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COMPLIMENTS OF
CHARLES C. ADAMS
NEW YORK STATE MUSEUM
ALBANY, NEW YORK

New York State Museum Bulletin

Published by The University of the State of New York

No. 317

ALBANY, N. Y.

February 1939

NEW YORK STATE MUSEUM

CHARLES C. ADAMS Ph.D., *Director*

ONE HUNDRED FIRST ANNUAL REPORT OF THE NEW YORK STATE MUSEUM

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ALBANY

THE UNIVERSITY OF THE STATE OF NEW YORK

1939

THE UNIVERSITY OF THE STATE OF NEW YORK

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New York State Education Department
The New York State Museum, February 28, 1938

The Honorable Frank P. Graves
President of the University and
Commissioner of Education

SIR: I beg to submit herewith the report of the Director of the New York State Museum for the period from July 1, 1936, to June 30, 1937.

Very respectfully

CHARLES C. ADAMS
Director

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THE LEGAL STATUS OF THE NEW YORK STATE MUSEUM

All scientific specimens and collections, works of art, objects of historic interest and similar property appropriate to a general museum, if owned by the State and not placed in other custody by a specific law, shall constitute the State Museum. [*Education Law*, § 54.]

The Librarian of any library owned by the State, or the officer in charge of any state department, bureau, board, commission or other office may, with the approval of the Regents, transfer to the permanent custody of the State Library or Museum any books, papers, maps, manuscripts, specimens or other articles which, because of being duplicates or for other reasons, will in his judgment be more useful to the State in the State Library or Museum than if retained in his keeping. [*Education Law*, § 1115.]

THE FUNCTIONS OF THE STATE MUSEUM

"The Museum is the natural scientific center of the State government; it is the natural depository of all the material brought together by the state surveys; it is the natural custodian of all purely scientific state records; it is the natural center of the study of the resources of the State as a political unit; it must maintain its capacity for productiveness in pure scientific research—pure science has been the justification of the State Museum from the beginning of its history. * * * In brief, the distinctive sphere and scope of the State Museum corresponds with the scientific interests and welfare of the people within the geographic boundaries of the State.

The truest measure of civilization and of intelligence in the government of a state is the support of its institutions of science, for the science of our time in its truest sense is not the opinions or prejudices, the strength or weakness of its votaries, it is the sum of our knowledge of nature with its infinite applications to State welfare, to State progress and to the distribution of human happiness."—*Henry Fairfield Osborn, an address delivered at the dedication of the New York State Education Building, October 15, 1912.*

THE FUNCTIONS OF A MUSEUM

"A museum is an institution for the preservation of those objects which best illustrate the phenomena of nature and the works of man, and the utilization of these for the increase of knowledge and for the culture and enlightenment of the people.

In addition to local accessories, the opportunity for exploration and field work are equally essential, not only because of considerations connected with the efficiency of the staff * * * but in behalf of the general welfare of the institution. Other things being equal, exploration can be carried on more advantageously by the museum than by any other institution of learning, and there is no other field or research which it can pursue to better advantage.

To aid the occasional inquirer, be he a laboring man, schoolboy, journalist, public speaker, or savant, to obtain, without cost, exact information upon any subject related to the specialties of the institution; serving thus as a "bureau of information."

A museum to be useful and reputable must be constantly engaged in aggressive work either in education or investigation, or in both.

A museum which is not aggressive in policy and constantly improving can not retain in its service a competent staff and will surely fall into decay.

A finished museum is a dead museum, and a dead museum is a useless museum."—*G. Brown Goode, formerly assistant secretary, Smithsonian Institution.*

THE VALUE OF RESEARCH

"In the eyes of the world today the reputation of a country does not depend alone on the size of her armaments, the size of her empire or volume of her trade so much as upon the contribution she can make to the progress and happiness of mankind in art, in literature and in science.

"The development of industry depends more or less on the application of new ideas and discoveries in pure science. Successful industrial research is ultimately dependent on the prosecution of research in pure science with the object of adding to our knowledge of the processes of nature, and generally without regard to the practical applications."—*Stanley Baldwin, Lord President of the Council, Opening the Mond Laboratory at Cambridge, England, From the New York Times of February 19, 1933.*

RESEARCH AND EDUCATION

"The future of America is in the hands of two men—the investigator and the interpreter. We shall never lack for the administrator, the third man needed to complete this trinity of social servants. And we have an ample supply of investigators, but there is a shortage of readable and responsible interpreters, men who can effectively play mediator between specialist and layman. The practical value of every social invention or material discovery depends upon its being adequately interpreted to the masses. Science owes its effective ministry as much to the interpretative mind as to the creative mind. The knowledge of mankind is advanced by the investigator, but the investigator is not always the best interpreter of his discoveries. Rarely, in fact, do the genius for exploration and the genius for exposition meet in the same mind. . . . The interpreter stands between the layman, whose knowledge of all things is indefinite, and the investigator whose knowledge of one thing is authoritative. The investigator advances knowledge. The interpreter advances progress. History affords abundant evidence that civilization has advanced in direct ratio to the efficiency with which the thought of the thinkers has been translated into the language of the workers. Democracy of politics depends upon democracy of thought. 'When the interval between intellectual classes and the practical classes is too great,' says Buckle, 'the former will possess no influence, the latter will reap no benefit.' A dozen fields of thought are today congested with knowledge that the physical and social sciences have unearthed, and the whole tone and temper of American life can be lifted by putting this knowledge into general circulation. But where are the interpreters with the training and the willingness to think their way through this knowledge and translate it into the language of the street? I raise the recruiting trumpet for the interpreters."—*Glenn Frank.*

ENDOWMENT AND TRUST FUNDS

While the State has done much for the New York State Museum, it has not fully met its needs. Just as the citizens of the State have in the past generously donated much valuable material to the Museum, the public should be informed in what ways it may continue to assist.

Many persons do not realize that the State Museum, like the universities and other research institutions devoted to advanced learning, has in reserve many important problems and projects that require more money than the Museum budget provides. It is hoped that private citizens will assist in financing such worthy projects. To make this more definite certain methods of assistance will be listed.

1 Donations of funds to be devoted to special scientific, educational or economic studies. A list of these can be furnished to any seriously interested person.

2 A donation of funds, the income alone of which is to be used to conduct special studies. This kind of fund would give a fluidity which is particularly lacking under the present budget system. Such funds would enable the State Museum to undertake certain studies in advance of general public interest and legislative appreciation.

3 The donation of carefully selected tracts of land, suitable for scientific field stations, or for scientific reservations or important historic sites. Each tract should be provided with an endowment for maintenance. Such tracts could be made of the greatest scientific and educational importance under proper supervision.

In this connection attention should be called to the fact that gifts up to 15 per cent of net income, and that all bequests to the Board of Regents of The University of the State of New York in trust for the State Museum, are exempt from federal taxation, under the Federal Revenue Act of 1918.

FORM OF BEQUEST

I do hereby give and bequeath to the Board of Regents of The University of the State of New York, in trust for the New York State Museum:

Museum Committee of the Board of Regents

OWEN D. YOUNG, *Chairman*
WM LELAND THOMPSON
JOHN LORD O'BRIAN

State Museum Council

ORANGE L. VAN HORNE
SANFORD L. CLUETT
WILLIAM OTIS HOTCHKISS
WALDEMAR B. KAEMPFERT
PIERREPONT B. NOYES

State Museum Staff

CHARLES C. ADAMS, Ph.D., D.Sc.	<i>Director of State Museum</i>
ALVIN G. WHITNEY A.B.	<i>Assistant Director of State Museum</i>
RUDOLF RUEDEMANN Ph.D.	<i>State Paleontologist</i>
DAVID H. NEWLAND B.A., Ph.D.	<i>State Geologist</i>
ROBERT D. GLASGOW Ph.D.	<i>State Entomologist</i>
HOMER D. HOUSE Ph.D.	<i>State Botanist</i>
CHRIS A. HARTNAGEL M.A.	<i>Assistant State Geologist</i>
WINIFRED GOLDRING M.A., Sc.D.	<i>Assistant State Paleontologist</i>
DAYTON STONER Ph.D.	<i>State Zoologist</i>
KENYON F. CHAMBERLAIN	<i>Assistant State Entomologist</i>
ELSIE G. WHITNEY A.M.	<i>Assistant State Botanist</i>
NOAH T. CLARKE	<i>State Archeologist</i>
EDWIN J. STEIN	<i>Museum Draftsman and Photographer</i>
WALTER J. SCHOONMAKER	<i>Assistant State Zoologist</i>
ARTHUR PALADIN	<i>Museum Technical Assistant (Taxidermy)</i>
CLINTON F. KILFOYLE	<i>Museum Technical Assistant (Paleontology)</i>
JOHN L. CASEY	<i>State Museum Guide</i>

Honorary Curators

WILLIAM L. BRYANT	<i>Honorary Curator of Fossil Fishes</i>
HARRY S. PECK	<i>Honorary Curator of Minerals</i>

Collaborator

DR EPHRAIM P. FELT

Temporary Scientific Appointments

ARETAS A. SAUNDERS Ph.B.	<i>Temporary Ornithologist</i>
ROBERT B. GORDON Ph.D.	<i>Temporary Botanist</i>
WILLIAM L. LASSITER M.A.	<i>Temporary Curator of History</i>
A. F. BUDDINGTON Ph.D.	<i>Temporary Geologist</i>
HENRY VAUGHAN	<i>Temporary Geologist</i>
A. GLENN RICHARDS Ph.D.	<i>Temporary Entomologist</i>
ROGERS McVAUGH Ph.D.	<i>Temporary Botanist</i>
JOHN H. COOK	<i>Temporary Geologist</i>
MEDORA L. H. KRIEGER M.A.	<i>Temporary Geologist</i>
NORMAN TAYLOR	<i>Temporary Botanist</i>



New York State Education Building

ONE HUNDRED FIRST ANNUAL REPORT OF THE NEW YORK STATE MUSEUM

BY CHARLES C. ADAMS Ph.D., *Director*

New York State Museum

FOREWORD

This administrative Annual Report covers the fiscal year closing June 30, 1937. The last, the 31st Annual Report (State Mus. Bul. 313), concluded the hundredth year since the establishment by the Legislature, on April 15, 1836, of the State Geological and Natural History Survey, which under various names came to be known as the New York State Museum. It has seemed advantageous to number the Annual Reports of the new century in harmony with its age, and therefore the present report becomes the One Hundred First Annual Report of the New York State Museum.

YOUR STATE MUSEUM AND STATE HISTORY¹

During the past three years you have been hearing several talks in this rural education series, of the work and activities of your New York State Museum. You have heard members of the Museum staff and its friends speak of certain natural resources of the State which are of great importance to our citizens. These addresses have been on subjects which have been studied by the scientific staff of the Museum and have included such varied topics as salt, the water in your wells, the glacial soils, poison ivy, poisonous and edible mushrooms, insect pests of your household, garden, fields and forests, the birds which sing about your home and which feed their young a great number of the insect pests, with which you are often battling in order to save your garden and field crops. You thus see that these are subjects which come home to every one of us. Hundreds of letters come to the State Museum regularly from all parts of the State and elsewhere, inquiring about minerals, rocks, oil, gas, plants, insects, birds and other animals. You have heard of these natural history subjects, and now let us turn to another important phase of

¹ Radio address given by the Director of the State Museum, Station WGY, June 14, 1937.

the State Museum's work. I refer to the State Museum as the central state repository for historical objects.

You have heard rather recently of the famous Iroquois Indian groups by one of their creators, David C. Lithgow, the artist of the groups. These six lifelike groups portray the life of the Indians; and do you realize that this is the first chapter in the human history of this State? Everyone who has seen these groups realizes that this is a worthy subject, adequately and beautifully executed.

At the same time let us note that we also need similar groups to portray other important phases in the history of the State, as for example, the life of the early settlers, showing how they worked, the kinds of homes in which they lived, the home industries, how they made their clothes, the kinds of tools which they used, the method of preparation of their food, their businesses and trades and all similar activities. Groups to illustrate these phases, comparable in execution to those of the Indian groups are now needed. By a comparison of such exhibits we are able at a glance to appreciate the great changes and improvements which have taken place through the years.

The State Museum has for three-quarters of a century been accumulating materials bearing on the history of the State. As a result the State Museum today has an important collection of old ploughs, old corn planters and many other agricultural implements, as well as spinning wheels, samples of old homespun textiles, a great variety of carpenters', and metal-working tools, machinery, including moving machines, carriages, clocks, locks and similar products of the industrial arts. You see at once that these are not historic library materials but are objective museum materials.

There are people who say they are not interested in such historic objects, and yet only a few of these would refuse to notice the set of George Washington's surveying instruments, or the little bell which Joseph Henry rang by electricity for the first time in the history of the world. To this day every time the telephone bell rings in your home it is paying tribute to this discovery, and it will continue to do so as long as such bells ring! Are not such objects of interest and importance?

The question is frequently asked, What kind of historic material is of interest and of value to the Historic Collection of the State Museum? First of all, allow me to say that the State Museum is the central depository for state-owned historic objects, as contrasted with documents and publications, which fall within the field of the New York State Library. The state law states that, "objects of

historic interest and similar property appropriate to a general museum, if owned by the State and not placed in other custody by a specific law, shall constitute the State Museum." In brief, it is the printed and written matter that falls to the State Library, and other kinds of historic objects that fall within the field of the State Museum.

While the limited storerooms of the State Museum are already crowded with historic objects, there are serious deficiencies in the Historic Collection. For example, the collection needs additional material illustrating the Colonial Period, particularly from the Dutch and English settlements of the Hudson valley and Long Island, and up-State from the Mohawk Valley settlements. This applies particularly to the household industries. The collections of materials of the Revolutionary War period and of the period from that war to the Civil War are incomplete. Likewise, materials from the period of the great commercial and industrial expansion following the Civil War, and of the World War are needed. The State has never made adequate provision for the exhibition and storage of such bulky collections.

At various times the State has been given historic houses, buildings and battlefield sites, but these have not been acquired according to any general plan or system, and one might say almost by accident. These historic objects are in fact branch or outdoor museums, and should be so conducted. It has been proposed repeatedly that the State inaugurate a comprehensive plan for the administration of all these historic resources, houses, buildings and grounds, and give the State Museum facilities and staff to administer them as branches of the State Museum. Under such a proposal these historic sites would have their collections properly inventoried according to modern museum methods, and properly labeled as exhibits, with overcrowding eliminated by the storage of all superfluous material. The unique and priceless materials would then have proper professional care and protection from fire and theft.

The State Museum has in the past had considerable experience with an allied kind of reservation, the geological history preserve. The former Director of the State Museum, Dr John M. Clarke, through years of effort, secured for the State Museum several scientific reservations which displayed important aspects of the geological history of the State. The ideal was to pass these places on "to future generations unimpaired," as is the ideal of the great national parks. These scientific reservations were not intended as recreational parks, as that phase was and is elsewhere being well provided for, but to preserve them for educational purposes. That has proved to be a very difficult undertaking.

With the reorganization of the State Government in 1927, however, these educational reservations were transferred from the Education Department to the Department of Conservation, where they were converted into state recreational parks. It has long been contended that the scientific and the historical reservations should have the same kind of administration, that is, that they should be administered not as parks but primarily as educational reservations, and only secondarily for recreation; and further, that such reservations should be under the direct supervision of the State Education Department as should all the State's educational activities.

As a part of any such comprehensive program it is also necessary to provide adequate quarters for the State Museum itself. A new State Museum building built and designed exclusively for museum purposes is what is needed; a building at least as large as the present Education Building has been advocated for many years. It was proposed that such a building be considered the proposed World War Memorial, but this proposal has never been approved by the Legislature. No more appropriate memorial could be suggested, because it would not only house and exhibit the history of the State, including adequate World War exhibits, but would be a permanent exposition of the natural resources of the State and an exhibit of the achievements of its people.

A SUMMARY OF THE YEAR'S WORK

1 Field studies, laboratory or office work have been continued on the geological and mineral resources of 15 quadrangles or special areas. Museum bulletins on the Santa Clara and Thirteenth Lake quadrangles have been published. Studies have been continued on the mineral production of the State; recent developments of oil and gas; a monograph of the Graptolites; Devonian coral reefs; and special studies of stratigraphy.

2 Field studies, laboratory or office work have been continued on plants and animals. A popular handbook has been in preparation on ferns and their allies, and a handbook on the vegetation of the Alleghany State Park has been completed. This is the most intensive ecological study of a relatively large area yet made in the State. A similar survey of Cattaraugus county is nearing completion. The report on the flora of Columbia county is also nearing completion.

Field studies of the bank swallows of the Oneida Lake region and in the vicinity of Albany have been extended. The study of the cliff swallows of Albany has been continued. These swallow investigations have resulted in the completion of two short papers. Field

studies of mammals of the vicinity of Albany have been continued, as well as those of the birds of the Allegany State Park, and an important handbook on bird population of Quaker Run has been published.

