisted by Mr. Sloat, has supplied the first specimens ever received from that region, proving of great interest. Mr. James Wayne has also furnished important collections from the Columbia river.

9. *Rocky mountains.*—A collection of birds from Cantonment Burgwyn, sent in by Dr. W. W. Anderson, has added a new species of birds to our fauna. Interesting collections of mammals and birds from Fort Massachusetts were also made and presented by Captain A. W. Bowman and Dr. McKee. Captain Marcy, in collecting specimens of the *Lagopus leucurus*, or white tailed ptarmigan, has added to the fauna of the United States an interesting species of bird hitherto only found in British America.

10. *Other regions of North America.*—Additional collections of the animals of the Red River of the North have been received from Mr. Donald Gunn, and of Texas, from Major G. H. Thomas. Mr. Thos. E. Blackney, of Chicago, has contributed one of the few specimens of whooping crane (*Grus americana*) found in collections. The collections of Florida animals by Mr. Gustavus Wurdemann, made in continuation of previous years, have been very valuable, adding, as they have done, several new species of birds, reptiles, and invertebrates to our fauna; collections made in northern Wisconsin by Mr. Kennicott, and in many other regions by contributors, mentioned in detail in the alphabetical list at the end of this report, have also been of much value.

11. *Other parts of the world.*—The exotic additions consist chiefly of collections made in the Sandwich Islands by Mr. W. H. Pease, and on the Isthmus of Panama by Captain J. M. Dow and the Rev. Jos. Rowell.

12. *Astronomical expedition to Peru.*—The expedition to Peru, for the purpose of observing the total eclipse of the sun of September, 1858, by Lieutenant Gilliss, United States navy, under the auspices of the Smithsonian Institution, was accompanied by Mr. Carrington Raymond, who made such collections of birds, reptiles, and fishes as his time and opportunities would allow, and succeeded in obtaining several species not previously in the collection.

Among the collections received during the year, not strictly made by single expeditions or individuals, one presented by the Museum d'Histoire Naturelle of Paris deserves especial mention. This consists of the types of many of the genera of serpents described by M. Duméril, selected with special reference to American forms. A labelled collection of land shells from Mr. Binney, and of rare eggs of North American birds from Mr. John Krider, are also worthy of particular notice.

PRESENT CONDITION OF THE MUSEUM.

The museum of the Smithsonian Institution, as at present constituted, has been supplied with materials chiefly from the following sources:

First. The collections brought from the Patent Office, and made up principally of the results of various explorations. They are as follows:

1. United States exploring expedition, under Captain Wilkes, United States navy, 1838–1842. The collections made by this naval expedition are supposed greatly to exceed those of any other of similar character ever fitted out by a foreign government, no published series of results comparing at all in magnitude with that issued under the direction of the Joint Library Committee of Congress.*

The collections made embrace full series of the animals, plants, minerals, and ethnological material of the regions visited, such as the coasts of South America, the islands of the South Seas, &c.

2. Exploration of the Amazon and its tributaries, by Lieutenant

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* The following reports relating to the operations and collections of the expedition have been published or are in press, the text in quarto, the plates in folio:

1. Narrative of the expedition by Captain C. Wilkes, 5 vols. text, one of plates.
Zoophytes. By Prof. J. D. Dana, 1 vol. and atlas.
Geology and Mineralogy. By Prof. J D. Dana, 1 vol. and atlas.
Crustacea. By Prof. J. D. Dana, 2 vols. and atlas.
Philology. By Mr. Hale, 1 vol.
Races of Man. By Dr. C. Pickering, 1 vol.
Geographical Distribution of Species. By Dr. C. Pickering, 1 vol.
Mammals and Birds. By T. R. Peale, 1 vol.
Mammals and Birds, 2d edition. By J. Cassin, 1 vol. and atlas.
Meteorology. By Captain Wilkes, 1 vol.
Shells. By Dr. A. A Gould, 1 vol. and atlas.
Reptiles. By Dr. C. Girard, 1 vol. and atlas.
Ferns. By Mr. Breckenridge, 1 vol. and atlas.
Botany. By Dr. Gray, 2 vols. and atlas.
Botany of Western America. By Dr. Torrey, 1 vol. and atlas.
Mosses. By Mr. Sullivant, 1 vol. and atlas.
Fungi. By Messrs. Berkeley and Curtis, 1 vol. and atlas.
Algae. By Prof. Bailey, 1 vol. and atlas.
Charts. 2 vols. folio.

In addition to these, the report on the fishes, by Professor Agassiz, is stated to be nearly ready for the press.

W. E. Herndon, United States navy. These consist chiefly of vertebrate animals and ethnological material.

3. Exploration of the valley of Great Salt Lake, by Captain Stansbury, United States army. Collections in character much like the last.

4. Exploration of the Zuñi and Colorado rivers by Captain Sitgreaves, United States army, and the survey of the Creek Boundary by Captains J. C. Woodruff and Sitgreaves.

5. Presents made to the United States by the King of Siam and other foreign governments, deposited by the State Department.

6. Collections of Commodore M. C. Perry, United States navy, made while negotiating a treaty with Japan, and the presents to the United States government through him from the Japanese authorities.

7. Collections made by Dr. D. D. Owen in his United States geological explorations in the west.

8. Collection of birds, &c., of British Guiana, from Rev. C. W. Denison.

9. African curiosities, deposited by Rev. Dr. Gurley, in behalf of the American Colonization Society.

10. Miscellaneous specimens belonging to the old Washington Museum and deposited by Mr. John Varden.

11. Miscellaneous specimens, including paintings and statuary, from different individuals, presented to or deposited in the national gallery.

12. Collection of Indian paintings from the War and Indian Departments.

In addition to the collections above enumerated, the old hall contained numerous specimens of different kinds belonging to or deposited in the care of the National Institute. These the Smithsonian Institution offered to take charge of, subject to such future order as the National Institute might make in regard to them, but the offer was declined at the time by its authorities and the specimens were left in their places, but afterwards concentrated in several of the old cases of the Patent Office hall. As no supervision is now exercised over them it is much to be feared that great injury will necessarily result to the more perishable portions.

Second. The collections in the Smithsonian Institution belonging to the United States, and deposited in pursuance of the act of incorporation, other than those mentioned, are as follows:

13. Collections of the United States geological survey made in Iowa, Illinois, and Minnesota, under Dr. D. D. Owen.

14. Collections made on Lake Superior, by Messrs. Foster and Whitney.

15. Collections made by Dr. Charles T. Jackson.

16. Collections made in Oregon and Washington Territories, by Dr. J. Evans.

17. Collections of vertebrates and minerals of Chile, made by Lieutenant J. M. Gilliss, U. S. N.

18. General collections made by the North Pacific surveying and exploring expedition under Captains Ringgold and Rodgers, U. S. N., chiefly in the China Seas, Behring Straits, Coast of California, &c.

19. General collections made by the United States and Mexican

boundary survey, under Colonel Graham and Major W. H. Emory, U. S. A.

20. General collections made by the Pacific railroad survey of the 47th parallel, under Governor Stevens.

21. General collections made by the Pacific railroad survey on the 38th, 39th, and 41st parallels, under Captains Gunnison and Beckwith.

22. General collections made by the Pacific railroad survey on the 35th parallel, under Captain Whipple.

23. General collections made by the Pacific railroad survey on the partial route in California, under Lieutenant Williamson.

24. General collections made by the Pacific railroad survey on the western end of the 32d parallel, under Lieutenant Parke.

25. General collections made by the Pacific railroad survey on the eastern end of the same parallel, under Captain Pope.

26. General collections made by the Pacific railroad survey in California and Oregon, under Lieutenant Williamson.

27. Collections made by Captain Pope while sinking artesian wells on the Llano Estacado.

28. Collections made by the northwestern boundary survey, under A. Campbell, esq.

29. Collections made in Paraguay, by Captain Page.

30. Collections made on the Isthmus of Darien, by Lieutenant Michler, U. S. A.

31. Collections made by Lieutenant Bryan during two seasons spent in constructing a wagon road from Fort Riley to Bridger's Pass.