Entomological studies have been devoted to cooperative investigations of pests of forest, nursery, greenhouse, field and garden, which have developed largely in various state administrative departments. Work on the black fly and mosquito problem has continued, with a great expansion of the mosquito control efforts due to a large amount of relief labor available. This study has required special research on the relation of ditching to salt marsh vegetation and to water birds. Preliminary reports have been printed on the salt marsh plants, and other reports are in process of publication.

3 Through relief help the study collections of Indian archeology have been greatly improved by storage, cataloging and cleaning, with the result that this material is now in the best condition in many years. A careful history has been published of the Iroquois Indian Groups. Relief labor has also materially assisted in the cataloging, storage and exhibition of the historic collections, which are constantly growing and improving in quality.

4 Although all the work of the State Museum is educational, certain relations merit special mention. The State Museum staff assists in the preparation of the Arbor and Bird Day numbers of the Bulletin to the Schools; it encourages the increasing attendance of school children and students from colleges, who come to study the exhibits. The State Museum guide is constantly on hand to assist such groups. In ten years the attendance has increased from 200 classes from 13 counties to over 400 from 38 counties, totaling over 12,000 this year. Visitors to the exhibition halls are rapidly approaching the attendance of 200,000 a year as under normal economic conditions. Cooperation in conducting the Allegany School of Natural History in the Allegany State Park has continued. Six radio talks have been given by members of the staff.

5 The economic problems receiving attention included the study of the status of oil and gas production in the State and the collection of mining and quarry statistics. The various geological quadrangle reports also bear on local mineral resources. Studies of insect pests of forests, fields and gardens have great economic value, as well as those on the black flies and mosquitoes previously referred to.

6 Certain administrative problems have required special attention. With the recent development of the Division of State Planning, the State Museum has given special attention to the orientation of the

natural resources in relation to planning. A scientific study of the natural resources is one of the fundamental necessities in sound public planning and the 100 years accumulation of data on that subject should be intelligently utilized.

7 Since the Regents decided to celebrate the Centenary of the establishment of the State Museum and its antecedents on April 16, 1836, a chronological sketch of the Division of Science and State Museum has been prepared and was published in the 31st Annual Report of the State Museum.

8 About 20 cooperative projects have been conducted with such agencies as state departments, universities, colleges, museums, federal bureaus and with individuals. All have been mutually advantageous, and several have already resulted in printed reports.

9 Relief projects have enabled the Museum to accomplish much urgently needed work which has been impossible on our limited budget. Every office has profited by such work.

COOPERATION WITH STATE AND OTHER ORGANIZATIONS

As has been emphasized in recent Annual Reports, the large amount of unemployment involving technical, scientific and clerical workers has made available a certain amount of help. This appeared to be a rare chance not only to perform a public service but to permit the Museum to do a great amount of work long in arrears because of a limited budget. A large number of important field investigations could have been conducted advantageously in various parts of the State had conditions allowed this. A ground water survey of the capital district could have given work to a considerable number of unemployed geologists and geologic engineers, but only a small beginning was made. Certain local planning boards continue to call for fundamental physical and biological surveys and special studies, but this help can not be provided on account of the limited Museum facilities. As a result a relatively small amount of work has been done. In spite of these conditions many relief workers on other projects have called on the State Museum for assistance on their own projects.

During the past year the State Museum has cooperated with the following agencies or individuals:

1 United States Bureau of Mines, Washington, D. C. The Museum has continued the long-standing plan of collecting jointly the statistics of mineral production from the mines and quarries of the State.

2 New York State Department of Agriculture and Markets. Cooperative entomological studies of the European pine shoot moth and of other insect pests of ornamental trees and shrubs have been continued.

3 New York State Conservation Department. The Director of the State Museum is a member of the State Council of Parks. The geologists of the Museum staff advise the Conservation Department on the purchase of lands when mineral resources are involved. The State Entomologist has continued his studies of the Pales weevil injurious to Scotch and other pines, and his studies of the European pine shoot moth. The Division of Fish and Game has cooperated with the State Entomologist on the relation of mosquito control to wild life. The Allegany School of Natural History is conducted in the Allegany State Park by the Buffalo Society of Natural Sciences. The State Museum has continued to cooperate in this and conducts scientific studies of park problems in this park.

4 The State Department of Health has cooperated with the State Entomologist of the Museum staff in the control of the blood-sucking flies on the grounds of the State Tuberculosis Hospital at Ray Brook, and the Division of Sanitation on the relation of mosquito control to wild life on Long Island.

5 State Law Department, Office of the Attorney General. The Museum geologists cooperate with the Office of Land Titles on the purchase of mineral lands in the Adirondacks and on other legal problems.

6 State Executive Department, Division of State Planning. The State Museum has cooperated in many ways with the Division of Planning.

7 Buffalo Society of Natural Sciences, Buffalo, N. Y. The Museum cooperates in conducting the Allegany School of Natural History in the Allegany State Park. The school has assisted in local scientific surveys in the region of the park. There is also cooperation with the Allegany State Park Commission.

8 Colgate University, Department of Geology and Geography, Hamilton, N. Y., cooperated on a geological survey of the Morrisville quadrangle.

9 The University of Rochester, Department of Geology, cooperated on a geological survey of the Clyde and Sodus Bay quadrangles.

10 Cooperation within the Education Department: State Library, conducting exchanges of Museum publications; Department Editor, on the publication of Bird and Arbor Day numbers of the Bulletin to the Schools.

11 Dr Rudolf Ruedemann, State Paleontologist of the Museum staff, has cooperated with several universities and museums.

12 Dana Natural History Society, Albany, N. Y. Cooperation on a lecture on birds to Albany school children on Bird Day, April 9, 1937, by Dr John B. May.

13 United States Department of Agriculture, Bureau of Entomology, has cooperated on plans for scientific studies to determine the relation of mosquito control operations to wild life conservation. This cooperation is a continuation of the work begun as a state branch of the Federal Civil Works Administration (C.W.A.) mosquito control relief program, and has been extended to include cooperation with the United States Biological Survey on the same series of studies, and with neighboring states.

14 The American Humane Association, Albany, N. Y. This organization has been conducting a prize competition in order to secure a more humane trap for catching animals. In this worthy endeavor the Zoology office of the State Museum has cooperated. This work has been under way for nine years.

15 The National Association of Audubon Societies has cooperated with the State Entomologist on the relation of mosquito control to wild life.

16 National Research Council, Committee on Wild Life and Nature Reserves. The Director is a member of this committee, which has been studying the facilities devoted to the preservation of natural conditions.

17 Biological Survey, United States Department of Agriculture, cooperates in furnishing bands for the bird-banding studies of the State Zoologist, and has cooperated with the State Entomologist on plans for a study to determine the relation of mosquito control work to wild life conservation.

18 The City Health Department of New York City. The State Entomologist has cooperated with this department on the control of mosquitoes and on their relation to wild life.

19 The Suffolk County Mosquito Extermination Commission has cooperated with the State Entomologist on methods of controlling mosquitoes in relation to wild life conservation.

20 The Nassau County Mosquito Extermination Commission has cooperated with the State Entomologist on studies of mosquitoes and their relation to wild life.

21 The Eastern States Association of Official Mosquito Control Workers. The State Entomologist has participated in the organization and activities of this interstate association, in which the follow-

ing states are represented: Virginia, Maryland, Delaware, Pennsylvania, New Jersey, New York, Connecticut, Rhode Island, Massachusetts and New Hampshire, as is also the Federal Bureau of Entomology of the United States Department of Agriculture.

22 Works Progress Administration (W.P.A.). Cooperation on Project No. 50,470. By means of this assistance a large amount of clerical work has been performed for which the State Museum budget was unable to provide; also professional services in several lines that have materially contributed to the regular duties of the Museum.

STATE PLANNING

The functions and relations of the State Planning to the Federal National Resources Board, and their relation to the State Museum were discussed in the 30th Annual Report, "The Relation of National Resources to Regional and County Planning," Museum Bulletin 310, p. 121-41. The State Museum is in hearty accord with all such efforts to develop public policies based on sound scientific and technical studies looking toward public interest and social advantage.

The Museum needs additional funds and personnel if it is to cooperate properly in meeting urgent local requests for such assistance. A bill providing for extra funds passed the Legislature but was vetoed. The fundamental importance of the local natural resources and the relative advantages of geographic position are physical facts which are fundamental in sound public planning, although this is not always appreciated.

In general, local planning boards can not expect, with their limited resources, to conduct the essential local scientific surveys of their natural resources. Such work should be conducted in cooperation with the State Museum, but when these studies reach the planning and engineering stage, only occasional scientific assistance may be needed. It is frequently observed, however, that engineers and administrators plunge ahead without adequate scientific and technical advice, and many avoidable errors are thus made, and even permanent injury has thus been done.

STATE COUNCIL OF PARKS

The State Council of Parks, in the Department of Conservation, is the "central advisory agency for all parks and parkways, and all places of historic, scientific and scenic interest." The Director of the State Museum is a member of the council, and has attended regularly the monthly meetings and inspection trips through the parks and

parkways. The State Museum has also cooperated in conducting the Allegany School of Natural History in the Allegany State Park for the past ten years, and has conducted scientific and economic studies of the natural resources in this park. The results of many of these studies have been published and others are in preparation. Important cooperative entomological experiments have been conducted by the State Entomologist, of the Museum staff, with the Westchester County Park Commission and with the Long Island State Park Commission, in connection with the mosquito control problem in relation to wild life on the tidal marshes.

ALLEGANY SCHOOL OF NATURAL HISTORY

"Future educational systems of the States will undoubtedly offer increasing possibilities for intellectual and spiritual growth of adults. In this connection, the wide field of nature will be recognized as a major asset, furnishing inspiring original materials teaching their own lessons. A well-developed State Park system, closely articulated to the educational program of the State, may be an extremely important instrument for use in ways of which we are as yet scarcely aware."—*John C. Merriam, President, Carnegie Institution of Washington, 1932.*

The tenth session of the Allegany School of Natural History was held from July 4 to August 22, 1936, in the Allegany State Park. The school was conducted by the Buffalo Society of Natural Sciences with the cooperation of the State Museum, and with the cooperation also, of the Commissioners of the Allegany State Park, and in affiliation with the University of Buffalo.

The Buffalo Society of Natural Sciences, in harmony with the wishes of the Board of Regents, is now wholly responsible for the educational policy of the school. This was a responsibility of the State Museum for the past nine years, and was its leading extension activity in a new field.

This school has been conducted with certain very definite purposes. First of all, it has been planned to demonstrate the advantages of the extensive system of state parks for educational as well as recreational purposes. Only a beginning has been made in the educational utilization of these parks. There yet remain many unique advantages which are undeveloped. The Allegany School has not duplicated work that is done by other educational agencies. The park officials are not in a position to conduct scientific studies of the natural resources of the park, and are yet in constant need of just such information. Sooner or later this problem comes to every large park. In my opinion the scientific and educational work in the state parks should be supervised or conducted by the Education Department, just as definitely as any other kind of educational activities within its particular field.

Dr R. B. Gordon, director of the school, reports that the tenth session was very successful. A brief summary of Doctor Gordon's report as director of the school is published in the 76th Annual Report of the Buffalo Society of Natural Sciences for 1936-37, pages 22-24.

RELATION OF THE MUSEUM EXHIBITS TO SCHOOLS AND COLLEGES

(Figure 2)

That the schools and colleges show an increasing appreciation of the value of objective teaching is a healthy sign of advance. This has not been the result of a sudden spurt but one that appears to be of gradual and normal growth. Book learning and laboratory methods have long been utilized, but excursions to the fields and forests, to historical, industrial and governmental sites, and to public museums, have been of much slower development. The excellent and increasing custom of making school excursions by bus or train to the State Capitol, and on to Washington, is one that deserves every encouragement. Properly conducted excursions will open up many vistas to the young, expanding mind.

The number of classes of school children and college students which visit the State Museum exhibits continues to increase. During the past year the number of classes was 402, with a total attendance of 12,444, and a class average of 30. This is the largest recorded attendance. For the preceding year the number of classes was 445 and the total number was 12,315. The attendance for the past ten years, as recorded by the Museum guide, is as follows:

<i>Year</i>	<i>No. classes</i>	<i>No. students</i>	<i>No. counties</i>
1927-28	200	5 500	13
1928-29	175	4 750	21
1929-30	235	6 308	25
1930-31	264	7 128	30
1931-32	253	6 726	28
1932-33	309	7 981	31
1933-34	301	8 769	28
1934-35	333	8 364	36
1935-36	445	12 315	39
1936-37	402	12 444	38

Most of the classes from a distance are from the high schools. The following 38 counties were represented: Delaware, Schenectady, Albany, Schoharie, Rensselaer, Washington, Saratoga, Fulton, Cayuga, Dutchess, Greene, Montgomery, St Lawrence, Essex, Ulster, Suffolk, Chenango, Orange, Westchester, Otsego, Rockland, Columbia, Herkimer, Onondaga, Sullivan, Tompkins, Oneida, Broome, Clinton,

As in past years, the Museum staff aids the Department Editor in the preparation of the Bird and Arbor Day Bulletin to the Schools. The Museum also cooperates with the Dana Natural History Society in giving a lecture to the school children on birds. This year it was by Dr John B. May and was given on April 9th.

Finally, it is well to recall that in adult education activities there is a vast field which is largely independent of the whole school system. As a research institution the State Museum, through its exhibits, its publications, correspondence and conferences, is constantly assisting in this phase of education.

MUSEUM ATTENDANCE

Although it is not possible to count the attendance to the exhibition halls, nor to distinguish between those on business errands or those who come for consultation, careful estimates are made and school classes are counted, so that it is known that in normal times the exhibition halls have about 200,000 visitors annually. At the bottom of the depression this number declined about 40,000. The estimated attendance for the present year is about 195,000, an increase over last year of about 20,000.

A few years ago an effort was made to learn what was the possible ratio between the attendance of a museum and the population of the city in which it was located. The ratio ran as high as 856 per cent. The New York State Museum with an attendance of 200,000 a year, and a population of Albany of about 120,400 gives a percentage of 166. This would place the State Museum at 15 in the rating of 105 museums listed; a very good rating. Undoubtedly this high percentage is due to the large number of automobile tourists who visit Albany during the summer months.

For a number of years the Museum has been closed on Sunday, but because of Albany's celebration of the granting of the Dongan charter to the city, a special legislative appropriation was made to keep the State Museum open between May 24 and July 1, 1936. The hours were from 10 a.m. to 5 p.m. During this period the Museum was open six Sundays and on Memorial Day, and the total attendance was 4833. During the same period the combined attendance at the Capitol and at the State Office Building was 5316, clearly showing the great attractive power of the State Museum exhibits. Most of these visitors were from out of the city. They were particularly orderly and displayed a very keen interest in the exhibits. Between July 4, and September 13, 1936, inclusive, 11 Sundays and two holidays, the attendance was 11,023. From May 23, 1937, to June 27,

1937, six Sundays and one holiday, the attendance was 5017. The total attendance for 17 Sundays and three holidays was 16,040.

The largest attendance is during July and August, when it is estimated the visitors reach 35,000 to 40,000 a month. This is the tourist season and a large part of the attendance is from outside of the State.

The special exhibit of old Albany buildings by Paul Schrodt, opened April 16, was extended to September 5, 1936, and was a strong attraction for the local public, bringing some for the first time to the Museum. As a rule the local public is not interested in the Museum exhibits during the summer months.

INFORMATION AND PUBLICITY

A large public looks to the State Museum as a bureau of information on the natural resources of the State. This results in an extensive correspondence and many office visitors. Members of the Museum staff, working in cooperation with other agencies, also act as diffusion agents. Press releases assist in keeping the public informed about aspects of the work of the Museum. The announcement of the courses at the Allegany School of Natural History was widely distributed to schools and teachers and reached a large public interested in education.

There are a considerable number of requests for public lectures, but with our limited travel funds and without official automobiles, not many invitations can be accepted, even when expenses are provided. During the past year members of the staff have given nine lectures, talks or hearings, reaching about 2000 persons.

Six radio talks were given in cooperation with the Rural Education Division over station WGY at Schenectady, as follows:

1 January 11th, Dr H. D. House, "The Mushroom Collection of the State Museum"

2 February 8th, Mr David C. Lithgow, "The Making of the Indian Groups in the State Museum"

3 March 8th, Dr D. H. Newland, "Minerals Found and Not Found in New York State"

4 April 12th, C. A. Hartnagel, "The Salt Exhibits in the State Museum"

5 May 29th, Dr Dayton Stoner, "A Tour of the Zoological Exhibits in the State Museum"

6 June 16th, Dr C. C. Adams, "Your State Museum and State History" *cf.* p. 13.

CONDITION OF EXHIBITION HALLS, STUDY COLLECTIONS AND SPECIAL EXHIBITS

The problem of the leaky skylights continues as a permanent problem in the halls of Geology and Paleontology, necessitating special care to protect the exhibits. The leaks in the Zoology Hall disfigured the ceiling, which was repainted by October. Between January and April the floors in Paleontology and Geology halls were cleaned and a new clear finish applied; this is a decided improvement. During March and April nine table cases for historic exhibits were repaired with extra thick glass and stronger fasteners.

The temporary exhibit of models of old Albany buildings by Paul Schrodt was extended through the summer to September 5, 1936 (Cf. State Mus. Bul. 313, p. 32-37), and continued to interest visitors.

The lighting of the labels of the Iroquois Indian Groups has never been satisfactory and calls for a thoroughly modern treatment.

The overcrowded condition of the study collections continues, as no additional space has been available. Modern storage cases for these collections are a major need of the Museum.

PRINTING AND PUBLICATIONS

"After all it is the written word that lives."—*Dr W. M. Beauchamp.*

The following is a list of the serial publications of the State Museum printed during the fiscal year:

Adams, Charles C.

- 1937 Thirtieth Report of the Director of the Division of Science and State Museum. N. Y. State Mus. Bul., 310: 1-146

Buddington, A. F.

- 1937 Geology of the Santa Clara Quadrangle, New York. N. Y. State Mus. Bul., 309: 1-56

Krieger, Louis C. C.

- 1937 A Popular Guide to the Higher Fungi (Mushrooms) of New York State. N. Y. State Mus. Handbook, 11: 538 (1935)

Krieger, Medora H.

- 1937 Geology of the Thirteenth Lake Quadrangle, New York. N. Y. State Mus. Bul., 308: 1-124

Saunders, Aretas A.

- 1936 Ecology of Birds of Quaker Run Valley, Allegany State Park, New York. N. Y. State Mus. Handbook, 16: 1-174

Stoner, Dayton

- 1937 Ten Years' Returns from Banded Bank Swallows. N. Y. State Mus. Cir., 18. 21p.

Accompanying this report is also the Annual Museum Bibliography which includes papers by members of the staff, and also papers by others which are based at least in part on the collections of the State Museum, or which are the result of some form of cooperation with it.

The need of funds to reprint various State Museum publications is one that continues to be a serious problem. Frequent requests are made for publications that are out of print and can not be supplied. So little has been done to meet this need that it would require \$25,000 to reprint the publications for which there is the greatest demand. This is only a part of the larger problem of a general printing policy for the State Museum publications, which has never been properly solved. Neither the general public's interest nor protection of the State's interest can be given proper attention at present. As has been mentioned in previous Annual Reports, Dr H. A. Pilsbry's monograph on the land and fresh water mollusca of the State remains in manuscript after its completion for more than ten years. Another report of unusual merit, by Dr S. C. Bishop, on the salamanders, should be published. Elsewhere I have discussed certain phases of this problem (Suggestions for a Printing Policy for the New York State Museum. *The Museum News*, v.11, p. 7-8, 1935.) The reprinting of the bird plates, the wild flower volumes, and certain Museum handbooks is an aspect of the problem that calls for careful study and a progressive policy.

PHOTOGRAPHY AND DRAFTING

In the conduct of scientific and scholarly investigations no satisfactory substitute has been found for photographs, drawings and maps. These are not only a part of the record, supplementing the written notes, but are an essential part in presenting the results of these studies in printed form for public use. The workers in the field, as a rule, make their own exposures, and the negatives are developed and printed at the Museum, in order to attain uniformity and permanence of the record. The quality of the record thus preserved under this system has improved considerably.

The older negatives, photographs, drawings and maps are by degrees being systematized, indexed, and the older negatives placed in better envelopes which protect them from dust and injury. During the past year relief workers have been available part of the time and have helped substantially in advancing this work. A card index of the greater part of the negatives is a very substantial improvement.

Additional electric outlets have been placed in the dark room, increasing the safety of the room, and valuable new equipment has been secured.

The photographer and draftsman reports the preparation of 511 negatives, 1443 prints, 74 lantern slides, 73 drawings and 94 labels.

HISTORICAL COLLECTIONS AND ALLIED MATTERS

(Figures 3-6)

"I warmly sympathize with the ambition expressed in your annual report to have this Museum more than a mere zoologic or scientific museum. It should be a museum of arts and letters as well as a museum of natural history. . . . "There should be here a representation of all our colonial and revolutionary life. There should be in this museum for the instruction and inspiration of our people, a full representation of American history since the time when New York cast off its provincial character and became an integral portion of the American Republic."—*Theodore Roosevelt's address at the opening of the New York State Museum, December 29, 1916.*

The accession cards and file records of the Historic Collection became so unwieldy that steel filing cases were provided for them. A working catalog of pertinent historical literature has been prepared, and has proved very useful.

Illustrative of representative materials in this collection is the old Van Rensselaer coach (figure 3), and an interesting old pewter Communion set used at a mission among the Indians on the Cattaraugus Indian Reservation (figure 4). Additional examples of the Isaac Hutton silver presented by Miss Catharine Eights Boies Potter are shown in figures 5 and 6.

MUSEUM COLLABORATORS

In order to encourage cooperation in the scientific and other aspects of the work of the Museum, the Regents on April 18, 1929, authorized the Director to appoint collaborators.

Dr E. P. Felt is at present the only Museum Collaborator. He has carefully revised his Museum Bulletin 200, Key to American Insect Galls, and has submitted it for reprinting.

STATE MUSEUM COUNCIL

The State Museum Council is an advisory group appointed by the Board of Regents to advance the general welfare of the Museum. Its duties are thus explained by the Rules of the Board of Regents:

Section 13 *Councils.* The Commissioner with the approval of the Regents shall appoint the following councils, of five members each; college, academic, library, *museum*, music, nurse training school,

industrial education, agricultural education, character and humane education, physically handicapped children, and medical. These councils shall serve as advisory bodies with which the officers of the Department may consult regarding institutions in the University or registered in the Department. One member of each council shall be appointed yearly to serve for a term of five years beginning with the first day of October next following the ending of the term to which each respectively, is to succeed, except that an appointment to fill a vacancy created otherwise than by the expiration of a term shall be for the unexpired term. The deans of the dental, pharmacy and veterinary medical schools shall, respectively, act as similar councils for dental, pharmacy and veterinary medical interests.

There was no meeting of the Council called this year.

SUMMARY OF THE ACTIVITIES OF THE SCIENTIFIC STAFF

(Figures 7-23)

"It is essential that this Museum should command the service of many different men for work in many different fields, and that its work should be so closely related to work of the same kind elsewhere that it shall all represent a coordinated whole. This is true of all departments of the work, but especially so of those departments which have a direct utilitarian bearing.

"This Museum, like every other institution of the type, should do everything to develop large classes of workers of this kind. And yet, friends, we must never forget that the greatest need, the need most difficult to meet, is the need to develop great leaders and to give full play to their activities. In the entirely proper effort to develop numbers of individual workers there must be no forgetfulness of this prime need of individual leadership if American achievement in the scientific field is to be really noteworthy. Yet, in scientific as well as in historical associations and academies, this fact is often forgotten.

"The really great works must be produced by some individual great man who is able to use to the utmost advantage the indispensable preliminary work of a multitude of other observers and investigators. He will be the first to recognize his debt to these other observers and investigators. If he does not do so he will show himself a poor creature. On the other hand, if they are worth their salt they will be proud to have the great architect use all the results of their praiseworthy and laborious and necessary labor in constructing the building which is to crown it."—*Theodore Roosevelt's address at the opening of the New York State Museum, December 29, 1916.*

From an administrative point of view the following is a summary of the scientific work of the staff:

Paleontology. Dr. Rudolf Ruedemann, State Paleontologist, has continued his work on the report on the geology of the Catskill quadrangle. John H. Cook is completing his report on the glacial geology of the same quadrangle. George H. Chadwick has not completed his part of the report on the Catskill quadrangle made in cooperation with Doctor Ruedemann. The completion of the report is mainly dependent on the publication of a revised topographic map of the quadrangle (figures 7-9).



Figure 3 An old Van Rensselaer coach in the Historic Collection.
Presented by the Goold Company, Albany, N. Y.



Figure 4 Old pewter Communion set, used at Oldtown Indian Presbyterian
Mission, Cattaraugus Indian Reservation.



Figure 5 Silver pitcher and bowl made by Isaac Hutton (1767-1855) of Albany.
Donated by Catharine Eights Boies Potter.

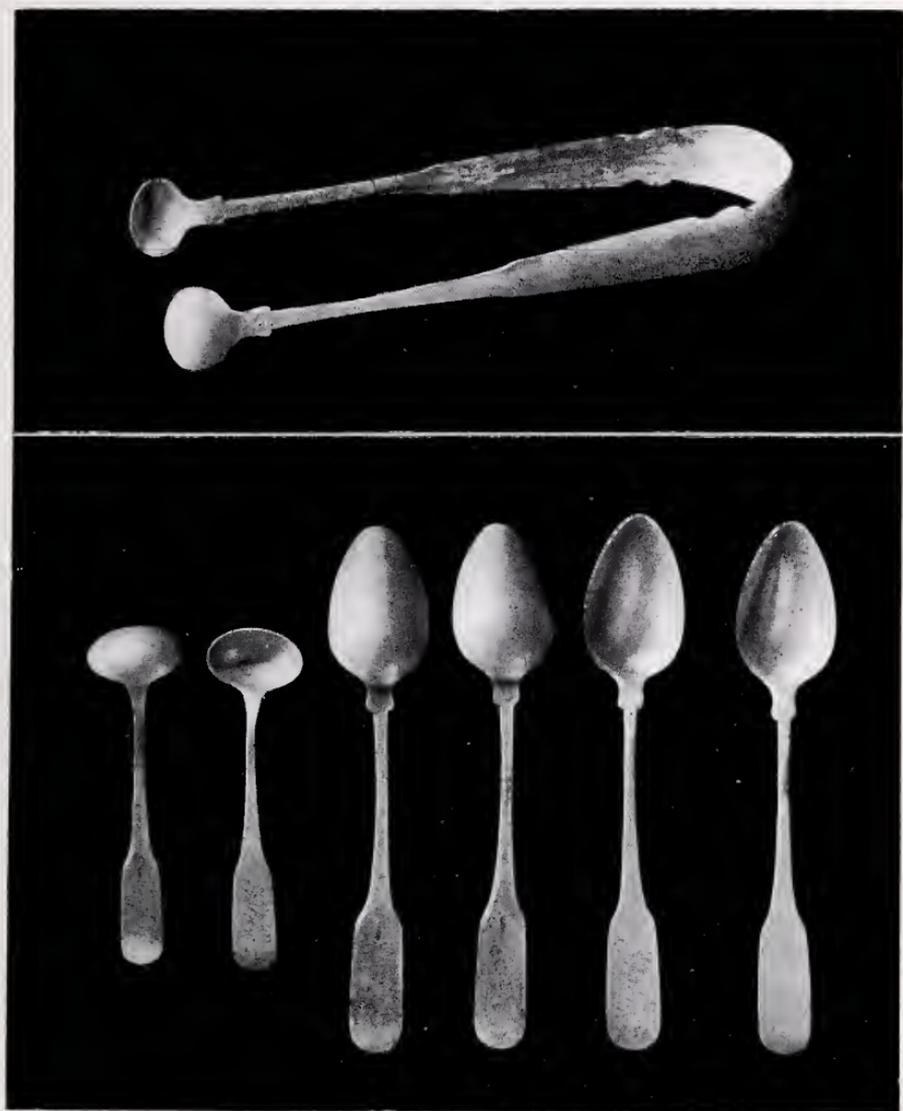


Figure 6 Silver sugar tongs and spoons, made by Isaac Hutton of Albany.
Donated by Catharine Eights Boies Potter.



Figure 7 Entrance to Mount Tom Iron Mine, near Linlithgo, N. Y. Burden iron ore mine, Catskill quadrangle.



Figure 8 Fold in Ordovician rocks. Catskill quadrangle near Mount Merino.

Doctor Ruedemann's monograph on the Graptolites and their stratigraphy is still in preparation. With the Catskill quadrangle in the background this monograph will receive increased attention.

Dr Winifred Goldring, Assistant State Paleontologist, has nearly completed the field work on the geology of the Cocksackie quadrangle, and John H. Cook has completed the field work on the glacial geology for this area. Doctor Goldring has continued her studies of Devonian stratigraphy. The coral reef paper has been completed and is ready for publication, and a report was completed on Devonian crinoids for the Carnegie Museum at Pittsburgh.

C. F. Kilfoyle has continued the cataloging of the Clarke collection of pamphlets, and has brought to date the catalog of types of fossils, including over 3500 unpublished cards.

Dr A. C. Tester, Temporary Geologist, has not completed his report of the geology of the Randolph quadrangle.

Dr Gordon I. Atwater, Temporary Geologist, has not completed his report on the revision of the geology of the Salamanca quadrangle.

Professor L. W. Ploger, Temporary Geologist, has continued his study of the geology of the Cattaraugus quadrangle.

Dr R. J. Colony, Temporary Geologist, who died March 26, 1936, was engaged for many years on the complex geology of the Schunemunk quadrangle. The field work was practically completed, the report was well in hand, and it will be completed by his colleagues in the Department of Geology, Columbia University.

Professor N. C. Dale, Temporary Geologist, is completing his report on the geology of the Oriskany quadrangle.

Dr G. Arthur Cooper, Temporary Geologist, continued work on his report on the Hamilton formation and a report on the fossils of the Allegany State Park.

Professor H. D. Whitnall and his colleagues of Colgate University have continued their cooperative study of the geology of the Morrisville quadrangle.

Dr John G. Woodruff, of Colgate University, has completed his report on the geology of the Wellsville quadrangle, studied in cooperation with Colgate University.

Dr Tracy Gillette, of the University of Rochester, who has been making the cooperative study with the Geology Department of the University of Rochester of the Clyde and Sodus Bay quadrangles, has completed his general report.

John H. Cook, Temporary Geologist, has about completed his studies of the glacial geology of the Catskill and Cocksackie quadrangles, as above mentioned.

Economic Geology. Dr D. H. Newland, State Geologist, began a revised study of the limestones in the southern counties, Orange, Ulster and Greene, but because of the depression this project was temporarily suspended.

Doctor Newland, assisted by Henry Vaughan, Temporary Geologist, continued for the second season, their field work on the geology and mineralogy of the Lake George region. This study is to serve as the basis for a popular handbook on the geology and mineralogy of the region. Because of the large number of summer visitors in that region and the lack of a satisfactory popular account of its minerals, it is believed that such a handbook will meet a real need (figures 10-12).

Doctor Newland, assisted by C. A. Hartnagel, Assistant State Geologist, has continued the long-standing cooperative preparation of a biennial report on the mining and quarry production for the State. The report will be completed next year.

Since this cooperative project was begun about 30 years ago the industries have expanded about four times. At the same time more detailed information is required, so that without a corresponding increase in funds for the State Museum, this additional work has become a serious problem. No one questions the value of these industrial statistics, and increased funds are now needed for this work.

C. A. Hartnagel, Assistant State Geologist, has as usual given special attention to oil and gas development within the State, and is nearing completion of a report on the Randolph mammoth.

Dr A. F. Buddington, Temporary Geologist, continued his field work on the geology of the Willsboro quadrangle.

Mrs Medora H. Krieger, Temporary Geologist, extended her field work on the geology of the Indian Lake quadrangle.

The geological report on the Childwold quadrangle in the Adirondacks, conducted in cooperation with the Geology Department of the University of Rochester, was suspended for the season.

Botany. Dr H. D. House, State Botanist, reports no important changes in the reports of the flora of the Newcomb or Oneida Lake reports.

Mrs Elsie G. Whitney, Assistant State Botanist, continued her work on the preparation of a handbook on ferns, but from January on was ill.



Figure 9 Unconformity between the hill of Silurian, and the rocks in the stream bed of Ordovician. Catskill quadrangle.



Figure 10 Old lime kiln (1759) at Fort George, Lake George region



Figure 11 Glacial clays, showing landslide topography, near Whitehall, Lake George region



Figure 12 Lake George, after passing French mountain on Glens Falls road



Figure 13 Mosquito breeding water, Albany city dump. Photograph by R. D. Glasgow.



Figure 14 A detail of the Albany city dump, showing how water-holding objects make breeding conditions for mosquitoes. Photograph by R. D. Glasgow.

Dr Robert B. Gordon, Temporary Botanist, completed the preparation and editing of Handbook 17 on the Vegetation of the Allegany Park. He is also completing his report on the ecological mapping of the vegetation of Cattaraugus county.

Handbook 17 is the most intensive study of the vegetation of any large tract thus far made in this State, and illustrates, in part, the kind of reports needed in county planning.

Dr Rogers McVaugh, Temporary Botanist, has continued his study of the flora of Columbia county.

Norman Taylor, Temporary Botanist, made field studies of the salt marsh vegetation on Long Island in relation to the ditching conducted in mosquito control work. A preliminary report has been published, and the full report has been completed.

Relief assistance has been continued to the great advantage of the botanical collection.