32. Collections made on the Upper Missouri and Yellowstone, under Lieutenant Warren.

33. Collections made on the Platte, by Lieutenant Warren.

34. Collections made on Red river, by Captain Marcy.

35. Collections made by the South Pass wagon-road expedition, under W. M. Magraw.

36. Collections made during the exploration of the Colorado river, under Lieutenant Ives.

For an account of the many private collections presented to the Smithsonian Institution, reference must be made to the annual reports of 1850—1857, and to another portion of the report for the present year; several, however, need special mention here on account of their extent and value.

37. Collections made in northern Mexico, by Dr. Berlandier, purchased and presented by Lieutenant Couch, in addition to a similar collection made by himself.

38. Collections made in Texas, Louisiana, and Florida, by Mr. Gustavus Wurdemann.

39. Collections made on the Pacific coast, by Lieut. Trowbridge.

40. Collections made in Washington and Oregon Territories, by Dr. George Suckley.

41. Collections made in Washington, California, and Nebraska, by Dr. J. G. Cooper.

42. Collections made at Petaluma, California, by Mr. E Samuels.

43. Collections made on the Upper Missouri, by Thaddeus Culbertson; and others made by Dr. Hayden and Colonel A. J. Vaughan, Indian agent for the Blackfeet.

44. Collections made at Fort Tejon, Cal., by Mr. John Xantus.
45. Collections made in Wisconsin and Missouri, by Dr. P. R. Hoy.
46. Collections made in Wisconsin, by Rev. A. C. Barry.
47. Collections made in Illinois and Minnesota, by Robert Kennicott.
48. Collections made on the New England coast, by W. Stimpson.
49. General collections, deposited by S. F. Baird.

Together with very many others of greater or less note.

As the result of combining all the collections referred to in the preceding notices, it may be said that the museum of the Smithsonian Institution is entitled to no mean rank among similar establishments elsewhere. It is certainly superior to any other in the United States as a general collection, although in the specialities of exotic birds, shells, fossils, and minerals it is surpassed by the Philadelphia Academy of Natural Sciences. The material is not even now wanting to give it a first class position; only the means to properly determine, arrange, and exhibit the collections already within the walls of the Institution. With the enormous amount of duplicates of rare and new species on hand, it will be possible, after the determinations have been completed, to make additions by exchange to any conceivable extent, almost without the expenditure of a single dollar in the way of purchase. It must be remembered, too, that the collections in the building have been made since 1850, (with the exception of most of those brought from the Patent Office, which hardly form one-fifth part of the whole museum,) and that the additions of the past year, independently of those just mentioned, have exceeded those of any previous one.

There are many departments of natural history in which the collections of the Smithsonian Institution are believed to be superior to any others extant, not merely to those of the United States. In all that relates to North America, and perhaps to South America, also, it has no equal anywhere. The collection of crustacea of the world is said to be superior even to that of the Paris museum; and the same may, possibly, be said of the recent corals. And yet no special attempts have been made to this end. With the general interest of Americans in such subjects, nothing would be easier than to excite the zeal of officers of the naval and mercantile marine, government officials abroad, and travellers, to such a pitch as to yield vast results every year. Unfortunately the Smithsonian Institution has neither space for such extensive exotic collections nor funds to devote to their preparation and arrangement, all the appropriation of Congress being required for the preservation of the specimens belonging to the United States, and for the arrangement and exhibition of the contemplated North American museum. This latter it is proposed to make as complete as possible, so as to exhibit to visitors from all parts of the Union a full series of natural objects belonging to each State.

In view of the importance of having some one public museum, illustrating as fully as possible the natural history of the world, and taking rank with those of London, Paris, Berlin, Vienna, and others, and considering that so excellent a foundation has already been laid by the collections now in the Smithsonian Institution, and the ease

with which they may be augmented to any desirable extent, it is earnestly to be hoped that the day is not far distant when the moderate amount of funds necessary may be placed in the hands of this Institution.

It is, of course, impossible, in a few words, to give a detailed account of the collections of the Smithsonian museum. This can only be supplied by the descriptive catalogues of species and specimens already published or now in course of preparation, after the plan of those of the British museum. These will serve not only as guides to the cases and collections, but as manuals by which the same species may be readily identified elsewhere.

Work done in connexion with the collections.

The chief labor of the year in reference to the museum has consisted in the transfer and partial arrangement of the collections belonging to the United States, for many years constituting the national gallery of the Patent Office, at first under the direction of the Joint Committee of the Library of Congress, but for some years under that of the Commissioner of Patents.

In the spring of 1857 the appropriation was made by Congress for the construction of cases in the Smithsonian building for the reception of the Patent Office collections, but owing to various drawbacks these cases were not entirely finished until 1858. As soon as the various technicalities incident to the transfer of this property were completed, the work of removal was commenced and the whole collection moved over in July last. Since that time much has been accomplished towards giving to the different portions of the collections thus transferred their final arrangement, but much necessarily remains to be done before this can be completed. An indispensable preliminary consists in the entry of every specimen in its appropriate record book and the ineffaceable attachment of a number, by means of which the displacement or loss of a label (so likely to occur in the operations of a large and growing museum) will be of comparatively little consequence. The next step is to post all the specimens of each species on its appropriate invoice sheet, as fast as accurate identification is accomplished, and after these sheets are systematically assorted the final arrangement of the specimens themselves can then be completed and catalogues printed as guides to the collection.

As none of these details had been entered into with regard to the Patent Office collections previous to their removal, (with the exception of the labelling of a portion, and the entry of the crustacea in a record book,) it becomes necessary to carry them out in the Smithsonian Institution. This, however, will require a long time to complete, owing to the magnitude of the undertaking, and in the mean time the specimens exhibited have been provisionally arranged for the present, to be systematically placed and accurately and legibly labelled hereafter. This has already been done by Mr. Varden for the ethnological collections in the galleries of the west end of the hall, and by Professor Dana for the corals.

Considerable progress has been made in recording, determining, and invoicing the other collections in the Institution, apart from those brought from the Patent Office. The mammals, North American birds and their eggs, the osteological collection, and the North American lizards, are at present so well posted up that the number of species represented in the different series, with the aggregate number in each series, the locality, donor, and other incidents of all the specimens of each can be shown at a glance. Nearly all the North American reptiles, other than saurians, are entered, and many of them determined; and the same may be said of the western fishes. The following table will show how much of this labor of recording has been done in 1858.

Table exhibiting the entries in the record books of the Smithsonian museum in 1858, *in continuation of previous years.*

	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.
Mammals	------	114	198	351	1,200	2,046	3,200	3,226
Birds	------	------	------	4,353	4,425	5,855	8,766	11,390
Reptiles	------	------	------	------	------	106	239	4,370
Fishes	------	------	------	------	------	155	613	1,136
Skeletons and skulls	911	1,074	1,190	1,275	2,050	3,060	3,340	3,413
Crustacea	------	------	------	------	------	--------	--------	939
Eggs of birds	------	------	------	------	------	--------	--------	1,032
Total	911	1,188	1,388	4,979	7,675	11,222	16,158	25,506

The actual number of entries during the year amounts to 9,348, being the difference between the aggregates of 1858 and 1857. As most of these, however, have been made at least twice in the record book and on the invoices, the total is nearer 18,000.

From the preceding table it will be seen that the entries already exceed twenty-five thousand. In the case of alcoholic series, however, each bottle, though containing only one species from one locality, may, and almost always does, include more than one specimen, the average being at least five, which would give to the reptiles and fishes an addition of 22,024 pieces, which would bring the number of registered specimens nearly to forty-eight thousand. This is, however, far from expressing the full statistics of the collection, as there are at least ten thousand jars of alcoholic specimens not yet entered, to say nothing of the exotic birds and other objects.

During the year the determination of the North American birds in the Smithsonian collection has been completed, and the results presented by myself in the ninth volume of the reports of the Pacific railroad survey, occupying over a thousand quarto pages. The description of each species is followed by a list of all the specimens in the collection, with an indication of the locality, collector, date, and other details, and the report in question thus serves as a catalogue of the ornithological collections of the Institution, as the previous volume (eighth) did of its North American mammals. From this report it

will be seen that the number of known North American species of birds amounts to nearly 720, or about 225 more than given in 1844 by Mr. Audubon, and that nearly all are in the Smithsonian collection.