Entomology. Dr R. D. Glasgow, State Entomologist, has continued his studies of various insect pests of the fields, gardens and forests, and has given special attention to the pressing mosquito control problem because of the availability of relief labor, particularly about New York City, on Long Island and about Albany (figures 13-16).

Insecticide dusts are usually applied by a blast of air generated mechanically by a bellows, by a cylinder and piston as in a bicycle pump, or by a centrifugal "blower" type of fan. None of these has sufficient power to drive a blast of dust-laden air high enough to cover mature forest trees, as in gypsy moth control work and the like. Dusting from airplanes for control of forest insects, also, is not practicable on hilly ground.

Experiments made on May 4, 1937, and later appear to indicate that insecticide dusting by means of explosives may solve many difficult insect control problems. These experiments were made in collaboration with Robert E. Blair, representing the W. H. Loomis Talc Corporation of Gouverneur, N. Y. An important new field of insect control procedure appears here to have been opened up (figures 17-19).

Dr A. Glenn Richards jr, Temporary Entomologist, made field studies of the mosquito problem on Long Island, as a part of a program to determine the relation of mosquito control to the local wild life problem. His report has been completed.

K. F. Chamberlain, Assistant State Entomologist, has continued his work on the transferring of the insect collection to the new insect

boxes and steel cabinets. The condition of the collection has thus been greatly improved.

Doctor Glasgow has supervised relief workers engaged in organizing, printing and indexing the negatives devoted to insects, listing on cards the office collection of literature, translating pertinent foreign literature, and summarizing the literature on mosquito control. This work is of much permanent value.

Reports are nearing completion by Doctor Glasgow on the European pine shoot moth, the larch case bearer, Birch skeletonizer, the Narcissus bulb problem, pine and Texas weevils.

Zoology. Dr Dayton Stoner, State Zoologist, has continued his prolonged studies of the bank, barn and cliff swallows, by the banding method, in the vicinity of Oneida lake and near Albany. The study of the birds in Washington Park, Albany, is approaching a stage warranting a report for publication.

The care of the exhibits, the storage collections, the files and indexes constitutes a time-consuming but essential duty. Several temporary exhibits have been prepared (figures 22-23).

W. J. Schoonmaker, Assistant State Zoologist, has continued his study of the habits of the woodchuck, and his survey of the mammals of Rensselaer county.

Aretas A. Saunders, Temporary Ornithologist, working in the Allegany State Park, has continued his extensive studies of the birds of this park, and is summarizing his observations on the summer birds of the park. His Handbook 16 on Birds of Quaker Run Valley has been published. His report, Studies of Breeding Birds in the Allegany State Park, is in process of printing as a Museum bulletin, and his report on the Summer Birds of the Allegany State Park has been completed and awaits publication.

Archeology and History. Noah T. Clarke, State Archeologist, assisted by relief help, has been able to review all the stored archeological material under the exhibit cases in Archeological Hall. Scattered collections have been concentrated, numbered, cataloged, indexed and labeled. A card index to collectors and sites has also been prepared. The series of photographs and prints has received special attention. On account of ill health of the State Archeologist the field survey of private collections has been delayed.

W. L. Lassiter, Temporary Curator of History, as has been the regular procedure for many years, devoted July and August to cataloging, recording, caring for and storing the Historic Collection. He has also rearranged the temporary historic exhibits. The relief assistance available has materially advanced in this work.

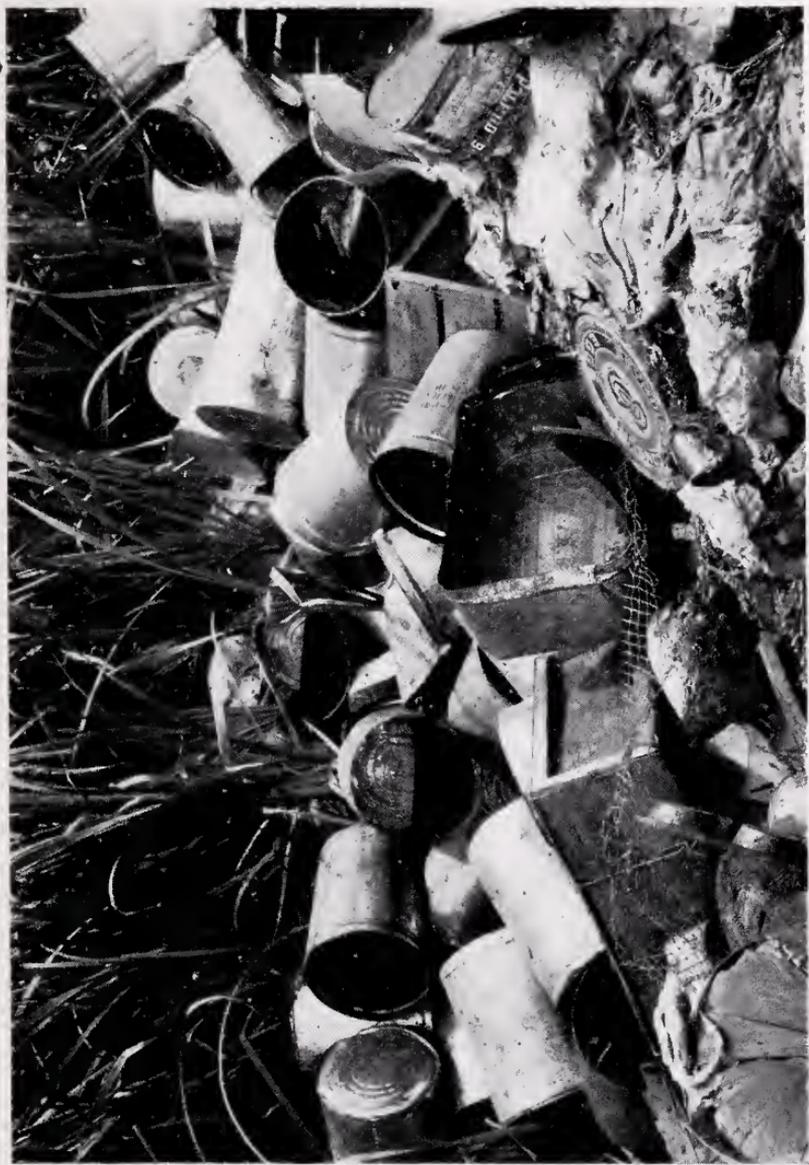


Figure 15 Mosquito-breeding water in old tin cans at Albany city dump. Such cans should be crushed to prevent holding water. Co-operative State Museum and City of Albany W.P.A. mosquito control project. Photograph by R. D. Glasgow.



Figure 16 Swamp pools like this within the city of Albany are a prolific source of mosquitoes. Photograph by R. D. Glasgow.



Figure 17 Experiments with explosives for applying insecticide dusts. Photograph by R. D. Glasgow.

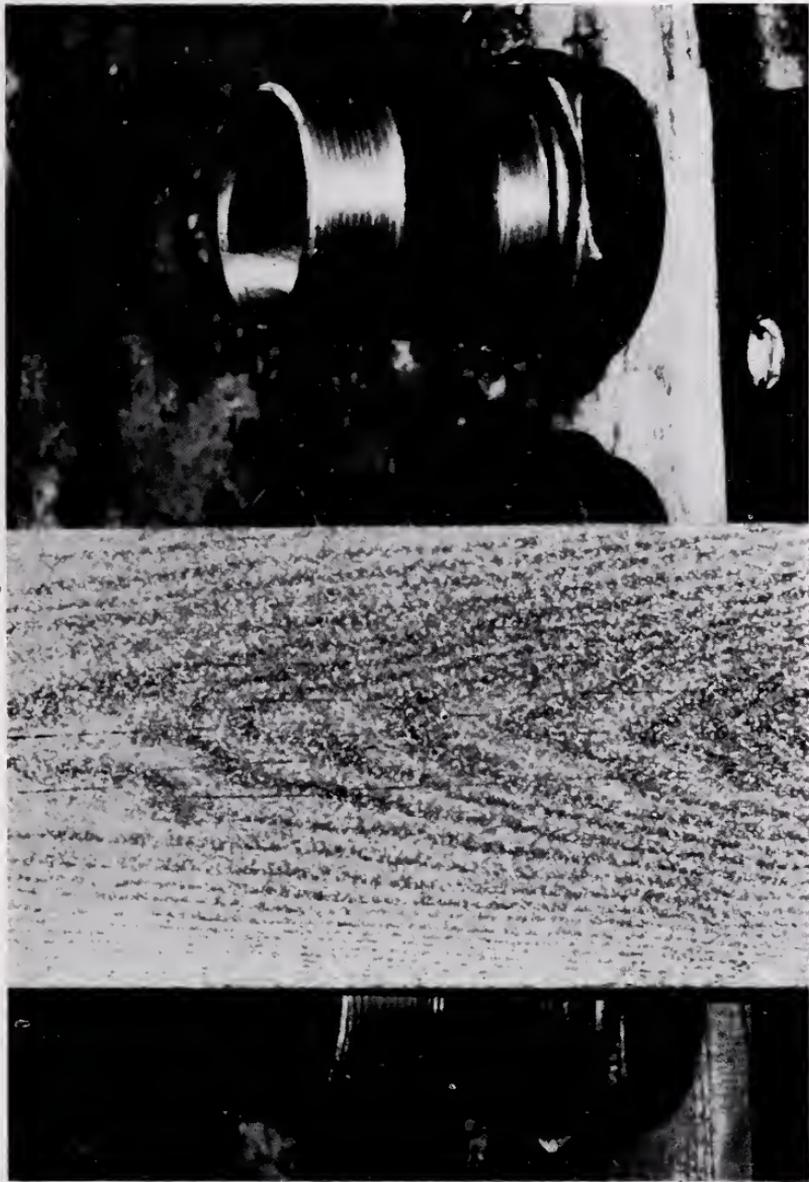


Figure 18 Distribution on board of dust discharged by explosives, at 50 feet from mortar. Mortar used, cap and five-inch nipple of four-inch gas pipe. Two ounces of powder used to lift three pounds of dust. Photograph by R. D. Glasgow.

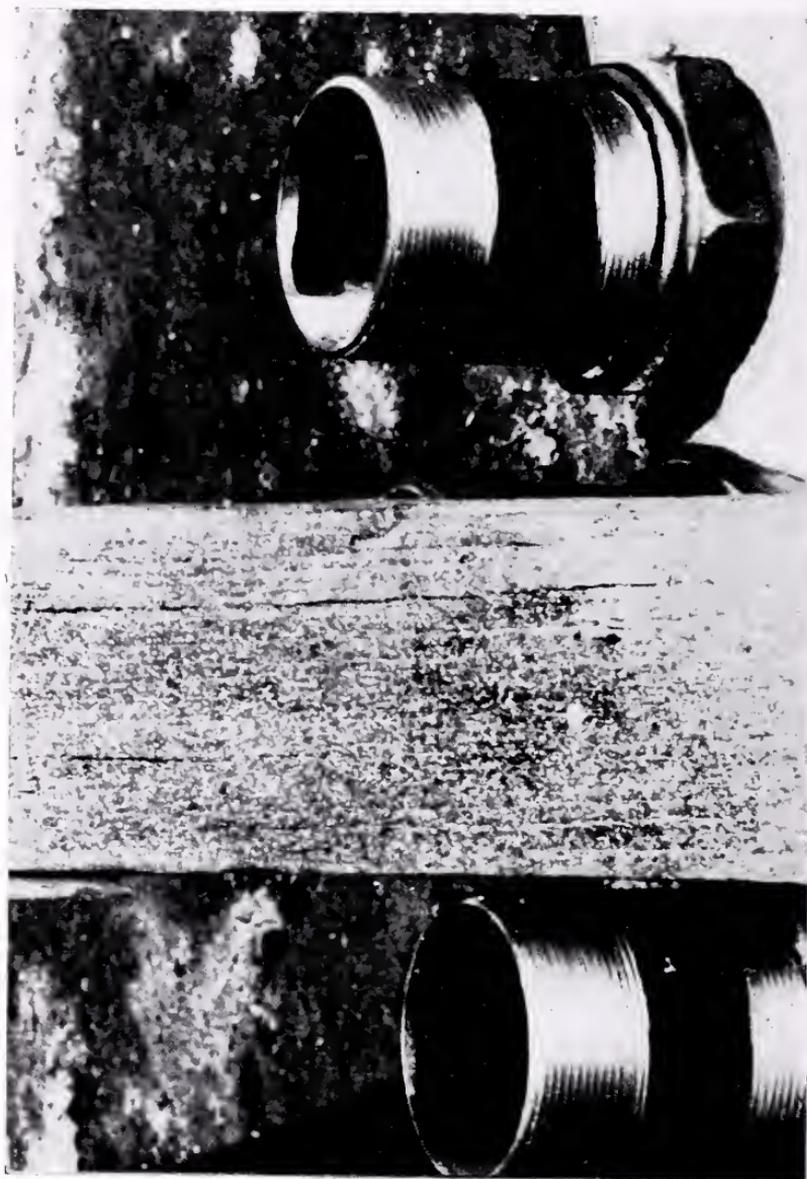


Figure 19 Distribution on board of dust discharged by explosives, at 100 feet from mortar. Mortar used, cap and five-inch nipple of four-inch gas pipe. Two ounces of powder used to lift three pounds of dust. Photograph by R. D. Glasgow.



Figure 20 Five banded adult bank swallows, No. 37/55001 to 37/55005. Oneida lake, New York. May 28, 1937. Photograph by Dayton Stoner.



Figure 21 Site of a bank swallow colony comprising more than 500 individuals. South bank of Fish creek near Oneida lake, New York. Photograph by Dayton Stoner.



Figure 22 Temporary exhibit of recent zoological accessions.
Photograph by E. J. Stein.



Figure 23 Temporary exhibit of recent zoological accessions.
Photograph by E. J. Stein.

GENERAL ADMINISTRATIVE PROBLEMS

THE CENTENARY APRIL 15, 1936

On April 15, 1836, the Legislature of New York, authorized the establishment of the State Geological and Natural History Survey. This was the first scientific agency of the State Government. At that date only a few states had come to realize the need of a scientific inventory of their natural resources and a technical knowledge of them. This work under the names of the State Survey, the State Cabinet of Natural History, and the State Museum, has been maintained so that on April 15, 1936, the institution was 100 years old.

In several of the Annual Reports attention has been called to the appropriateness of celebrating this centenary in a suitable manner. The Board of Regents decided to devote the 73d Convocation of The University of the State of New York on Friday, October 15, 1937, to that purpose.

The significance of such an anniversary appears to be so obvious as to call for no explanation. The value of an anniversary has recently been well expressed by Dr C. Stuart Gager as follows :

But what is the point and purpose of recognizing an anniversary? . . . It is not so much to celebrate past achievement, but to reveal to the world the nature of the institution; for those in charge of it to clarify and possibly to restate their ideals in the light of the wisdom gained by past experience, and with a clear vision of future and larger accomplishments, made possible by new conceptions, new deeds, new methods and techniques, new resources and new enthusiasm. (*Gager, Science*, v. 84, 1936, 365.)

The execution of this general plan falls to the next Annual Report.

HISTORICAL POLICIES

In the last Annual Report attention was again called to the need of revised or new policies on certain historic matters intimately related to the work of the State Museum as follows :

1 The unsatisfactory status of state-owned historical and scientific reservations, and the need of a comprehensive constructive policy for their administration, care and use. (Cf. Mus. Bul. 288, p. 51-56. 1931.)

2 The unsatisfactory status of the battleships that lie upon state land, in public waters of the Atlantic ocean, the Great Lakes, Lake Champlain and Lake George.

WORLD'S FAIR OF 1939

Plans are now under way for a World's Fair in New York City in 1939, to commemorate the 150th anniversary of the founding of the government of the United States and of the inauguration of George Washington. If the State Museum and the natural resources of New York State are to be properly represented in this proposed fair, plans should be developed now. Moreover, there will be an opportunity to secure desirable exhibits at the close of the fair.

The Centennial of 1876 at Philadelphia, the World's Fair of 1893 at Chicago, the Pan-American Exposition at Buffalo in 1901, the Universal Exposition at St Louis in 1904 and the Century of Progress Fair at Chicago in 1933 and 1934 provided opportunity for public museums to acquire the collections and the exhibits at the close of these fairs. The United States National Museum is an outgrowth of the Centennial, and the Field Museum of Natural History, of the World's Fair, and are well-known examples of the influence of such expositions. Some of the best exhibits in the New York State Museum were the outcome of such fairs. For example, the large relief map of the State was made for the World's Fair of 1893, and the Pan-American Exposition in 1901 at Buffalo was the source of several economic exhibits in the hall of geology.

In order to make any satisfactory utilization of such exhibits and materials, however, the already overcrowded condition of the State Museum points emphatically to the necessity of planning more definitely for the long proposed new Memorial State Museum Building. Valuable and extensive exhibits can not be acquired from such a source unless special storage quarters are provided.

Regarding plans for the proposed new State Museum building, reference should be made to the 25th Annual Report (Mus. Bul. 293, p. 81-110, 1932). Failure to prepare for this occasion properly would be an irreparable loss to the State Museum, as such an opportunity may not arise again for a generation.

ANNUAL FINANCIAL AND STATISTICAL SUMMARY**THE STATE MUSEUM BUDGET**

The following budget does not include the cost of heat, light, janitor service, orderlies (watchmen), carpenters, painters and elevator men. Certain other items also are furnished by the Education Department, such as postage, stationery, express, drayage in part, telegraph and telephone, and are therefore not included in the budget.

The traveling expenses have been budgeted so that each member of the scientific staff is able to plan his work to the best advantage.

Facilities provided by cooperative projects supplement to an important degree the state appropriation. It is impossible to estimate the amount of these funds precisely, since they include the federal franking privilege, cooperation with many individuals, with organizations and with other state departments. Labor, supplies, expert services, use of automobiles etc. have been provided by this cooperation. Such financial assistance is of the greatest value; but the funds do not pass through the Museum.

The annual and statistical summary for the fiscal year July 1, 1936, to June 30, 1937, follows:

APPROPRIATIONS AND FUNDS FOR FISCAL YEAR

(July 1, 1936, to June 30, 1937)

Appropriations

Salaries:

Administrative staff	\$9 000 00
Permanent scientific staff	33 450 00
Temporary expert services.....	2 500 00
Scientific assistants	5 200 00
Clerical, labor etc.....	10 220 00
Total salaries	\$60 670 00
Equipment and supplies.....	\$ 4 100 00
Traveling (of which \$250 was made available for out-of-state travel)	2 600 00
Printing	6 367 00
Total budget	\$73 737 00

DIRECTORY DATA

Name of Museum: New York State Museum

Location: Albany, New York, U. S. A.

Name of Director: Charles C. Adams

Name of Assistant Director: Alvin G. Whitney

Date of Founding: The Museum is the outgrowth of state surveys begun in 1836; formal organization of the Museum was effected in 1843. (See State Museum Bul. 313, p. 85-121, 1937, for historical sketch.)

Open to the public: Open week days from 9 a.m. to 5 p.m.

Closed on Sundays and legal holidays, except from June to September.

Total number of hours open to the public for the year, about 2556.

Staff:

Administrative officers	2
Permanent scientific staff.....	11
Technical and clerical assistants.....	11
Part-time employes	10
Total staff	34

Work relief employes (?)

Salary schedules, 1936-37:

Administrative	\$3000 to \$6000
Scientific professional staff.....	\$1720 to \$4500
Technical assistants (nonprofessional grade).....	\$1600 to \$2000

Hours and vacation:

Hours of work a week, 36½

Vacation allowance, 16½ working days, and all legal holidays.

NEEDS OF THE STATE MUSEUM**THE GENERAL FINANCIAL PROBLEM**

The State Museum moved into its present quarters in the State Education Building in 1912. After 20 years, in 1932, a careful comparison was made of its financial status during that interval. The results were very significant, as they showed a salary increase of about \$25,000 in 20 years. Equipment, supplies and traveling and temporary expert services increased about \$1300 in 16 years! The staff declined from 28 to 24 persons in 15 years. The printing funds have never been wholly adequate to meet the needs. These are fair samples of the relatively stationary or declining financial support of the State Museum during the 20-year period.

The tragic feature of the situation is that during this same period there was a great period of economic prosperity, during which museum and similar scientific and educational agencies all over the United States underwent unprecedented expansion. Likewise, within the State, while other educational agencies were expanding and new ones being developed, the State Museum did not maintain normal growth, but actually showed a relative decline. The neighboring state of Pennsylvania expended for its geologic work alone \$67,500; Illinois, \$125,000; and California, \$63,000 in a single year, and the New York State Museum, for the same period, with its very much broader field, has had about \$75,000. Throughout this period of relative decline of financial support, the public need for scientific and educational work, within the field of the State Museum, has constantly increased. This has led to the suggestion that the State Museum, like the state colleges in the Education Department, should have its own trustees, who would be able to devote considerable time to promoting the general welfare of the Museum.

As a natural result of this retarded condition of the Museum, other state agencies have encroached upon the legitimate field of the State Museum and tended to take over its functions, in spite of the fact that aside from finances, they are not properly staffed for such scientific, economic and educational work, they do not have the

necessary library, collections, files of data, for such work; and, in common with administrative departments, they do not generally have the viewpoint conducive to research and the educational approach. Furthermore, various administrative agencies at Albany frequently need scientific and technical assistance and cooperation which can best and quickest be furnished by an agency at Albany.

This long-standing financial situation has received constant emphasis in each Annual Report for many years, and has become a monotonous feature, but until conditions materially improve, it seems necessary to continue calling attention to the facts of the situation.

THE CURRENT FINANCIAL PROBLEM

As shown by the financial summary, the budget for the past fiscal year was about \$73,000. In addition to this there have been contributions from cooperating agencies, which are very difficult to estimate. Special economy reductions from the regular budget items or allotments have been made. On the other hand, valuable assistance has been received from the relief agencies, which have furnished clerical help.

Considering the value of the natural resources of the State, and their economic and social importance in a State with the largest population and the greatest wealth, however, it is at once apparent that a budget of \$73,000 is inadequate to cover an up-to-date, state-wide scientific survey of the natural resources.

RESEARCH FELLOWSHIPS

Cooperative research with various industries has often been found to be mutually advantageous. Such cooperation may be conducted by several methods. A method that deserves particular commendation is the establishment of research fellowships. By this method the cooperating agency would finance the work of capable research assistants or fellows, who work under the supervision of a member of the State Museum staff, on some problem in which the cooperator is particularly interested. The results of such studies should be published by the State Museum and thus made public.

GROUND WATER RESEARCH

As the population of the State increases, the demand for underground waters for public and private supplies, as well as for industrial use, increases very rapidly. One-half of the public waterworks of the State obtain all or part of their supplies from ground waters.

The mode of occurrence, the quality and the quantity of the water are thus of great importance, as was particularly realized during the severe droughts of recent years. Millions of dollars are invested in public water supply plants, and the delivery or sale of water to the consumer makes it one of the most important mineral resources of the State. The products of the mines and quarries during prosperous times have for a single year amounted to more than \$100,000,000 worth of raw materials, and it is not unlikely that the ground waters are worth considerably more than half that amount. Although the State Museum has collected observations and records on this subject for many years, it has never had the funds, men and equipment to make an adequate statewide study of this vital problem.

TEMPORARY STORAGE SPACE

Pending the construction of a new State Museum Memorial Building the problem of temporary storage for collections is becoming more acute every year. The hallways or corridors have been utilized for storage because there was no adequate provision made for storage when the Education Building was planned; yet this has been discouraged for various reasons. The crowded condition of the store-rooms is a menace to the collections, and the materials can not be consulted and used, although there is frequent need of this.

DONATIONS TO THE STATE MUSEUM

In spite of the preceding statement as to the need of storage space for the museum collections, it is desirable to inform the public that the State Museum welcomes donations of:

1 Scientific collections of natural history materials, minerals, fossils, rocks and specimens of plants and animals, particularly when accompanied by scientific data.

2 Historical collections of objects illustrating the history of New York Indians, objects of the Colonial period and the Revolutionary period, household and industrial equipment. Materials illustrating the history of the professions are particularly desired, such as illustrate the history of medicine and surgery, dentistry, engineering in its various aspects, and the tools and equipment used in various trades. Aviation should also be properly represented.

Historic objects related to the various wars in which New York has taken an active part are heartily welcomed.

In all cases it should be borne in mind that it is *primarily New York State material that is sought*, because first of all this is a New York State Museum, and also because space is lacking for other

materials. Persons contemplating such donations should call at the Museum or write in advance about such proposed donations.

The State Museum has no desire to monopolize all such materials, but at present in many localities there are no local organizations able to care properly for such collections; and the State should give reasonable assistance in preserving them and making them available for future study and display.

ANNUAL BIBLIOGRAPHY OF THE STATE MUSEUM

Publications by the Museum staff for the fiscal year ending June 30, 1937, or based, at least in part, on the Museum collections, or made in cooperation with the State Museum, are as follows:

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- 1937a The Relation of the Natural Resources to Regional and County Planning. N. Y. State Mus. Bul., 310: 121-41

Bryant, W. L.

- 1936 A Study of the Oldest Known Vertebrates, *Astraspis* and *Eriptychius*. Proc. Amer. Phil. Soc., 76, no. 4: 409-27

Bryant, W. L. & Johnson, J. H.

- 1936 Upper Devonian Fish from Colorado. Jour. of Paleontology, 10, no. 7: 656-59

Buddington, A. F.

- 1937 Geology of the Santa Clara Quadrangle, New York. N. Y. State Mus. Bul., 309: 1-56

Carson, Russel M. L.

- 1936 The Adirondack Forest. Univ. State of New York Bulletin to the Schools, 22: 142-46

Clarke, N. T.

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Glasgow, R. D.

- 1937 Some Relations of Mosquito-Control Work to Other Conservation Activities. A Problem in Practical Human Ecology. Proc. 24th, Ann. Meeting, N. J. Mosquito Extermination Ass'n, p. 205-11.

Goldring, Winifred

- 1937 Underground Sun Cracks. In "The Story of Howe Caverns," p. 66-69. Cobleskill

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Lithgow, David C.

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 1937 A New North American Graptolite Faunule. *Amer. Jour. Sci.*, 5 ser., 33: 57-62
 1937a Eastern New York Ordovician Cherts. *Supplementary Notes. Bul. Geol. Soc. Amer.*, 47 (supplement): 2016-17
 1937b Plankton and Radiolarian Ooze in Paleozoic Formations of New York. (Abstract of paper read at meeting of National Academy of Science.) *Science*, 85, no. 2210: 439

Ruedemann, Rudolf, & Howell, B. F.

- 1936 Impression of a Worm (?) on the Cheek of a Cambrian Trilobite. *Proc. Geol. Soc. Amer.* for 1935, p. 373 (abstract)

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Saunders, Aretas A.

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Stoner, Dayton

- 1936 Author's Summary of his "Temperature and Growth Studies on the Barn Swallow." [*Auk*, 52: 400-7] *Biological Abstracts*, 10: 1837-838
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MUSEUM ACCESSIONS FOR THE YEAR

Accessions are new additions to the Museum. These are classified into the following groups:

- 1 By donation: objects presented to the Museum
- 2 By exchange: for other Museum materials etc.
- 3 By purchase: payment from the Museum budget
- 4 By the staff: collected by the staff during official duties of any kind
- 5 By transfer, from other state departments or other divisions of the State Government, as provided by law

Gifts to scientific and educational institutions are listed at the end of this section.

BY DONATION

- Adirondack Bait Supply, Chestertown, N. Y.
Spotted salamander, Chestertown, N. Y.
- Albany Chamber of Commerce, Albany, N. Y.
Pamphlet on the 250th Anniversary of the granting of the Dongan Charter, Albany, 1936
- Angaramie, Patrick, and Carbone, Peter, Albany, N. Y.
Leech, Turners pond, near Westerlo, N. Y.
- Antemann, Elizabeth, Albany, N. Y.
Jewelry-makers' tools, designs and jewelry
- Arnold, E. J., Albany, N. Y.
Collection of historic materials comprising household, industrial and military objects
- Arnold, E. J., Saratoga Springs, N. Y.
Blade, near County Farm, Argyle, N. Y.
- Arnold, Wayne S., Mechanicville, N. Y.
Large banded slate tube, near Stafford's bridge, Saratoga county, N. Y.
Slate gagger fragment, Fishkill, N. Y.
Stone bird effigy, near Rudd, Guilford county, N. C.
- Ayres, D., jr, Fort Plain, N. Y.
Old broad ax
- Baldwin, H. T., Chestertown, N. Y.
Ellsworthite from Hybla, Ontario, Can.
- Bartlett, A. E., Delhi, N. Y.
Doll's bedding
- Beals, A. T., New York, N. Y.
3 specimens of *Calamagrostis epigeios* (L.) Roth, Long Island, N. Y.
- Beiermeister, F., Troy, N. Y.
Specimen of tropical cockroach, *Blaberus* sp., Troy, N. Y.

- Branche, Earl C., Lowville, N. Y.
Caterpillar of imperial moth, *Eacles imperialis* Dru., Brantingham, N. Y.
- Burdick, C. A., Manlius, N. Y.
Old iron skillet
- Case, Leslie V., Tarrytown, N. Y.
38 representative Egyptian flint implements (In memory of Dr John M. Clarke)
- Castle, B. M., Kingston, N. Y.
Southern bald eagle, Zena, N. Y.
- Chesebro Brothers and Robbins, Inc., New York, N. Y.
3 little redfish (no locality)
- Chrisp, Hugh P., Albany, N. Y.
Gray fox, Stamford, N. Y.
- Cook, David, Albany, N. Y.
10 specimens of plants from Wyoming county and one from Rensselaer county
- Cox, Oren H. R., Cohoes, N. Y.
Caterpillar of swallow-tail butterfly, *Papilio* sp., Cohoes, N. Y.
- Cranston, H. Howard, Fredonia, N. Y.
Photograph of Portland (now Barcelona) lighthouse on Lake Erie, taken about 1895
- Dempsey, J. M., Albany, N. Y.
Old ship's anchor
- De Vall, Harry L., and Martin, Clara E., Albany, N. Y.
Silver lamprey, Coveville, N. Y.
- Dobbin, Frank, Shushan, N. Y.
69 specimens of plants from New York and New England
- Edson, Mrs J. Z., Rochester, N. Y.
7 specimens of plants from western New York
- Finster, Ray E., Frankfort, N. Y.
5 blanks, 1 pebble, Schuyler, N. Y.
- Follett, Louis A., Saratoga Springs, N. Y.
1 steatite bannerstone fragment; 1 broken unfinished bannerstone; 2 net-sinkers; 6 arrowpoints; 5 rejects; 3 scrapers; 1 drill; 2 flint hammerstones, Saratoga county, N. Y.
- Fuller, Harold, Kingston, N. Y.
Indian burial, 1 celt, near Hurley, N. Y.
- Glasgow, Dr Hugh, Geneva, N. Y.
Specimens of May beetles, *Phyllophaga tristis* Fab., East Northport, N. Y.
- Glenn, James A., Albany, N. Y.
Photographs of old Albany historical models, made by Paul Schrodt
- Goold, Donald B., Albany, N. Y.
Old cutterhead tenoning machine and parts
4 parts of incomplete wagon wheels
- Gould, Rev. E. W., Center Brunswick, N. Y.
Fine-grained sandstone showing two natural cleavage faces and a distinct small fold showing displacement by faulting
- Graham, Dr C. F., Albany, N. Y.
2 specimens of *Platystrophia ponderosa* from Ohio
- Greeley, Hulda, Delmar, N. Y.
Eastern ruffed grouse, Pownal Center, Vt.
- Greeley, John R., Delmar, N. Y.
Small brown weasel, Voorheesville, N. Y.
3 eastern ruffed grouse, North Pownal, Vt.
2 eastern ruffed grouse, Pownal Center, Vt.
- Gunn, Mrs Abbie H., Cleverdale on Lake George, N. Y.
Worm tubes, Cleverdale, N. Y.