The North American eggs and nests have been determined and arranged in the hall, where they form a highly attractive feature. The North American saurians have also been monographed and described in detail to the number of about 90 species. This work is still in manuscript. Much progress has also been made in a similar memoir on the serpents, with the assistance of Mr. Kennicott. Detailed accounts of the fishes collected by the Mexican boundary and Pacific railroad surveys, as also of the reptiles of the United States exploring expedition, prepared by Dr. Girard, have been published in their several reports.

Other collections belonging to the Smithsonian museum, in process of elaboration during the year, are as follows:

Birds.—The report of Mr. Cassin on the birds of the United States exploring expedition has been printed during the year. The same gentleman has now the birds collected by Captain Page in Paraguay, and those of the North Pacific expedition, and has nearly completed reports upon them.

Reptiles.—The collection of North American turtles was placed some years ago in the hands of Professor Agassiz, from whom a detailed account of them may shortly be expected. Dr. Hallowell has furnished during the year a report on the reptiles of the North Pacific expedition.

Fishes.—The fishes of the United States exploring expedition are in the hands of Professor Agassiz for the preparation of a report, to be published in the series of the expedition. The collection contains many hundreds of new species. The fishes collected during the North Pacific surveying and exploring expedition, under Captains Ringgold and Rodgers, are in the hands of Mr. J. C. Brevoort.

Invertebrates.—Mr. Stimpson has been occupied during the year in investigating the crustacea collected by him on the North Pacific exploring expedition. Dr. A. A. Gould has also had in hand the shells, and Mr. Barnard the echini of the same expedition. The Neuroptera of the Smithsonian museum are in progress of examination by Dr. Hagen, of Königsberg, the Coleoptera by Dr. Le Conte, the Hymenoptera by Mr. De Saussure, the Diptera by Baron Osten-sacken, the Hemiptera by Mr. Uhler.

Plants.—Large collections of plants collected by government expeditions are still in the hands of Drs. Torrey and Gray, Mr. Sullivant, Mr. Curtis, and others.

Geological Collections.—The collections made during Lieutenant Warren's explorations of the Upper Missouri region have been in progress of investigation during the year by Messrs. Hayden and Meek, and those of Lieutenant Ives' expedition to the Colorado by Dr. Newberry.

Besides the scientific details connected with the administration of the Smithsonian museum and collections, much has been done in regard to the mechanical portion, in addition to the more or less complete arrangement of the Patent Office series. A beginning has been made in the cleaning of the mounted animals belonging to the

Patent Office collection, which had become greasy, dusty, or distorted, by time and accident, and by their transfer to new stands. Many skins of mammals and birds have been mounted and placed in the cases to supply deficiencies, or to replace defective specimens, although a vast amount yet remains to be accomplished in this respect before the collection will attain its proper condition. A large number of skulls have been cleaned and put in place; nearly all the jars of alcoholic specimens in the building, amounting to over 15,000, have been washed and replaced with fresh spirits; more than 1,000 gallons of alcohol having been required for this purpose.

Distribution of Collections.

As the collections of the Smithsonian Institution become properly indentified the duplicates are laid aside to be distributed to other parties. It would, of course, be manifestly inexpedient to make such distribution before determining the species accurately, as nearly all are referred to in some official report or special monograph, and the duplicates will be chiefly valuable as the types of such works. For this reason not much has yet been done in the way of distribution to public museums, although materials are constantly being furnished to men of science for monographic investigations.

Even after the species may have been determined some time must elapse before any extensive systematic distribution of series can be effected, as the labor of labelling each specimen, making duplicate catalogues, and of packing, will be very great. No time will be lost, however, in doing whatever is possible in the case, not only for the purpose of supplying a great want, but also of relieving the shelves and cases of the Institution of a redundancy of material.

LIST OF DONATIONS DURING 1858.

Dr. W. W. Anderson, U. S. A.—Birds of New Mexico.

Samuel Arny.—Reptiles from Kansas.

Dr. W. O. Ayres.—Fishes from California.

A. S. Babcock.—Eight skins of birds of Massachusetts.

Wm. M. Baird.—Coal from Pittston, Pa.

Thos. Barnet.—Cast of mastodon tusk (perfect) from St. Thomas, Canada West.

Sidney Barnet.—Box of minerals from Egypt.

Dr. J. B. Barratt.—Skin of *Pityophis melanoleucus* from South Carolina, and *Lepidosternon floridanum*, in alcohol.

Lieutenant Beale.—Four boxes of geological collections, with some birds and alcoholic specimens.

Thos. E. Blackney.—Mounted *Grus americana* from Illinois.

W. P. Blake.—Zoological collections from New Mexico.

W. G. Binney.—Series of land shells of United States.

Captain A. H. Bowman, U. S. A.—Mammals and birds of New Mexico.

J. Brakely.—Jar of mammals from New Jersey.

J. L. Bridger.—Wasp nests and alcoholic collections from North Carolina.

Dr. Geo. C. Brown.—Alcoholic specimens from Mount Holly, New Jersey.

Archibald Campbell.—Collections of animals and plants, made by Dr. C. B. Kennerly, assisted by George Gibbs, esq., and of minerals and fossils made by George Gibbs, in connexion with the Northwest boundary survey, on and near Puget's Sound.

A. Cassidy.—Birds, mammals, and alcoholic specimens from San Diego, Cal.

T. Apoleon Cheney.—Skull and other remains from an Indian mound in Cattaraugus county, N. Y.

E. D. Cope.—Specimens of *Heloecetes feriarum* from New Jersey.

Captain J. M. Don.—Two specimens of the *Pharomacrus* or quesal from Central America.

C. Drexler.—Collections of vertebrata from Fort Bridger. Living *Spermophilus townsendii* and *Cynomys gunnisonii.*

Dr. A. J. Foard, U. S. A.—Skins of *Cyrtonyx massena*, *Spermophilus grammurus*, and *Thomomys umbrinus* from Texas.

Dr. W. Gesner.—Reptiles and mammals from Western Georgia.

Th. Gill.—Fishes and crustaceans from the West Indies.

Jas. M. Gilliss, jr.—Alcoholic specimens from Florida.

T. Glover.—Living turtles from Florida.

Donald Gunn.—Skins of mammals, birds and alcoholic specimens from North Red river.

Dr. S. E. Hale.—Skulls of mammals from northern New York.

C. T. Hartt.—Fossils from Nova Scotia.

Rufus Haymond, M. D.—Mammals and reptiles from Indiana.

S. Hayes.—*Heloderma horridum* from Gila river.

Dr. Hunter.—Reptiles of North Carolina.

Lieutenant J. C. Ives, U. S. A.—Collection of animals, plants, minerals and fossils from southern California and the Colorado river, and eastward. The animals collected chiefly by H. B. Möllhausen, the remaining objects by Dr. J. S. Newberry.

Dr. Kellogg.—Fruit of the "Mara" of California.

Thos. Kite.—Casts of sculptured foot marks from near Barnesville, Ohio.

Prof. Jos. Le Conte.—Skins of birds of Georgia.

Major J. Le Conte.—*Hyla, Scapheopus, and Rana capito* from Georgia.

Dr. Lummas.—Jar of reptiles and fishes from Kentucky.

Dr. J. C. M'Kee, U. S. A.—Mammals and birds of New Mexico.

J. Mac Minn.—Fossil bones of *Cervus* and *Erethizon* from Pennsylvania.

W. M. M'Lain.—Collection of eggs of North American birds.

Mrs. M'Peak.—Pectoral spine of siluroid fish.

W. M. Magraw.—Five boxes collections vertebrata of Utah, made by C. Drexler, in connexion with South Pass wagon-road expedition.

Judge Merrick.—Scorpion from Nelson county, Ky.

Dr. Geo. F. Moore.—Reptiles from North Carolina.