- Hammer, C. C., East Hartford, Conn.
2 specimens of plants, Fishers Island, N. Y.
- Hardel, Edward, West Albany, N. Y.
Garden spider, West Albany, N. Y.
- Hawkins, Mrs A., Rome, N. Y.
Specimen of sap-beetle, *Cryptarcha ampla* Er., Rome, N. Y.
- Hayes, John W., Brookview, N. Y.
Cartridge and caps. Type used in Civil War, 1861-65
- Heaton, Clement, West Nyack, N. Y.
Crude hoe, 2 crude digging tools, Rockland county, N. Y.
- Heit, C. E., Saratoga Springs, N. Y.
Specimens of fungus gnats, *Sciara pauciseta* Felt, Saratoga Springs, N. Y.
Specimen of saw-fly parasite, *Perilampus hyalinus* Say, Saratoga Springs, N. Y.
- Hill, Mrs Erastus D., Schenectady, N. Y.
Collection of historic objects
- Hillery, J. Martin, Hartford, Conn.
Beryl (variety aquamarine) and Spodumene (variety kunzite), Strickland quarry, Portland, Conn.
Lepidolite surrounding muscovite, Portland, Conn.
Magnetite, Townsend, Mass.
Garnet containing graphite, and Cyanite (green variety), Burkhamsted, Mass.
- Hinchman, F. B., Altamont, N. Y.
Milliped, Altamont, N. Y.
Milk snake, Altamont, N. Y.
- Holweg, A. W., Brooklyn, N. Y.
7 specimens of plants from Suffolk county
- Howell, Professor B. F., Princeton, N. J.
5 trilobites, *Paedumias yorkense*, Resser & Howell, Fruitville, Pa.
- Jennings, Mr and Mrs Clarence, East Durham, N. Y.
Military hat
- King, A. H., Speculator, N. Y.
5 specimens of plants from Hamilton county
- Kingsley, H., Gilboa, N. Y.
Trilobite, *Homalonotus dekayi*, Blenheim, N. Y.
2 specimens of fossil tree trunk, Blenheim, N. Y.
- Kjellesvig, Dr E. N., Texas Company, Tulsa, Okla.
7 slides containing etched parts of the trilobite, *Acidaspis*, Trenton Falls, N. Y.
- Larrabee, David M., Urbana, Ill.
2 specimens Normanskill chert, Hampton, N. Y.
- Lasher, G. R., Rensselaer, N. Y.
2½-inch compass found on battlefield of Second Battle of Bull Run
- Leffler, Mrs C., and Schoonmaker, W. J., Rensselaer, N. Y.
Yellow-billed cuckoo, Rensselaer, N. Y.
- Levison, J. J., Sea Cliff, N. Y.
Specimen of broad-necked Prionus, *Prionus laticollis* Dr., Sea Cliff, N. Y.
- Linneman, J. P., New York, N. Y.
Rhodonite variety Fowlerite, Franklin Furnace, N. J.
- Lockrow, Mrs Anne, Albany, N. Y.
Garden spider, Albany, N. Y.
- McClelland, W. H., Tuckahoe, N. Y.
7 specimens polished serpentine, varicolored, Rye, N. Y.
- McLaren, G., Ballston Spa, N. Y.
Piece of British flagship "Confiance"

- McLear, J. H., Gouverneur, N. Y.
Feldspar, variety microcline, DeKalb Junction, N. Y.
- McVaugh Dr Rogers, Kinderhook, N. Y.
375 specimens of plants from Columbia county
- Morrill, Vaughan, Lowville, N. Y.
2 specimens hematite ore, Pierrepont, N. Y.
- Myers, John L., Albany, N. Y.
Specimen of sawyer beetle, *Monochamus carolinensis* Oliv., Saugerties, N. Y.
- Mynter, Kenneth H., and Schmucker, Robert A., jr, Hudson, N. Y.
Large collection of Indian artifacts, vicinity of Hudson, N. Y.
- Nash, Mrs Frances T., Albany, N. Y.
16 sea fans, Florida
- Paris, Dr Russell C., Hudson, N. Y.
Collection of medical history objects
- Pauly, Karl A., Schenectady, N. Y.
4 crustaceans, Plumulites, Stone Arabia, N. Y.
- Potter, Catharine E. B., Whitehall, N. Y.
Silver teapot; silver sugar bowl and cover; silver waste bowl, and silver cream pitcher, made by Isaac Hutton, Albany silversmith of 18th century, and many other valuable historic objects complete the Potter collection
- Pugsley, Frank, Pittsford, N. Y.
Gypsum, Pittsford, N. Y.
- Rasmussen, M., Amsterdam, N. Y.
Specimens of case-bearers, *Solenobia walshella* Clem., Amsterdam, N. Y.
- Riddle, W. C., Delhi, N. Y.
Pestle, Delaware county, N. Y.
- Rogers, Isaac, Dansville, N. Y.
Brachiopod, *Altrypa aspera*, Dansville, N. Y.
- Rowley, Elmer B., Glens Falls, N. Y.
2 specimens autunite, Grafton, N. Y.
Actinolite, pyrite crystals in schist, magnetite crystals in schist, and talc, foliated, Chester, Vt.
- Ruoff, J., jr, Chestertown, N. Y.
Wolf spider, Chestertown, N. Y.
- Sanderson, W. E., Loudonville, N. Y.
Hungarian partridge, ring-necked pheasant, and 3 eastern turkeys, Loudonville, N. Y.
Barn swallow, Maple View, N. Y.
- Schleifstein, Dr J., Albany, N. Y.
Scorpion, Albany, N. Y.
- Shadick, Anna, Albany, N. Y.
Specimen of luna moth, *Tropaea luna* L., Albany, N. Y.
- Sholenberger, Mrs H., Albany, N. Y.
Specimens of ants, Albany, N. Y.
- Simonds Saw & Steel Company, Fitchburg, Mass.
Booklet "Simond's Guide for Millman," v. 14, No. 2, 1932
Article on and illustration of Shaker circular saw
- Small, David, Syracuse, N. Y.
Photographs of New York Central Railroad grade crossing elimination at Syracuse, N. Y.
(1) Gravel bed at Minoa
(2) Gravel bed and plant at Minoa
(3) Roadbed slide in Syracuse
- Small, Dr J. K., New York, N. Y.
10 specimens of ferns from Florida

- Smith, W. E., Albany, N. Y.
Specimens of pine scales, *Toumeyella pini* King, Cold Spring, N. Y.
- Solvay Process Co., Syracuse, N. Y.
20 samples of crude and manufactured products
- Stoner, Mrs Dayton, Albany, N. Y.
Barn swallow, Clarksville, N. Y.
- Strong, L. H., Durham, N. Y.
Warming pan
Long handle iron shovel (peel)
- Taylor, Norman, New York, N. Y.
10 specimens of plants from Long Island
- Thomas, Wilfred, Catskill, N. Y.
Collection of historical objects of household and industrial objects
- Touchette, Mrs Mary, New York, N. Y.
Specimens of cicada killer, *Sphécus speciosus* Dru., New York, N. Y.
- Vairo, M., Inwood, N. Y.
Specimen of mole cricket, *Grylotalpa hexadactyla* Perty, Inwood, N. Y.
- Van Allen, Orisa M., Selkirk, N. Y.
Traveler's folding bootjack
- Van Eseltine, Dr G. P., Geneva, N. Y.
104 specimens of plants mainly from Onondaga county
- Van Schaik, F. C., Menands, N. Y.
3 field mice, 1 house mouse, Menands, N. Y.
- Volz, Mrs Gertrude R., Massena, N. Y.
95 specimens of plants from northern New York
- Whetzel, Dr H. W., Ithaca, N. Y.
Specimen (cotype of *Septotinia podophyllina*)
- Wicks, Frank R., Greenville, N. Y.
Old surveyor's chain
- Wilson, T. Y., Schenectady, N. Y.
6 specimens Bald Mountain limestone, near Middle Falls, N. Y.
2 graptolites, *Didymograptus nitidus*, Coxsackie, N. Y.
- Winter, William F., Schenectady, N. Y.
120 historical objects from Shaker colonies
- Zodac, Peter, Peekskill, N. Y.
Gneiss, augen, with magnetite inclusions, Peekskill, N. Y.

BY EXCHANGE

- Gray Herbarium, Cambridge, Mass.
358 plants from various localities
- Johnson, Professor J. Harlan, Golden, Colo.
8 fish plates, Canon City, Colo.
Collection of 72 fossils
- New York State College of Agriculture, Ithaca, N. Y.
268 specimens of plants mainly from New York State
- Ritchie, Robert, Saratoga Springs, N. Y.
Cryptozoon ruedemanni, Saratoga Springs, N. Y.
- Smith, E. S. C., Schenectady, N. Y.
Pyromorphite from Phoenixville, Pa., for specimen of tourmaline from Gouverneur, N. Y.
- United States National Museum, Washington, D. C., through Dr G. A. Cooper
Foraminifera, manuscript notes, 90 foreign brachiopods and 20 boxes of fossils from the Murchison collection
- University of Pennsylvania, Philadelphia, Pa.
75 specimens of plants from New York State

BY PURCHASE

- Curran, E. S., Troy, N. Y.
 Shaker swivel work chair
 Shaker friction electric machine
- Pitface Mining Company, Burlington, Vt.
 Jasper from town of Colchester, Vt.
- Schrabisch, Max, Paterson, N. J.
 A collection of Indian artifacts and materials from rock caves in southern New York
- Thomas, Frank M., Catskill, N. Y.
 Blown flip glass
 Blown wine glass
 Parian pitcher
- Thomas, Wilfred R., Catskill, N. Y.
 Collection of 25 historical household objects
- Works Progress Administration, through Frank P. Irving, Troy, N. Y.
 American optical view box
 Porcelain printing frame and plates
 Lowe instantaneous shutter
 Photographer's head rest
 Daguerreotype picture
 Silver prints
 Stereoscopic views
 Book of photographs of monuments
 Daguerreotype box and holder
 Daguerreotype portrait
 Irving view box

BY MUSEUM STAFF

- Adams, Dr Charles C., Albany, N. Y.
 Field mouse, Albany, N. Y.
- Cannon, Dr Ralph S., jr, Princeton, N. J.
 6 ostracods and graptolites, Piseco Lake, N. Y.
- Chamberlain, K. F., Albany, N. Y.
 Specimens of miscellaneous bugs (Heteroptera) from Texas, New Mexico, California, Virginia, and Tennessee
 Specimen of broad-headed bug, *Protenor belfragei* Hagl., Cornwall, Conn.
 Specimens of miscellaneous beetles (Coleoptera), Cornwall, Conn.
 Specimens of miscellaneous beetles (Coleoptera), Slingerlands, N. Y.
- Clarke, Noah T., Albany, N. Y.
 Skull of bald eagle
- Cook, John H., Albany, N. Y.
 Specimens of fungus gnats *Exechia* sp., Thompson's lake, N. Y.
 Specimens of moths, *Thyris maculata* Harr., Thompson's lake, N. Y.
- Glasgow, Dr R. D., Albany, N. Y.
 Specimens of taxus weevil, Yonkers, N. Y.
 Specimens of European pine shoot moth eggs, Armonk, N. Y.
 Specimens of larch case bearer larvae, North Elba, N. Y.
 Specimens of larch case bearer eggs, Warrensburg, N. Y.
 Specimens of black fly larvae, Essex county, N. Y.
- House, Dr H. D., Albany, N. Y.
 1020 specimens of plants
- Kilfoyle, C. F., Rensselaer, N. Y.
 260 graptolites from Mount Merino, near Hudson, N. Y.
 20 graptolites, Stuyvesant, N. Y.

- Paladin, Arthur, Albany, N. Y.
 Skull of black bear, Schroon Lake, N. Y.
 Skull of raccoon, Castleton on Hudson, N. Y.
 2 skulls of ring-necked pheasant, Albany, N. Y.
- Richards, Dr A. Glenn, jr, Freeport, N. Y.
 Specimens of miscellaneous insects, Jones Beach, N. Y.
 Specimens of miscellaneous insects, Shinnicock Bay, N. Y.
 Specimens of miscellaneous insects from Gilgo State Park, N. Y.
 Specimens of miscellaneous insects, Woodmere, N. Y.
 70 vials mosquito larvae and pupae, Long Island, N. Y.
 167 specimens adult mosquitoes, Long Island, N. Y.
- Schoonmaker, W. J., Albany, N. Y.
 4 embryo cottontails, Nassau, N. Y.
 Rabbit bot, Nassau, N. Y.
- Stoner, Dr Dayton, Albany, N. Y.
 Little brown bat, Albany, N. Y.
 Eastern phoebe, Voorheesville, N. Y.
 2 northern cliff swallows, Altamont, N. Y.
 Northern cliff swallow, Altamont, N. Y.
 2 English sparrows, Altamont, N. Y.
- Stoner, Dr Dayton, and Schoonmaker, W. J. Albany, N. Y.
 Skull of common dolphin, Van Wies Point, N. Y.
- Whitney, Alvin G., Albany, N. Y.
 Specimens of eggs and adult broad-necked Prionus, *Prionus laticollis* Dru., Albany, N. Y.
 Specimen of caterpillar, unidentified, Albany, N. Y.
- Whitney, Mrs Elsie G., Albany, N. Y.
 Specimen of spotted grape vine beetle, *Pelidnota* L., Albany, N. Y.
 Specimen of broad-necked Prionus, *Prionus laticollis* Dru., Albany, N. Y.
 350 specimens of plants

BY TRANSFER

- New York State Conservation Department, Albany, N. Y., through Dr Emmeline Moore
 Collection of fishes from 1936 survey of the Delaware and Susquehanna watersheds

GIFTS TO INSTITUTIONS AND INDIVIDUALS

- Bertrams, Professor Paul, Lille, France
 16 plant specimens
- Bethlehem Center School, Glenmont, N. Y.
 25 specimens of rocks and minerals
- Bishop, Raleigh A., Manhasset, N. Y.
 Collection of 14 fossils
- Boos, Dr Margaret Fuller, Denver, Colo.
 Collection of 20 fossils
- Historical Society of Monroe County, Pa., through Carl Clausen, East Stroudsburg, Pa.
 Collection of 40 fossils
- Hudson High School, Hudson, N. Y.
 23 rocks and minerals
- Larchmont-Mamaroneck Children's Museum, Larchmont, N. Y.
 Collection of 14 fossils
 15 rocks and minerals
 18 specimens of invertebrates and 1 tooth of sperm whale

Lochman, Dr Christian, South Hadley, Mass.

2 crinoids

Martines-Fortún, Dr Carlos A., Clara, Cuba, through Dr Ortelio Martines-Fortún, Habana, Cuba

Collection of 82 fossils

McClelland, W. H., Tuckahoe, N. Y.

Specimen of twinned rhombohedron of calcite from Sterlingbush, N. Y.

Philip Livingston Junior High School, Albany, N. Y., through Gertrude Rosenberg

Collection of 12 fossils

St Mary's Academy, Champlain, N. Y.

26 minerals

A SUMMARY OF THE ACCOMPLISHMENTS AND FUNCTIONS OF THE NEW YORK STATE MUSEUM DURING THE PAST CENTURY, 1836-1936

BY MEMBERS OF THE MUSEUM STAFF

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By ROBERT D. GLASGOW, *State Entomologist*
- 5 Office of Zoology
By DAYTON STONER, *State Zoologist*
- 6 Office of Botany
By HOMER D. HOUSE, *State Botanist*
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By CHARLES C. ADAMS, *Director, State Museum*, and WILLIAM L. LASSITER, *Temporary Curator of History*
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By the Director

INTRODUCTORY NOTE

BY CHARLES C. ADAMS, *Director, State Museum*

On October 15, 1937, the Board of Regents will devote its 73d Convocation to the centenary of the establishment of the State Geological and Natural History Survey, the lineal ancestor of the New York State Museum, which was established by the Legislature April 15, 1836. For this anniversary a chronological sketch of the history of the State Museum was prepared by the Museum staff, for the 31st Annual Report (State Museum Bulletin 313, p. 85-121). This sketch has proved very useful. For similar reasons the following summary of the major accomplishments and functions of the Museum is here given. This account is prepared from the viewpoint of each office, and is not a complete account of the institution as a whole. No special emphasis is given to the influence of the exhibition halls, to the extensive series of technical and popular publications, to the extension talks, to the supervision of the educational policy of the Allegany School of Natural History (1927-35), and to the various forms of assistance to the schools; but enough has been said to give a general idea of the kind and quality of the research and educational

work which the State Museum has conducted during the past century on the natural resources of the State in relation to education and public welfare. The activity of the State Museum in the fields of history, industry and art has never received the attention which its importance merits.

OFFICE OF GEOLOGY

BY DAVID H. NEWLAND, *State Geologist*

(Figure 24)

Accomplishments

The record of geological exploration and research under state support runs back for a full century. The first governmental survey—one of the pioneers in the field for this or any other country—was started in 1836, and there has been no interruption to the continuity of the work from that time to the present. It would be a laborious and time-consuming task to pass in review the whole series of contributions that have been made to public welfare or to scientific progress during this long interval and to attempt to select the most significant among them—especially so in the brief compass of this statement—and we shall restrict the effort to calling attention to a few broader features of the work that at this time appear to have general importance.

Fundamental in relation to all subsequent progress in geological investigation of the State is the service rendered by those engaged on the early survey of 1836-41, notably W. W. Mather, E. Emmons, L. Vanuxem and James Hall, who were really engaged in the task of exploration rather than methodically planned surveying. Certain parts or districts of the State were assigned to each, and the respective reports issued in four quarto volumes constitute a conspectus of the physical geography, mineral endowment, soils and geological framework of New York, interpreted in the light of the advanced science of that day. These four volumes—to which should be added the one by L. C. Beck on mineralogy—are an indispensable adjunct for all in search of information about the basic physical features of the State. Indirectly they have contributed to geological knowledge of a much broader field, and even today are in request by workers and students of many countries.

The State Geological Map on the scale of 5 miles to 1 inch, issued in 1901 by F. J. H. Merrill, State Geologist, although not the first published, was the most complete and satisfactory representation of the physical structure of the Commonwealth in its entirety from

present-day standards, so that it ranks as an outstanding contribution. The main classes of geologic formations from the Precambrian to Recent are thereon indicated as to outcrop by appropriate patterns and with faithful attention to detail. It is an invaluable guide to the distribution of the larger elements and stratigraphic groups that collectively comprise the series of New York formations. So great has been the demand for this map that the large edition is long since out of print; it fills an urgent need on the part of geologists and geographers, construction engineers and those interested in the minerals, soils and underground waters—to name some of its more important applications.