Lieut. N. Michler, U. S. A.—Collection of animals, plants, &c.,

from the Isthmus of Darien (Atrato expedition,) made by Arthur Schott, assisted by Wm. S. and Charles Wood.

Museum d'Histoire Naturelle, Paris.—Collection of 81 species serpents, types of erpetologie generale.

Alfred Newton.—Pair of stellers ducks, and *Xema minuta.*

Dr. Ed. Palmer.—Fossils from Kansas; skin of wild cat.

J. D. Parker.—Horns of moose, deer, skull of bear, &c., from Maine.

James P. Postell.—Reptiles, mammals, and invertebrates from Georgia.

Patent Office.—Government collections in natural history in Patent Office, consisting chiefly of those gathered by the United States exploring expedition under Captain Wilkes in 1838—1842; by Captain Howard Stansbury in the exploration of the valley of Great Salt Lake; by Captain Sitgreaves in the exploration of the Zuñi and Colorado; by Commodore Perry in his Japan expedition; by Lieut. Herndon on the Amazon, &c. (See page 52.)

Wm. H. Pease.—Fishes, crustaceans, lavas, &c., from Sandwich Islands.

A. Pitman.—Manganese ore from Virginia.

J. P. Postell.—Keg of alcoholic specimens from Georgia.

C. Raymond.—Collections of birds and of alcoholic specimens made in Peru during the astronomical expedition of Lieut. Gilliss.

Dr. Ravenel.—Two bottles of insects from South Carolina.

George M. Roberts.—Box of minerals.

Rev. Joseph Rowell.—Alcoholic specimens from the Isthmus of Panama.

P. L. Sclater.—Skins of Mexican birds.

A. Sharpless.—Collection of birds' eggs from Pennsylvania.

Dr. J. B Smith, U. S. A., and *Major H. Wayne, U. S. A.*—Skeleton of a camel from Texas.

Dr. J. B. Smith.—*Geomys bursarius* from Kansas.

Judge Steele.—Skin of albino deer; alcoholic collections from the coast of Florida.

J. J. Steenstrup.—Annulata and radiata from Greenland and the West Indies.

F. D. Steuart.—*Heterodon, Jaculus labradorius*, and mink from near Washington.

W. Stimpson —Fresh *Lophius*, with fishes and invertebrates in alcohol from Massachusetts.

Capt. C. P. Stone.—Shells, fossils, fishes, &c., from the Gulf of California.

Dr. George Suckley.—Jar of serpents from East Indies.

A. S. Taylor.—Marine animals from Monterey, Cal.

Miss Helen Teunison.—Specimens of reptiles and fishes in alcohol, from Mississippi.

Major G. H. Thomas, U. S. A.—Skins of animals and alcoholic specimens, Fort Mason, Texas.

Lieut. W. P. Trowbridge.—Starfish and tail of ray from the sea of Marmora.

Mr. Tufts.—Living marine animals from Massachusetts, for the aquarium.

Major Twiss.—Living grizzly bear from near Fort Laramie.

Union Lead Mines, N. C.—Massive lead ore.

Unknown.—Jar of fishes from Florida.

Unknown.—Box of copper ores from the Perseverance mines, near San Diego, Cal.

J. P. Verreaux.—Skins of Mexican birds.

Dr. Vollum, U. S. A.—Fishes and other animals, and specimens of the "rock oyster," from the coast of Oregon,

Lieut. G. K. Warren, U. S. A.—21 boxes collections of animals, plants, minerals, and fossils, from the valley of the Platte, gathered chiefly by Dr. Hayden.

James Wayne.—Mammals, and skins of fishes of Oregon.

Dr. Weinland.—Invertebrates from Hayti.

John R. Willis.—Collection of birds and their eggs from Nova Scotia.

W. S. Wood.—Alcoholic collections from New Jersey.

G. Wurdemann.—Skins and eggs of birds, and shells and specimens in alcohol from Florida.

John Xantus.—Very large collections of the animals and plants found in the vicinity of Fort Tejon, California.

LIST OF METEOROLOGICAL STATIONS AND OBSERVERS

FOR THE YEAR 1858.

BRITISH AMERICA.

Name of observer.	Station.	N. lat.	W. long	Height.
		° ′	° ′	*Feet.*
Baker, J. C	Stanbridge, Canada East	45 08	73 00	
Craigie, Dr. W	Hamilton, Canada West	43 15	79 57	
Delany, Edward M. J Delany, jr., John	Colonial Building, St. John's, Newfoundland.	47 35	52 38	105
Gunn, Donald	Red River Settlement, Hudson's Bay Territory.	50 06	97 00	853
Hall, Dr. Archibald	Montreal, Canada East	45 30	73 36	57
Hartt, C. F	Horton, Nova Scotia	45 06	64 25	95
Hensley, Rev. J. M	King's College, Windsor, Nova Scotia.	44 59	64 07	200
Magnetic Observatory	Toronto, Canada West	43 39	79 21	108
Smallwood, Dr. Charles	St. Martin, Isle Jesus, Canada East.	45 32	73 36	118

MAINE.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Dana, W. D	Perry	Washington	45 00	67 06	100
Gardiner, R. H	Gardiner	Kennebec	44 11	69 46	90
Gilman, Stephen	East Exeter	Penobscot	45 00	69 00	
Guptill, G. W	Cornishville	York	43 40	70 44	800
Parker, J. D	Steuben	Washington	44 44	67 58	50
West, Silas	Cornish	York	43 40	70 44	784
Willis, Henry	Portland	Cumberland	43 39	70 15	87
Wilbur, Benj F	Monson	Piscataquis	43 11	69 35	1,100
	Dexter	Penobscot	44 55	69 32	700

NEW HAMPSHIRE.

Bixby, A. H	Francestown	Hillsborough	42 59	71 45	
Brown, Branch	Stratford	Coos	44 08	71 34	1,000
Colby, E. P	Concord	Merrimack	43 12	71 29	378
Freeman, F. N	Claremont	Sullivan	43 29	72 22	535
Hanscam, R. F	North Barnstead	Belknap	43 38	71 27	
Odell, Fletcher	Shelburn	Coos	44 23	71 06	700
Purmort, Nath	West Enfield	Grafton	43 30	72 00	
Sawyer, Henry E	Concord	Merrimack	43 12	71 20	400

VERMONT.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Bliss, L. W.	West Fairlee	Orange	43 55	72 15	
Buckland, David	Brandon	Rutland	43 45	73 00	
Fairbanks, Franklin	St. Johnsbury	Caledonia	44 25	72 00	540
Marsh, Charles	Woodstock	Windsor	43 36	72 35	740
Jackman, Prof. A	Norwich	Windsor	43 42	72 20	
Paddock, James A	Craftsbury	Orleans	44 40	72 30	1,100
Parker, Joseph	Rupert	Bennington	43 15	73 11	750
Petty, McK	Burlington	Chittenden	44 29	73 11	346

MASSACHUSETTS.

Bacon, William	Richmond	Berkshire	42 23	73 20	1,190
Bond, Prof. W. C	Cambridge	Middlesex	42 22	71 07	71
Davis, Rev. Emerson	Westfield	Hampden	42 06	72 48	
Ellis, D. H.	Canton	Norfolk	42 12	71 08	90
Fallon, John	Lawrence	Essex	42 42	71 11	35
Felt, Charles W	Bridgewater	Plymouth	42 00	71 00	150
Lyons, Curtis J. Berger, M. L.	Williamstown	Berkshire	42 43	73 13	720
Mack, A. W.	Danvers	Essex	42 35	71 03	
Metcalf, Jno. G., M. D.	Mendon	Worcester	42 06	72 33	
Mitchell, Hon. Wm	Nantucket	Nantucket	41 16	70 06	30
Perkins, Dr. H. C.	Newburyport	Essex	42 47	70 52	46
Rice, Henry	North Attleboro'	Bristol	41 59	71 22	175
Rodman, Samuel	New Bedford	Bristol	41 39	70 56	90
Sargent, John S. Blake, George E. Prentiss, Henry C.	Worcester	Worcester	42 16	71 48	533
Snell, Prof. E. S.	Amherst	Hampshire	42 22	72 34	267
Whitcomb, L. F.	Florida	Berkshire	42 42	73 10	2,500

RHODE ISLAND.

Caswell, Prof. A.	Providence	Providence	41 49	71 25	120

CONNECTICUT.

Edwards, Rev. T., D.D.	New London	New London	41 21	72 12	90
Harrison, Benj F.	Wallingford	New Haven	41 26	72 50	133
Hunt, D.	Pomfret	Windham	41 52	72 23	596
Johnston, Prof. John	Middleton	Middlesex	41 33	72 39	175
Rankin, James	Saybrook	Middlesex	41 18	72 20	10
Scholfield, N.	Norwich	New London	41 32	72 03	50
Yeomans, William H.	Columbia	Tolland	41 42	72 16	

NEW YORK.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Alba, Dr. E. M	Angelica	Alleghany	42 15	78 01	1,500
Arden, Thomas B	Beverly	Putnam	41 22	72 12	180
Bowman, John	Baldwinsville	Onondaga	43 04	76 41	
Byram, Ephraim N	Sag Harbor	Suffolk	41 00	72 20	40
Chickering, J. W	Ovid	Seneca	42 41	76 52	800
Dayton, E. A	Madrid	St. Lawrence	44 43	75 33	280
Denning, Wiliam H	Fishkill Landing	Dutchess	41 34	74 18	42
Dewey, Prof. Chester, Ira C. Clark, Isaac C. Seely	Rochester	Monroe	43 08	77 51	516
Guest, W. E	Ogdensburg	St. Lawrence	44 43	75 26	
Holmes, E. S	Wilson	Niagara	43 20	78 56	250
House, J. Carroll	Lowville	Lewis	43 46	75 38	
House, John C	Waterford	Saratoga	42 47	73 39	
Howell, R	Nichols	Tioga	42 00	76 32	
Ingalls, S. Marshall	Pompey	Onondaga	42 56	76 05	1,745
Ives, William	Buffalo	Erie	42 50	78 56	600
Johnson, E. W	Canton	St. Lawrence	44 38	75 15	304
Julien, Alexis A	Schenectady	Schenectady	42 49	73 55	300
Landon, Anna S	Eden	Erie	42 30	79 07	700
Lefferts, John, Covert, A. B	Farmer	Seneca	42 40	76 50	1,000?
Magee, Irving	Spencertown	Columbia	42 19	73 41	860
Malcom, Wm. S	Oswego	Oswego	43 28	77 34	232
Morris, Prof. O. W	New York	New York	40 43	74 05	159
Paine, H. M., M. D	Clinton	Oneida	43 00	75 20	500
	Fordham	Westchester	40 54	74 03	147
Reid, Peter	Lake	Washington	43 15	73 33	
Riker, Walter H	Saratoga	Saratoga	43 06	74 00	960
Sheerar, H. M	Wellsville	Alleghany	42 07	78 06	1,480
Sias, Prof. Solomon	Fort Edward	Washington	43 13	73 42	
Spooner, Stillman	Wampsville	Madison	43 04	75 50	500
Titus, Henry Wm	Bellport	Suffolk	40 44	72 54	
Van Kleek, Rev. R. D	Flatbush	Kings	40 37	74 01	54
White, Aaron	Cazenovia	Madison	42 55	75 46	1,260
Yale, Walter D	Houseville	Lewis	43 40	75 32	
Young, Jude M	West Day	Saratoga			1,200
Zaepffel, Joseph	West Morrisania	Westchester	40 53	74 01	150

NEW JERSEY.

Cooke, Robert L	Bloomfield	Essex	40 49	74 11	120
Schmidt, Dr. E. R	Burlington	Burlington	40 00	75 12	26
Sergeant, John T	Sergeantsville	Hunterdon	40 29	75 03	
Simpson, B. F, Willis, O. R	Freehold	Monmouth	40 15	74 21	
Whitehead, W. A	Newark	Essex	40 45	74 10	35

PENNSYLVANIA.

Alsop, Samuel	Westchester	Chester	39 57	75 34	550
Baird, John H	Tarentum	Alleghany	40 37	79 19	950
Barrett, James	Linden	Lycoming	41 10	77 11	

PENNSYLVANIA—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Brown, Samuel	Bedford	Bedford	40 01	78 30	
Brugger, Samuel	Fleming	Centre	40 55	77 53	780
Burrell, J. T.	Bellefonte	Centre	40 50	77 49	
Coffin, Selden J.	Easton	Northampton	40 43	75 16	320
Comly, John	Byberry	Philadelphia	40 06	74 58	
Darlington, Fenelon	Pocopson	Chester	39 54	75 37	218
Edwards, Joseph Smedley, John H.	Chromedale	Delaware	39 55	75 25	196
Eggert, John	Berwick	Columbia	41 05	76 15	588
Friel, P.	Shamokin	Northumberland	40 45	76 31	920
Hance, Ebenezer	Morrisville	Bucks	40 12	74 53	30
Heisely, Dr. John	Harrisburg	Dauphin	40 16	76 50	
Heyser, William, jr.	Chambersburg	Franklin	39 58	77 45	
Hickok, W. O.	Harrisburg	Dauphin	40 16	76 55	320
Hildebrand, Wm. B. Peelor, David	Indiana	Indiana	41 15	79 02	1,321
Hoffer, Mary E.	Mount Joy	Lancaster	40 08	76 70	
Jacobs, Rev. M.	Gettysburg	Adams	39 51	77 15	
James, Prof. Charles S.	Lewisburg	Union	40 58	76 58	
Kirkpatrick, Prof. J. A.	Philadelphia	Philadelphia	39 57	75 11	60
Kohler, Edward	North Whitehall	Lehigh	40 40	75 26	250
Martin, William Speer, Dr. Alex. M.	Pittsburg	Alleghany	40 30	80 00	
Meybert, Dr. A. P.	Scranton	Luzerne	41 25	75 43	1,100
Mowry, George	Somerset	Somerset	40 02	79 02	2,180
Peale, Dr. J. Burd Hahn, Charles	Reading	Berks	40 19	75 56	263
Ralston, Rev. J. Grier	Norristown	Montgomery	40 08	75 19	153
Smith, Prof. Wm.	Canonsburg	Washington	40 25	80 07	936
Stewart, Thos. H.	Murrysville	Westmoreland	40 28	79 35	960
Swift, Dr. Paul	West Haverford	Delaware	40 00	75 21	400
Thickstun, T. F.	Meadville	Crawford	41 39	80 11	1,088
Wilson, Prof. W. C.	Carlisle	Cumberland	40 12	77 11	500
Wilson, W. W.	Pittsburg	Alleghany	40 32	80 02	1,026

DELAWARE.

Martin, R. A.	Milford	Kent	39 55	75 27	25
Porter, Mrs. E. D.	Newark	New Castle	39 38	75 47	120

MARYLAND.

Baer, Miss H. M.	Shellman Hills	Carroll	39 23	76 57	700
Bell, Jacob E.	Leitersburg	Washington	39 35	77 30	
Clark, Prof. A. W.	Chestertown	Kent	39 14	76 02	
Cofrau, L. R.	Oakland	Alleghany	39 40	79 00	
Goodman, Wm. R.	Annapolis	Anne Arundel	38 58	76 29	20
Hanshew, Henry E.	Frederick	Frederick	39 24	77 26	
Lowndes, Benj. O.	Bladensburg	Prince George	38 57	76 58	70
Mayer, Prof. Alfred M.	Baltimore	Baltimore	39 18	76 37	
McWilliams, Dr. Alexander.	Leonardtown	St. Mary's	38 17	76 43	

DISTRICT OF COLUMBIA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Smithsonian Institution.	Washington	Washington	38 53	77 01	60

VIRGINIA.