Not to single out any specific report—rather emphasizing their collective standing and value—mention should be made here of the monographic volumes on the mineral resources as of immense importance, measured in dollars and cents. These reports, among others of more limited interest, include a volume on the salt deposits, wherein was first recognized the wide distribution of the rock salt beds, now the basis of a great manufacturing and chemical industry; one on the clay and ceramic industries; several bulletins on the iron ores, which have both historic interest, as leading to the early settlement of outlying regions, and present-day value; reports on the extremely varied and serviceable quarry materials, running through the whole range of building stones; and bulletins on gypsum, sand and gravel and the mining quarry industries generally. These rank as positive contributions to our commercial and manufacturing welfare.

Special Services

On the other side of the account, although scarcely less important in the general interest, are the advisory functions of the office, whereby for example, the public is cautioned from time to time against embarking on fruitless ventures in attempts to prospect for and exploit such materials as are known to be lacking in our natural endowment. The futility of exploring for coal beds anywhere in the State—notwithstanding its abundance in the area immediately south of the New York-Pennsylvania line—was demonstrated conclusively years ago to the advantage of succeeding generations. Of more recent date are the warnings against get-rich-quick ventures which have the precious metals as their ostensible object. The office has investigated many such undertakings and in no instance has found any substantial basis for the expenditure of time, labor or money in the enterprise. Although no definite principle of geology is involved in the conclusion, as can be brought forth for coal, the evidence is

sufficient to advise at least a very conservative attitude toward this hazardous business. Again the search for oil and gas, although well based in certain localities or districts of the State—the production of the two commodities is worth millions of dollars annually—in other regions is without any solid foundation. Advice and direction in such matters are a function of this office, for which the returns can hardly be estimated according to the usual standards, but they are very substantial beyond doubt.

Cooperation with other state departments, including the Executive, Law, Public Works, Conservation, Labor, Agriculture and Markets, are a recurring obligation to which the office gladly responds. In the past few years, for example, it has participated at the instance of Governor Lehman in a national conference for the regulation and control of petroleum, of which the production temporarily was in excess of current needs. Cooperation with the officials of the Law and Conservation Departments a short time ago resulted in throwing open certain waste lands for leasing to natural gas companies, where geological study had indicated the probable presence of gas pools. The State now derives a substantial income from its property, without the risk and expense ordinarily connected with such undertakings.

The office, further, has been called upon for guidance or expert testimony in legal matters involving accidents on public highways caused by landslides or falls of rock, on condemnation proceedings relating to quarry sites, on titles to lands in the Adirondack Forest Preserve where mineral deposits may be concerned, on foundations for buildings and engineering structures, on hazardous occupations that come within the scope of labor regulations, and with regard to many matters involving soils, streams and underground waters. The recent agitation about silicosis as an occupational disease has brought many inquiries and requests for assistance in investigation of dust samples for the presence of certain minerals and in establishing geologic guidance to the local distribution of siliceous materials.

The geological collections in the Museum render a very broad and far-reaching service, the value of which can hardly be estimated in monetary terms. Thousands of visitors annually are given the opportunity to gain an all-round acquaintance with the structure and physical features of the State, such as are nowhere else presented in similar detail and completeness. That the collections do have public appeal has been attested also by the fact that a part of the exhibits—those relating to mining—were displayed at the Panama-Pacific Exposition in 1915, and there won the grand prize in competition with similar exhibits from many other States.

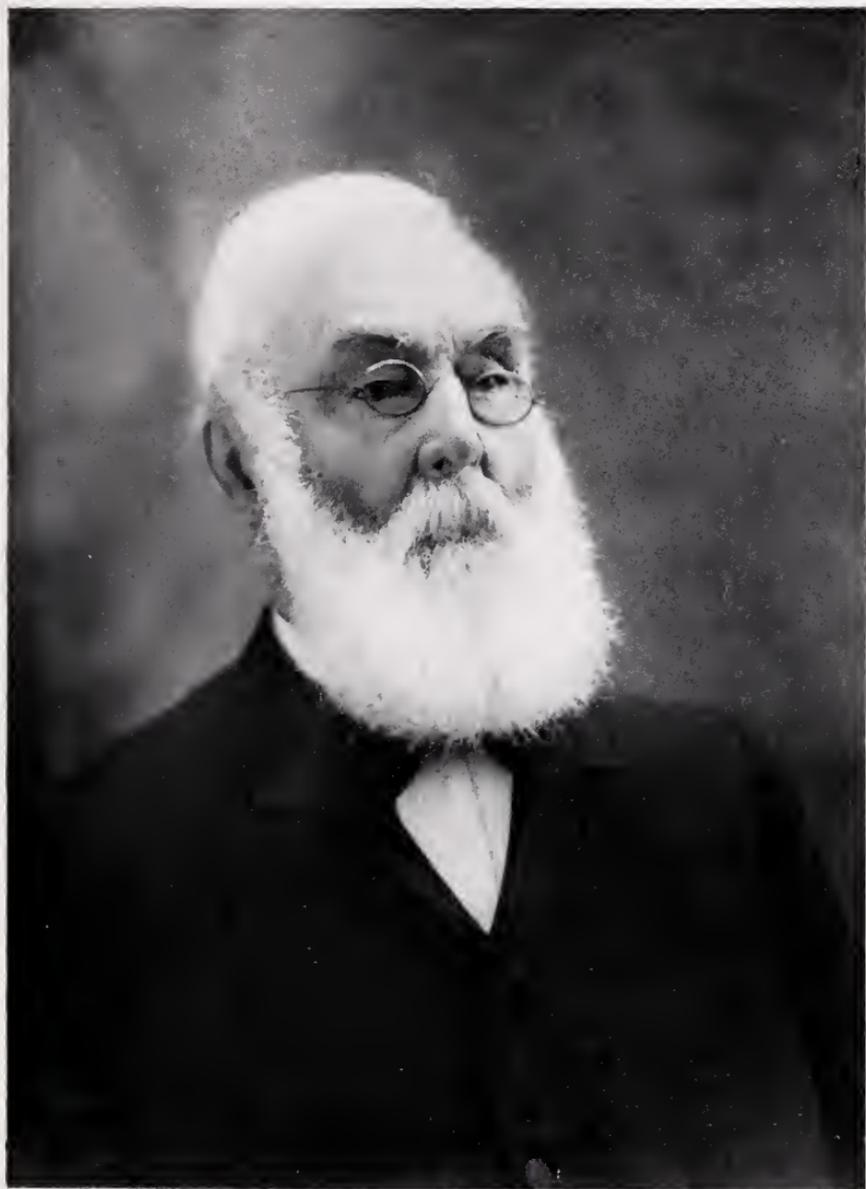


Figure 24 Dr James Hall (1811-98) State Geologist, State Paleontologist
and Director of State Museum

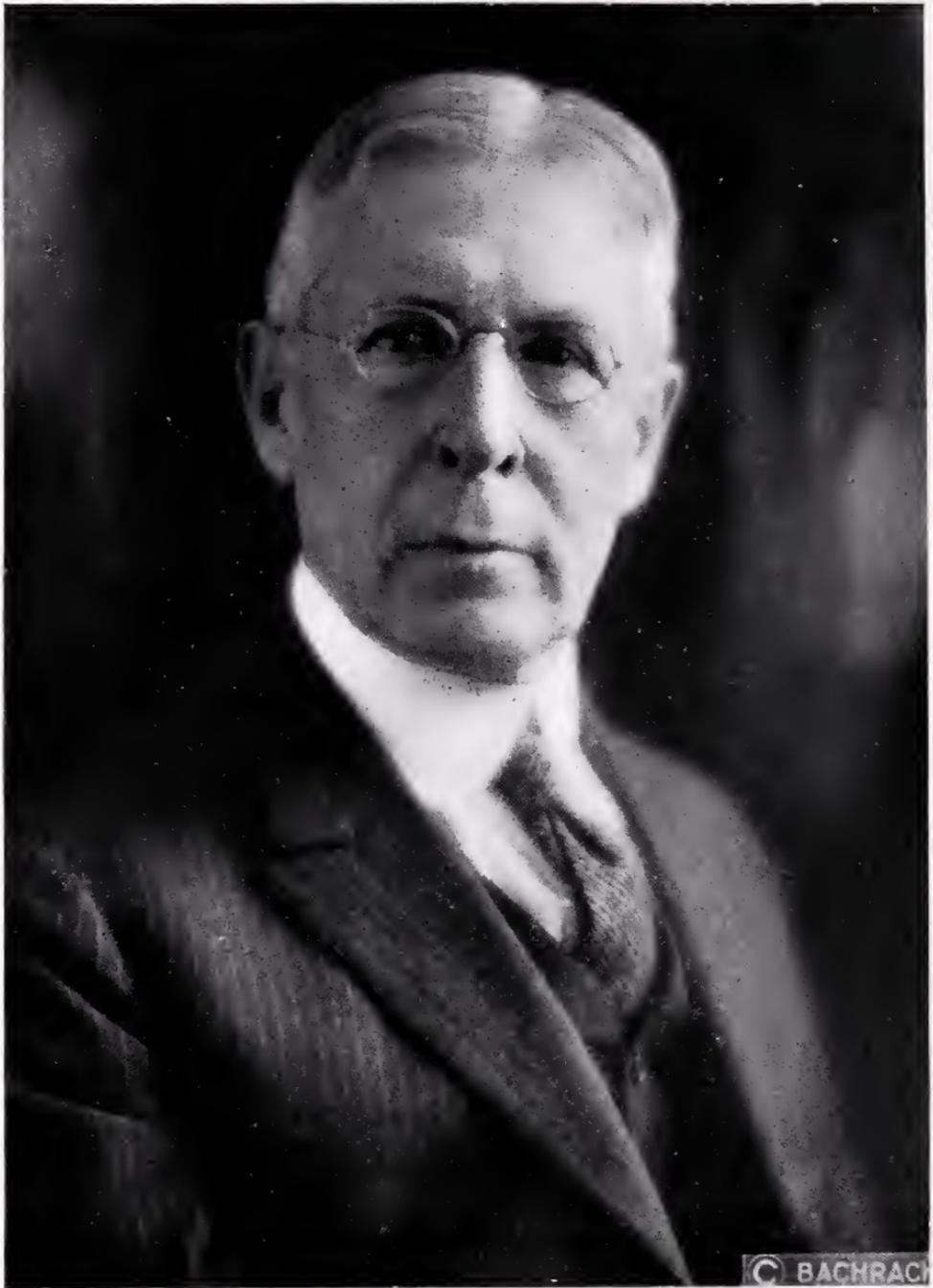


Figure 25 Dr John M. Clarke (1857-1925) State Geologist, State Paleontologist
and Director of State Museum

OFFICE OF PALEONTOLOGY

BY WINIFRED GOLDRING, *Assistant State Paleontologist*

(Figures 25-29)

Outstanding Accomplishments

Paleontological research. Outstanding among the paleontological publications are 14 quarto volumes, part of the Natural History of New York, constituting the Paleontology of New York by Dr James Hall. These deal with fossils of all the formations from the Cambrian through the Devonian and comprise more than 4000 pages of text and about 850 plates. These volumes, published in the years between 1847 and 1894, gained a worldwide circulation and won a high place among standards of reference which they hold to this day.

Under Dr John M. Clarke, successor to Doctor Hall as State Paleontologist and later as Director of the State Museum, investigations of high scientific value were published in 11 quarto monographic reports, totaling more than 3500 pages of text and about 400 plates. These monographs, also holding a high place among standards of reference, are as follows:

- 1889 **Beecher, C. E. & Clarke, J. M.** Development of Some Silurian Brachiopoda. 96p. 8 pl.
- 1898 **Hall, James, & Clarke, J. M.** Paleozoic Reticulate Sponges. 350p. 70 pl.
- 1900 **Clarke, J. M.** The Oriskany Fauna of Becraft Mountain, Columbia County, New York. 128p. 9 pl.
- 1903 **Clarke, J. M. & Ruedemann, Rudolf.** Guelph Formation and Fauna of New York State. 196p. 21 pl.
- 1904 **Clarke, J. M.** Naples Fauna in Western New York. 268p. 26 pl. map.
- 1905 **Ruedemann, Rudolf.** Graptolites of New York, Pt 1: Graptolites of the Lower Beds. 350p. 17 pl.
- 1907 **Eastman, C. R.** The Devonian Fishes of the New York Formations. 235p. 15 pl.
- 1908 **Ruedemann, Rudolf.** Graptolites of New York, Pt 2: Graptolites of the Higher Beds. 584p. 31 pl.
- 1909 **Clarke, J. M.** Early Devonian of New York and Eastern North America, Pt 1: 366 p. 70 pl. 5 maps.
- 1912 **Clarke, J. M. & Ruedemann, Rudolf.** The Eurypterida of New York, v.1, text, 440p. v.2, 88 pl.
- 1923 **Goldring, Winifred.** Devonian Crinoids of New York. 670p. 60 pl.

A Monograph of the Graptolites of North America is nearing completion, and was begun by Doctor Ruedemann, State Paleontologist at the request of the United States Geological Survey. This work (probably two large quarto volumes) will be authoritative for the graptolites of North America.

Outstanding among 14 paleontologic bulletins is a three-volume work (500 pages; 41 plates), *The Utica and Lorraine Formations of New York*, by Doctor Ruedemann, of stratigraphic as well as paleontologic value and monographic in character.

Stratigraphical research. The work of the paleontology section includes studies of the Paleozoic rocks underlying about two-thirds of the area of the State. Detailed geologic mapping has been continued to the present day with the result that about one-third of the State has been so mapped. Among 54 bulletins on stratigraphic subjects, 27 out of 44 quadrangle bulletins deal, entirely or in part, with Paleozoic formations and cover 39 quadrangle areas. These bulletins with their accompanying geological maps are valuable for both economic and purely scientific purposes. The maps cover important areas of the State, as the capital district, Syracuse, Rochester and Buffalo areas; the Mohawk and Hudson valleys.

The exhibition halls. Housed in the Museum is the valuable type collection of more than 10,000 specimens which comprises all specimens of figures in paleontological publications of the State Museum. These are valued by dealers at \$10 and more apiece.

The paleontological exhibits in the State Museum have been declared, by word and in print, by scientists from all over the world to constitute the finest display of Paleozoic fossils in any museum.

The State Museum pioneered in fossil restorations and restoration groups such as the Lower Devonian (Helderberg), Upper Devonian (Portage), Eurypterid and Upper Devonian Sponge Groups, executed by Henri Marchand under the supervision of Doctor Ruedemann; the Middle Devonian Forest of Seed Ferns, executed by Henri Marchand under the supervision of Miss Goldring; and the mastodon, executed by Noah T. Clarke and Charles P. Heidenrich. Reproductions have appeared frequently in textbooks and other publications here and abroad, and similar restorations now appear in other museums.

Popular publications. Under the directorship of Dr Charles C. Adams, successor to Doctor Clarke, a new handbook series of



Figure 26 Home of Dr Ebenezer Emmons, 1838, corner of Hudson avenue and High street, Albany, N. Y. Birthplace of the American Association of Geologists and the American Association for the Advancement of Science. Photographed March 1900.



Figure 27 Helderberg group. Restoration of early Devonian marine life of New York, showing seaweeds, crinoids, triobites, cephalopods, spiny gastropod, brachiopods, etc. Executed by Henri Marchand under the supervision of Rudolf Ruedemann.