Astrop, Col. R. F.	Crichton's Store.	Brunswick	36 40	77 46	500
Boyers, Wm. R.	Buffalo	Putnam	38 38	81 57	
	Point Pleasant	Mason	38 50	82 31	
Couch, Samuel	Buffalo	Putnam	38 38	81 57	
Dickinson, George C	Rougemont	Albemarle	38 05	78 21	450
Fraser, James	Mustapha	Wood	39 20	81 41	
Hallowell, Benjamin	Alexandria	Alexandria	38 48	77 01	56
Hoff, Josiah W.	Wirt C. H	Wirt	39 05	81 26	
Hotchkiss, Jed	Mossy Creek	Augusta	38 20	79 05	
Johnson, Enoch D.	Sisterville	Tyler	39 34	80 56	540
Kendall, James E.	Kanawha C. H.	Kanawha	38 20	81 21	1,720
Mackee, Rev. C. B.	Anna	Fairfax	38 56	77 04	180
Marvin, John W.	Winchester	Frederick	39 15	78 10	
Patton, Thomas, M. D. Stalnaker, J. W., M. D.	Lewisburg	Greenbrier	38 00	80 00	2,000
Purdie, John R.	Smithfield	Isle of Wight	36 50	76 41	100
Reynolds, W. C.	Kanawha Salines.	Kanawha	38 30	81 30	
Ruffin, Julian C	Ruthven	Prince George	37 21	77 33	
Sanders, B. D.	Holliday's Cove	Hancock			
Slaven, James	Meadow Dale	Highland	38 23	79 35	
Spence, Edward E.	Montross	Westmoreland	38 07	76 46	200
Upshaw, George W.	Rose Hill	Essex	38 00	76 57	250
Van Doren, Abram	Hartwood	Stafford	38 15	77 34	350
Webster, Prof. N. B.	Portsmouth	Norfolk	36 50	76 19	34
Wells, J. Carson	Salem	Roanoke	39 20	80 01	1,100

NORTH CAROLINA.

Drysdale, Robt. H.	Marlboro'	Pitt			
Johnson, Dr. W. M.	Warrenton	Warren	36 30	78 15	
Kerr, Prof. W. C.	Davidson College	Mecklenburgh	35 30	80 54	850
McDowell, Rev. A.	Murfreesboro'	Hertford	36 30	77 06	
McDowell, W. W.	Asheville	Buncombe	35 37	82 29	2,250
Moore, Geo. F. M. D.	Gaston	Northampton	36 32	77 45	
Morelle, Rev. Daniel	Goldsboro'	Wayne	35 20	77 51	
Phillips, Rev. Jas., D. D	Chapel Hill	Orange	35 54	79 17	

SOUTH CAROLINA.

Cornish, Rev. John H.	Aiken	Barnwell	33 32	81 34	565
Glennie, Rev. Alex'r.	Waccaman	All Saints	33 40	79 17	20
Johnson, Joseph, M.D Dawson, J. L, M.D	Charleston	Charleston	32 46	80 00	30
Ravenel, Thomas P.	Black Oak	Charleston	33 00	80 00	50
Tew, Capt. C. C.	Columbia	Richland	34 00	81 07	295

GEORGIA.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Anderson, Jas., M. D.	The Rock	Upson	32 52	84 23	833
Arnold, Mrs. J. T.	Zebulon	Pike	33 07	84 26	
Doughty, Wm. H.	Augusta	Richmond	33 27	81 33	152
Easter, Prof. John D.	Athens	Clarke	33 58	83 80	850
Gibson, R. T.	Whitemarsh Is'd.	Savannah	32 04	81 05	18
Grant, Dr. W. T.	Thomson	Columbia			
Glover, Eli S.	Hillsboro'	Jasper	33 13	83 45	566
Pendleton, E. M , M. D.	Sparta	Hancock	33 17	83 09	550
Posey, John F., M.D.	Savannah	Chatham	32 05	81 07	42

FLORIDA.

Bailey, James B	Gainesville	Alachua	29 35	82 26	184
Baldwin, A. S., M. D.	Jacksonville	Duval	30 30	82 00	13
Batchelder, F. L.	Hibernia	Duval	30 15	81 30	15
Bean, James B	Micanopy	Alachua	29 35	82 32	78
Dennis, Wm. C.	Salt Ponds	Key West	24 33	81 48	
Hester, Lt. J. W., U. S. N.	Pensacola	Escambia	30 20	87 16	12
Ives, Edward R.	Alligator	Columbia	30 12	82 37	174
Mauran, P. B., M. D.	St. Augustine	St. John's	29 48	81 35	8
Steele, Judge Aug.	Cedar Keys	Levy	29 07	83 02	12
Whitner, Benj. F.	Belair	Leon	30 24	84 20	70

ALABAMA.

Alison, H. L., M. D.	Carlowville	Dallas	32 10	87 15	300
Darby, Prof. John	Auburn	Macon	32 37	85 34	821
Jennings, Dr. S. K.	Selma	Dallas	32 25	86 51	200
Tutwiler, Henry	Greene Springs	Greene	32 50	87 46	500
Waller, Robert B.	Greensboro'	Greene	32 40	87 34	350

MISSISSIPPI.

Lull, James S.	Columbus	Lowndes	33 30	88 29	227
McCary, Robert	Natchez	Adams	31 34	91 25	264
Robinson, Rev. E. S.	Paulding	Jasper	32 20	82 20	

LOUISIANA.

Kilpatrick, A. R.. M. D.	Trinity	Chatahoula	31 30	91 46	108
Merrill, Edward, M. D.	Trinity	Chatahoula	31 37	91 47	68

TEXAS.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Brightman, John C	Goliad	Goliad	28 30	97 15	50
Friedrich, Otto	New Braumfels	Comal	29 41	98 15	
Gantt, Dr. Wm. H	Union Hill	Washington	30 11	96 31	540
Gibbs, T	Huntsville	Walker			
Palm, Swante	Austin	Travis	30 15	97 47	
Rucker, B. H	Washington	Washington	30 26	96 15	
Van Nostrand, J	Austin	Travis	30 20	97 46	650
Yoakum, F. L	Larissa	Cherokee	31 45	95 20	

TENNESSEE.

Stewart, Prof. Wm. M	Clarkesville	Montgomery	36 28	87 13	481
Tuck, W. J., M. D	Memphis	Shelby	35 08	90 00	262

KENTUCKY.

Beatty, O	Danville	Boyle	37 40	84 30	950
Grinnell, J	Nolin	Hardin	37 10	85 35	
Lunemann, John H	Bardstown	Nelson	37 52	85 18	
Ray, L. G., M. D	Paris	Bourbon	38 16	84 07	810
Savage, Rev. Geo. S	Millersburg	Bourbon	38 20	84 20	804
Williams, S. R	Louisville	Jefferson	38 03	85 30	452
Young, Mrs. Lawrence	Springdale	Jefferson	38 07	85 34	570

OHIO.

Abell, B. F	Welchfield	Geauga	41 23	81 12	1,115
Ammen, J	Ripley	Brown	38 47	83 31	
Anthony, Newton	Mount Union	Stark	41 20	81 01	
Atkins, Rev. L. S	Madison	Lake	41 49	81 10	
Benner, J. F	New Lisbon	Columbiana	40 45	80 46	961
Bennett, Sarah E	Collingwood	Lucas	41 49	83 34	
Clarke, Wm. P	Medina	Medina	41 07	81 47	1,206
Colburn, Edward	Cleveland	Cuyahoga			
Gilmor, Moses	Jackson	Jackson	39 10	82 32	666
Groneweg, Lewis	Dayton	Montgomery	39 30	84 10	720
Harper, Geo. W	Cincinnati	Hamilton	39 06	84 27	150
Haywood, Prof. John	Westerville	Franklin	40 04	83 03	
Herrick, James D	Jefferson	Ashtabula	42 00	81 00	
Hollenbeck, F	Perrysburg	Wood	41 39	83 40	
Hurtt, Francis W	Cincinnati	Hamilton	39 06	84 34	
Hyde, Gustavus A	Cleveland	Cuyahoga	41 30	81 40	665
Ingram, John, M. D	Savannah	Ashland	41 12	82 31	
Jaeger, H. Wm	Lancaster	Fairfield	39 41	82 37	1,000
King, Mrs. Ardelia C	Unionville	Lake	41 52	81 00	650
Luther, S. M	Hiram	Portage	41 20	81 15	675
Mathews, Joseph McD	Hillsborough	Highland	39 13	83 30	1,000
Peck, W. R., M. D	Bowling Green	Wood	41 27	83 45	700
Poe, James H	Portsmouth	Scioto	38 50	82 49	468
Rogers, A. P	Gallipolis	Gallia	39 00	82 01	520

OHIO—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Sanford, Prof. S. N	Granville	Licking	40 03	82 34	995
Sanford, Smith	Edinburg	Portage	41 20	81 00	520
Shaw, Joseph	Bellefontaine	Logan	40 21	83 40	1,031
Shields, Rev. Robert Smith, John C	Bellecentre	Logan	40 28	83 45	1,170
Treat, Samuel W	Windham	Portage	41 10	81 05	
Ward, Rev. L. F	Medina	Medina	41 07	81 47	1,206
	Avon	Lorain	41 27	82 04	800
Williams, Prof. M. G	Urbana	Champaign	40 06	83 43	1,015
Wilson, Prof. J. H	College Hill	Hamilton	39 19	84 26	800
Young, Prof. Chas. A. Childs, E. W	Hudson	Summit	41 15	81 24	1,137

MICHIGAN.

Allen, James, jr	Port Huron	St. Clair	42 53	82 24	606
Blaker, Dr. G. H., jr	Marquette	Marquette	46 32	87 41	630
Campbell, Wm. M., M.D.	Battle Creek	Calhoun	42 20	85 10	750
Crosby, J. B	New Buffalo	Berrien	41 45	86 46	661
Currier, Alfred O	Grand Rapids	Kent	43 00	86 00	752
Pitcher, Dr. Zena Horton, L. S	Detroit	Wayne	42 24	82 58	597
Streng, L. H	Grand Rapids	Kent	43 00	86 00	625
Walker, Mrs. Octavia C.	Cooper	Kalamazoo	42 40	85 31	
Whelpley, Miss H. I	Monroe	Monroe	41 56	83 22	590

INDIANA.

Barnes, Charles	New Albany	Floyd	38 17	85 45	
Chappellsmith, John	New Harmony	Posey	38 08	87 50	320
Crisp, John F	Evansville	Vanderburgh	38 08	87 29	390
Lasselle, Charles B	Logansport	Cass	40 45	86 13	600
Moore, Joseph	Richmond	Wayne	39 47	84 47	800
Smith, Hamilton, jr	Cannelton	Perry	37 58	86 40	450
Vagnier, Prof. Thos	Notre Dame	St. Joseph	41 45	86 10	
Woodard, C. S	Michigan City	La Porte	41 41	86 53	622

ILLINOIS.

Babcock, Andrew J	Aurora	Kane	41 40	88 15	600
Babcock, E	Riley	McHenry	42 08	88 33	650
Baker, Frank	South Pass	Union	37 28	89 14	1,050
Bowman, Dr. E. H	Edgington	Rock Island	41 25	90 46	
Brendel, Fred'k, M.D.	Peoria	Peoria	40 36	89 30	
Cantril, Joshua E	Waynesville	De Witt	40 16	89 07	
Capen, E	Batavia	Kane	41 52	88 20	636
Collier, Prof. Geo. H	Wheaton	Du Page	41 49	88 06	682
Dudley, Timothy	Jacksonville	Morgan	39 30	90 06	
Eldredge, William V	Brighton	Macoupin	39 00	90 13	

ILLINOIS—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Grant, John	Manchester	Scott	39 33	90 34	683
Hall, Joel	Athens	Menard	39 52	89 56	
Harris, J. O., M. D.	Ottawa	La Salle	41 20	88 47	500
James, John, M. D.	Upper Alton	Madison	39 00	89 36	
Meacham, H. G.	Evanston	Cook	42 00	10 50	
Mead, S. B., M. D	Augusta	Hancock	40 12	89 45	
Mead, Thompson	Batavia	Kane	41 52	88 20	636
Newcomb, John B	Elgin	Kane	42 00	88 15	600
Riblet, J. H	Pekin	Tazewell	40 36	89 45	
Rogers, O. P	Marengo	McHenry	42 14	88 38	650
Smith, Isaac H	Fremont Centre	Lake	42 18	88 06	736
Swain, John, M. D.	West Urbana	Champaign	40 09	88 17	550
Titcomb, John S.	Hillsboro'	Montgomery	39 12	89 26	
Titze, Henry A.	West Salem	Edwards	38 30	88 00	
Tolman, James W	Winnebago Depot	Winnebago	42 17	89 11	800
Whitaker, Benjamin	Warsaw	Hancock	40 20	91 31	

MISSOURI.

Englemann, George. Wislizenus, A., M. D.	St. Louis	St. Louis	38 37	90 16	461

IOWA.

Beal, Dexter	Franklin	Buchanan	42 45		
Beeman, Carlisle D.	Rossville	Allamakee	43 10	91 21	1,400
Fory, John C.	Bellevue	Jackson	42 15	90 25	
Goss, William K.	Border Plains	Webster	42 36	94 05	
Horr, Asa, M. D.	Dubuque	Dubuque	42 30	90 52	1,258
McConnell, Townsend	Pleasant Plain	Jefferson	41 07	91 54	
McCready, Daniel	Fort Madison	Lee	40 37	91 28	
Odell, Rev. Benj. F	Pleasant Spring	Delaware			
Parker, Nathan H.	Clinton Davenport	Clinton Scott	41 48	90 15	
Parvin, T. S.	Muscatine	Muscatine	41 26	91 05	586
Reynolds, W.	Iowa City	Johnson	41 39	91 33	
Saville, Dr. J. J.	Sioux City	Woodbury	42 31	96 25	
Shaffer, J. M., M. D.	Fairfield	Jefferson	41 01	91 57	940

WISCONSIN.

Bean, Professor S. A.	Waukesha	Waukesha	42 50	88 11	833
Breed, J. Everett	New London	Waupacca	44 21	88 45	
Blanding, William M.	Falls of St. Croix	Polk	45 30	92 40	660
Burham, W. J	Racine	Racine	42 49	87 40	
Ellis, Edwin, M. D.	Bay City	La Pointe	46 33	91 00	658
Gridley, Rev. John	Kenosha	Kenosha	42 35	87 50	600
Horsford, William F.	Mount Morris	Waushara	44 06	89 14	

WISCONSIN—Continued.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Lapham, Increase A.	Milwaukie	Milwaukie	43 03	87 57	593
Lüps, Jacob	Manitowoc	Manitowoc	44 07	87 37	
Mason, Prof. R. Z.	Appleton	Outagamie	44 10	88 35	800
Nourse, Harvey J.	Bayfield	La Pointe			
Pickard, J. L., M. D.	Platteville	Grant	42 45	91 00	
Pomeroy, F. C.	Milwaukie	Milwaukie	43 04	87 59	658
Porter, Prof. Wm.	Beloit	Rock	42 30	89 04	750
Schue, A., M. D.	Madison	Dane	43 05	89 25	892
Sterling, Prof. J. W.	Madison	Dane	43 05	89 25	892
Struthers, R. H.	Lind	Waupacca	44 20	89 00	
Underwood, Col. D.	Menasha	Winnebago	44 13	88 18	
Winkler, C., M. D.	Milwaukie	Milwaukie	43 04	87 57	593
Willard, J. F.	Janesville	Rock	42 42	89 91	768

MINNESOTA.

Clarke, Thomas	Beaver Bay	Lake	47 12	91 24	675
Garrison, O. E.	Princeton	Benton	45 50	93 45	
Hibbard, A. A.	Burlington	Lake	47 01	92 30	645
Hillier, Spencer L.	Wabashaw	Wabashaw	44 30	92 15	850
McMullen, J. F. / Shortwell, Dan. F.	Lapham	Pembina	46 10	96 00	850
Riggs, Rev. S. R.	Hazlewood		45 00	95 30	
Van Voorhes, A.	Stillwater	Washington	45 04	92 45	756
Walsh, Stephen	Buchanan		47 33	92 00	

NEBRASKA.

Bowen, Anna M. J.	Elkhorn City	Douglas			
Byers, William N.	Omaha	Douglas	41 15	96 10	
Hamilton, Rev. Wm.	Bellevue	Sarpy	41 08	95 50	
Smith, Charles B.	Brownville	Nemaha	40 30	96 00	

KANSAS.

Berthoud	Leavenworth	Leavenworth	39 19	94 50	800
Brown, G. W.	Lawrence	Douglas	38 58	95 12	800
Fish, Edmund	Council City	Shawnee	38 42	95 50	
Giles, Foy W.	Topeka	Shawnee	39 04	95 40	
Goodnow, Isaac T.	Manhattan	Riley	39 13	96 45	
Himoe, S. O., M. D.	Mapleton	Bourbon	38 04	94 51	
McCarty, H. D.	Leavenworth City	Leavenworth	39 20	94 33	1,342

OREGON.

Name of observer.	Station.	County.	N. lat.	W. long.	Height.
			° ′	° ′	*Feet.*
Snyder, James A.	Fort Snyder	Thomson Pass	42 00	----------	8,010

UTAH.

Phelps, Henry E. Phelps, W. W.	Great Salt Lake City.	----------	40 45	111 26	4,250

MEXICO.

Name of observer.	Station.	Lat.	Long.	Height.
		° ′	° ′	*Feet.*
Laszlo, Charles	Minititlan, Tehuantepec	17 59	94 07	16

CENTRAL AMERICA.

Camedas, Antonio	Guatemala, Guatemala	14 15	90 34	
Dorat, Charles, M. D.	La Union, San Salvador	13 00	88 00	

SOUTH AMERICA.

Fendler, Aug	Colonia Tovar, Venezuela Caracas, Venezuela	10 26	67 20	6,500
Hering, C. J.	Plantation Catharina Sophia, Colony of Surinam, Dutch Guiana	5 48	56 47	

BERMUDA.

Royal Gazette	Centre Signal Station, St. Georges			

Stations from which telegraphic reports of the weather were received at the Smithsonian Institution by the Morse line, during the year 1858.

New York, N. Y.
Philadelphia, Pa.
Pittsburg, Pa.
Baltimore, Md.
Frederick, Md.
Hagerstown, Md.
Cumberland, Md.
Richmond, Va.
Petersburg, Va.
Norfolk, Va.
Lynchburg, Va.
Grafton, Va.
Wheeling, Va.
Parkersburg, Va.
Marietta, Ohio.
Chilicothe, Ohio.
Cincinnati, Ohio.
Bristol, Tenn
Knoxville, Tenn.
Chatanooga, Tenn.
Wilmington, N. C.
Columbia, S. C.
Charleston, S. C.
Augusta, Ga.
Savannah, Ga.
Macon, Ga.
Columbus, Ga.
Montgomery, Ala.
Lower Peach Tree, Ala.
Mobile, Ala.
Gainesville, Miss.
New Orleans, La.

REPORT OF THE EXECUTIVE COMMITTEE.

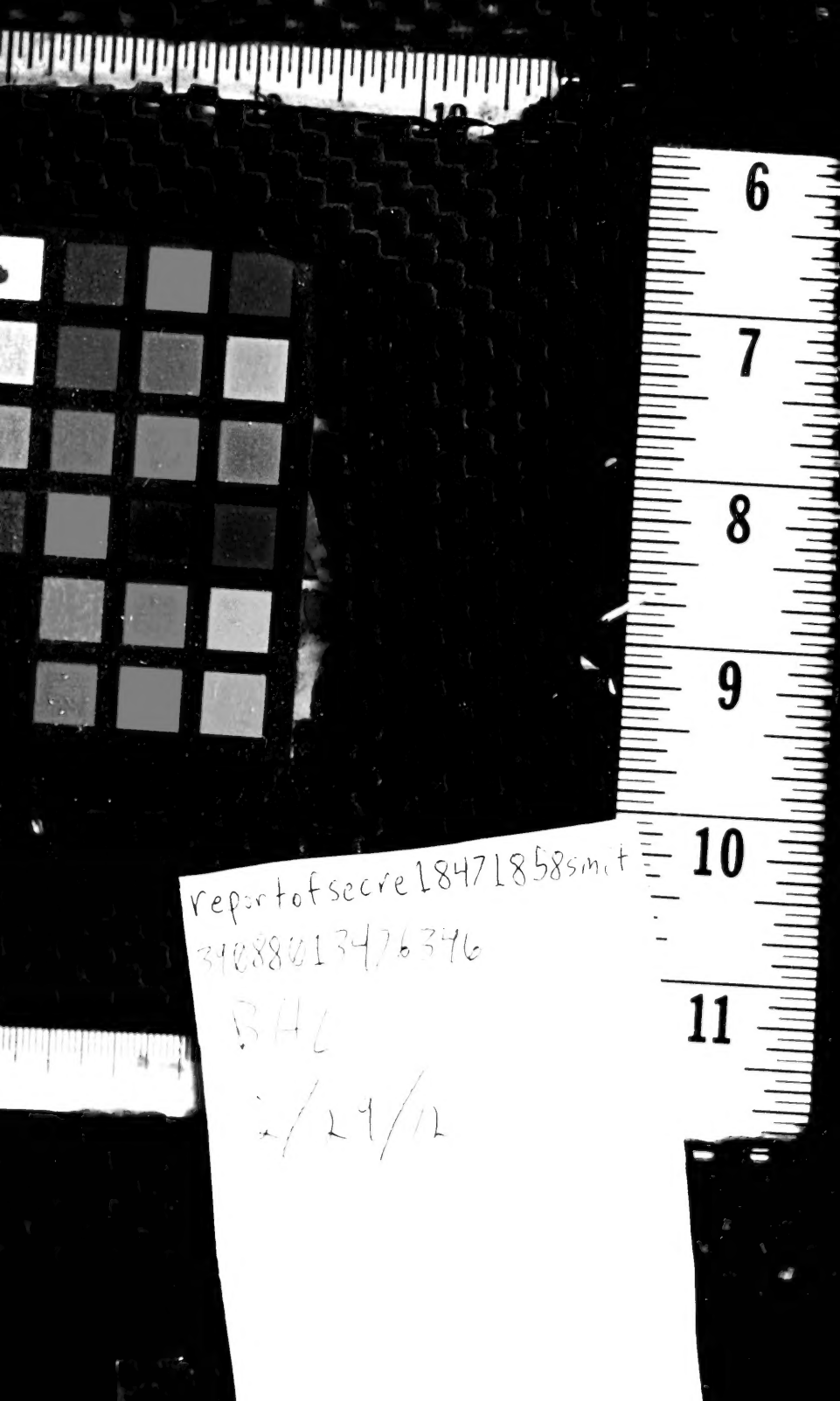
The Executive Committee respectfully submit to the Board of Regents the following report of the receipts and expenditures of the Smithsonian Institution during the year 1858, with estimates for the year 1859.

Receipts.

The whole amount of Smithson's bequest deposited in the treasury of the United States is $515,169, from which an annual income, at 6 per cent., is derived, of		$30,910 14
Extra fund from unexpended income invested as follows:		
In $75,000 Indiana 5 per cent. bonds, yielding	$3,750 00	
In $53,000 Virginia 6 per cent. bonds, yielding	3,210 00	
In $7,000 Tennessee 6 per cent. bonds, yielding	420 00	
In $500 Georgia 6 per cent. bonds, yielding	30 00	
In $100 Washington 6 per cent. bonds, yielding	6 00	
		7,416 00
		38,326 14
Balance in hands of treasurer January 1, 1858		10,341 30
		48,667 44

Expenditures.

For building, furniture, and fixtures	$1,107 87	
For items common to the different objects of the Institution	9,619 03	
For publications, researches, and lectures	11,956 83	
For library, museum, and gallery of art	9,814 29	
		32,498 02
Balance in the hands of the treasurer January 1, 1859, of which $5,000 belongs to the extra fund		16,169 42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