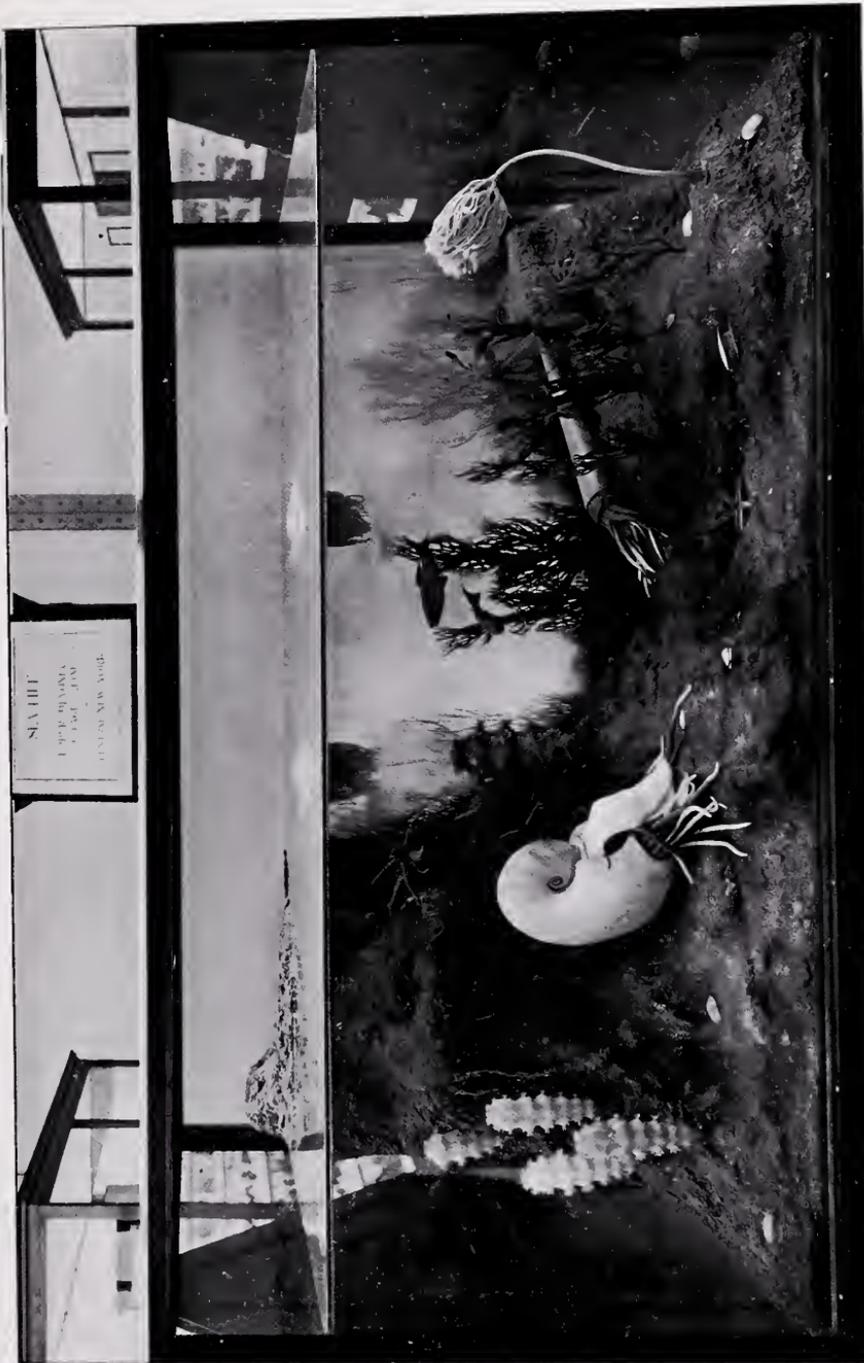


Figure 28 Portage group. Restoration of Upper Devonian marine life of New York, showing seaweeds, crinoid, starfishes, cephalopods, glass sponges, fishes. Executed by Henri Marchand under the supervision of Rudolf Ruedemann.



Figure 29 The Gilboa group, showing the rocks with the three horizons of fossil stumps in front, and the restoration of the forest in the background. Restored by Howell, Mead, and ...

popular publications was introduced in response to a growing demand on the part of the layman with little or no scientific background. Among these is the Handbook of Paleontology for Beginners and Amateurs prepared by Miss Goldring with the layman in mind. These two volumes (Handbook 9; Part 1, The Fossils. 355p. 97 figs.; Handbook 10: Part 2, The Formations. 488p. 51 figs.), though designed for and in demand by the layman, have filled a long-sought need for a simplified textbook for college classes and a reference book, here and abroad, for paleontologists seeking a concise summary of the New York formations which constitute the standard section for the Paleozoic in America. The demand for layman, student and scientists has exhausted Handbook 9, and Handbook 10 is nearing exhaustion. Both volumes are still in considerable demand.

Special Services

Among the various special services of the office of Paleontology should be mentioned:

Legal assistance in various suits against the State, such as those arising from the building of the Barge canal; suits in connection with the mineral waters of Saratoga Springs and with road contracts in cases where sedimentary rocks are involved.

Supervision of studies of American and foreign scientists who come to study the paleontological collections, the value of which is known internationally as well as nationally. Not mentioning the numerous Americans, notable among foreign scientists are Dr F. A. Bather, late head curator of the British Museum; Dr R. Kräusel, of the University of Frankfurt, Germany; Dr M. Le Compte, of the Royal Museum, Brussels, Belgium; Dr Leif Störmer, of the University of Oslo, Norway; Dr Teiichi Kobayashi, of the University of Tokio, Japan; Dr Curt Teichert, of Germany. The last three spent several months, each, in the study of special groups.

Identification of faunas for scientists for the fixation of formations. Among these are the numerous collections of graptolites sent to Doctor Ruedemann from all over the United States, Alaska, Canada and Newfoundland; crinoid collections sent to Miss Goldring from collectors within and without New York State and from Canada. This work indicates the high standing of the Museum paleontologists among their colleagues abroad.

The part played by the geologists of the New York State Geological Survey, in leading to the formation of the American Association for the Advancement of Science, is here briefly summarized:

In the fall of 1838, four geologists, then working on the Geological Survey of New York State, met at the house of one of its members, Dr Ebenezer Emmons, at the corner of Hudson avenue and High street, Albany, N. Y. The other geologists present were James Hall, W. W. Mather and Lardner Vanuxem. The conference was called for the purpose of devising means for consultations and the comparing of results with geologists working in other states. After correspondence with geologists a second meeting of the Geological Survey staff was held at Doctor Emmons' house in the autumn of 1839, the outcome of which was the calling of a formal meeting of geologists at Philadelphia in April 1840. At this meeting the Association of American Geologists was organized. The second meeting of the association was also held in Philadelphia, and the third meeting in Boston in 1842. At the Boston meeting naturalists were desirous of joining the association and the name was changed to the Association of American Geologists and Naturalists. As an enlarged outgrowth of this parent organization the American Association for the Advancement of Science was formed in 1847.

In commemoration of the part played by the New York State Survey geologists, the American Association for the Advancement of Science, in 1901, authorized the placing of a memorial tablet on the Emmons' House in Albany (figure 26) (Clarke, J. M., 1902. New York State Museum Bul., 52: 452-56). The inscription on the tablet is as follows:

In this House, the home of

DR EBENEZER EMMONS

The first formal efforts were made in 1838 and
1839, toward the organization of the

ASSOCIATION OF AMERICAN GEOLOGISTS

The parent body of the

American Association for the Advancement of Science
by whose Authority this tablet is erected

1901

OFFICE OF ENTOMOLOGYBY ROBERT D. GLASGOW, *State Entomologist*

(Figures 30-31)

Accomplishments

From the beginning, the Office of Entomology and its antecedent or parent agencies have been a continuing instrumentality for scientific research on insect problems of public concern, and a source of information and instruction concerning such problems.

During the earlier years the most notable contributions appear to have been a very important series of treatises containing the results of much original work on the insects of New York. These treatises were of great value at a time when such publications on insects were few or nonexistent, and have had a profound influence upon the development of both public and private interest in entomological work, not only in the State of New York, but also throughout the United States and the world at large.

In 1854 appeared *Descriptions of the More Common and Injurious Insects* by Ebenezer Emmons M.D. This appeared as volume 5 of Emmons' magnificent report on the Agriculture of New York, which was published in five volumes as Series 5 of the Natural History of New York. With its hundreds of exquisite drawings largely in color, this volume was probably one of the most important among the early American publications on entomology in the stimulus it gave to the more general study of insects.

Also in 1854, by act of the State Legislature, Asa Fitch M.D., was appointed official entomologist "to make an examination of the insects of the State, especially those injurious to vegetation." Doctor Fitch, the first entomologist to be so commissioned by any state, had previously been appointed in 1847 to collect and name specimens of New York insects for the State Cabinet of Natural History. Of this work Doctor Emmons wrote in his acknowledgments: "and have been very much assisted by our eminent entomologist Dr Asa Fitch." Many of the specimens collected and named by Doctor Fitch for the State Cabinet of Natural History and thus for Emmons' report are still in the State Museum collection of insects.

Subsequent reports of our official entomologists have numbered: Fitch, 14; Lintner, 13; Felt, 22—up to the time when such reports from officers of the Museum other than the Director were discontinued in 1921.

Many other important monographs and treatises on insects of New York have been published by entomologists of the State Museum staff. Especially notable among these are the following:

Aquatic Insects of New York, by Needham, McGillivray, Johannsen and Davis. N. Y. State Mus. Bul. 68, 1903

Mosquitoes of New York, by Felt. N. Y. State Mus. Bul. 79, 1904

May Flies and Midges of New York, by Needham, Morton and Johannsen. N. Y. State Mus. Bul. 86, 1905

Insects Affecting Park and Woodland Trees, by Felt. N. Y. State Mus. Memoir 8, v. 1, 1905, v. 2, 1906

A Study of Gall Midges, by Felt. N. Y. State Mus. Buls. 165, 175, 180, 186, 198, 202, 231-32, 1913-21

A Key to American Insect Galls, by Felt. N. Y. State Mus. Bul. 200, 1918

Black Flies and Other Biting Flies of the Adirondacks, by Metcalf and Sander-son. N. Y. State Mus. Bul. 289, 1932

The Caddis Flies or Trichoptera of New York State, by Betten. N. Y. State Mus. Bul. 292, 1934.

Growth of the State and the attendant increase in number and complexity of public problems, including an enormous increase in the urgency of insect problems of many kinds, have brought a multiplication of state agencies concerned with the solution of such problems.

Originally the State Entomologist was the sole state agency concerned with the study of insect problems. With the establishment of the College of Agriculture at Ithaca, of the Agricultural Experiment Station at Geneva, and of the State College of Forestry at Syracuse, however, other agencies concerned with such problems and equipped for their study arose. Other state agencies also notably concerned with such problems but not equipped for their study are the State Conservation Department and the State Department of Agriculture and Markets, both located at Albany.

Special Services

With this expansion of entomological activity and interest, mutual adjustments among these agencies have been largely determined by the judgment and common sense of the personnel concerned. Chief among the entomological services now rendered by entomologists of the State Museum are:

Identification service. Including the accumulations of more than 90 years, the State Museum reference collection of insects now comprises more than 200,000 specimens. The State Entomologist's Office also has an unusually good entomological reference library.



Figure 30 Dr Asa Fitch (1809-79) first American official
State Entomologist



Figure 31 Dr J. A. Lintner (1822-98) State Entomologist

These facilities have made possible the extensive entomological identification and general information service that the State Museum has provided for other state departments, for the schools of the State and for the general public.

Interdepartmental cooperation. The State Museum and its Office of Entomology is located in the State Education Building at Albany. The State College of Forestry, at Syracuse, the State College of Agriculture, at Ithaca, and the Agricultural Experiment Station at Geneva, are respectively 132, 171 and 184 miles distant.

The administrative state departments that are also located at Albany, which have urgent insect problems and no adequate facilities for their study, have continued logically to depend upon the State Museum entomologists for assistance with such problems. The special needs of these departments in many such cases could not possibly be met by agencies not available for frequent and direct personal collaboration and conference. The only alternative to the service rendered by the State Museum would be for these departments to add to their own personnel, research entomologists, for whose work they would not have adequate reference facilities nor other necessary research equipment.

When confronted by a newly introduced pest, or by some new development in interstate or international quarantine requirements, the administrative officers charged with responsibility for such matters must decide at the earliest practicable moment upon the formulation of compensating new regulations or upon the recommendation of new legislation.

In such cases the administrative officers concerned wish to work in very close collaboration with the cooperating investigators, so that they may be able to act officially even before the results of the investigation are finally verified and ready for publication.

All such interdepartmental cooperative studies of insect problems have been carried on, of course, with publication of the results as one of the major objectives.

Notable examples of such cooperative service are:

Narcissus pest problems. A new industry in New York, forced by a federal embargo to migrate from Europe (chiefly from Holland) to America. A psychological and planning problem, as well as a whole new group of pest problems. Work begun in 1929, and carried on to date in collaboration with officers of the State Department of Agriculture and Markets, and of the Long Island Bulb Growers' Association. Results partly in print; complete report in course of preparation.

Studies of the European pine shoot moth. An introduced pest of pine species that is of major importance in nurseries, in ornamental plantings and particularly in reforestation work. Work begun in 1930, and carried on to date in collaboration with the State Department of Agriculture and Markets and the State Conservation Department.

Practical control measures have been found that are economical and effective.

The gypsy moth law has been amended to read: ". . . the gypsy moth and/or the European pine shoot moth"

Preliminary recommendations have been made from time to time. A complete report on this series of studies is now in course of preparation.

Studies of black flies (Simuliidae) and of related blood-sucking insects. Pioneer work on a very complicated and economically important problem. Work begun in 1929 with privately contributed funds, and continued to date. Has included a highly successful experimental clean-up project at the Ray Brook Sanatorium for Incipient Tuberculosis, carried out in collaboration with officers of the State Department of Health.

Reports on preliminary work in print. Other reports in course of preparation.

Federal mosquito control work relief program. When, in 1933, the Civil Works Administration (C.W.A.) was set up for the relief of unemployment, mosquito control work was immediately pronounced one of the most appropriate forms of work relief activity. A large allotment of work relief funds was made for such work to be carried on under administrative supervision of the United States Bureau of Entomology. Of this allotment, \$400,000 for mosquito control work and an additional \$4000 for travel were reallocated to the State of New York.

With its background of aquatic insect studies covering thirty-odd years, the State Museum was chosen to represent the Federal Bureau of Entomology in this program, and the State Entomologist was appointed director of this great federal mosquito control work relief program in the State of New York.

In spite of baffling obstacles, during the course of this brief program more than 1000 men were given work and more than 2,000,000 feet of ditch were excavated.

Although the Civil Works Administration was discontinued at the conclusion of its originally assigned ten weeks of life, the State Museum has continued its close association with all important mosquito control activities within the State.

Studies of mosquito control and wild life conservation. A major problem in human ecology with an important relation to the planned coordination of conflicting human interests, and to regional planning and the like. Carried on in collaboration with officers of the State Conservation Department, and with representatives of the United States Bureau of Entomology, of the United States Bureau of Biological Survey, of neighboring states, and of public and private local agencies concerned. Another long-time study; but with several preliminary reports already printed.

Museum exhibits. The State Museum has an excellent series of public entomological exhibits; but a reorganization of some of these exhibits is planned.

Entire classes from many public and private schools visit the State Museum exhibits each year. Teachers in some of these schools have prepared questionnaire outline forms to be used by the pupils as a guide in their study of the insect exhibits, and in reporting the information so acquired. Reorganization to promote this use of the exhibits would be highly desirable.

With the limited floor space available in our public exhibition halls, the usefulness of our exhibits, both for school use and for general public information, could be greatly increased by the development of special exhibits for display in rotation either to present seasonal conditions or to follow seasonal progress through the school syllabuses.

Additional resources and personnel, however, would be required to make such revisions possible.

Demands for these and other entomological services provided by the State Museum greatly exceed the limits imposed by our present resources and by our physical ability to respond. Perhaps this is as it should be; but there appears to be great need for means to expand many of these services.

OFFICE OF ZOOLOGY

BY DAYTON STONER, *State Zoologist*

(Figures 32-33)

Accomplishments

The installation and maintenance of exhibits illustrating representative types of New York State animal life. These exhibits are and have been of scientific, educational and recreational value for large numbers of visitors. Typical of these are the moose,

bison, green heron and other habitat groups as well as the representative synoptic series illustrating the principal types of animal forms found in the State.

The assembling and maintenance of study and research collections of the animal life of New York State. These collections have, in part, served members of the Museum staff who have reported or who contemplate reporting thereon. The collections are available also to members of other institutions who may be conducting investigations which will be facilitated by the records or other data thus provided. The fish, spider, myriopod, bird and mammal collections are outstanding examples.

The contribution to knowledge of New York State animals through investigation and research. Some of the outstanding research activities which have been undertaken or are now being conducted are :

The Mammals of New York, by Gerrit S. Miller jr; The Reptiles and Batrachians of New York, by E. C. Eckel and F. C. Paulmier; Higher Crustacea of New York City, by F. C. Paulmier; Osteology of Birds, by R. W. Shufeldt; The Birds of New York, by E. H. Eaton; The Spiders of New York, by S. C. Bishop; The Chilopoda of New York, by J. W. Bailey; Bird Song, by A. A. Saunders; Studies on Migration, Homing, Temperature and Growth Rate of Swallows and Other Species of Birds, by Dayton Stoner.

Other publications such as scientific, technical and semi-popular journals and the organs of various societies. Hundreds of papers prepared by various staff members of the Office of Zoology in the Museum have contributed to human knowledge and aided in promoting interest in biological science, not only in this State but throughout the Nation and in countries abroad.

Special Services

Other services performed by the personnel of the Office of Zoology in the dissemination of knowledge and in contributing to the educational interests of the people may be grouped as follows :

The maintenance of records, files and correspondence relating to the animal life of New York State. These records are gradually accumulating and not only serve current activities but also will constitute a fundamental background of information for future workers.



Figure 32 General view of Zoology Hall



Figure 33 General view of Zoology Hall

The preparation and maintenance of a limited amount of loan material available to schools and properly qualified individuals for temporary exhibit and study. Examples are duplicate specimens and skins of mounted birds and mammals; duplicate specimens of reptiles and amphibians.

The representation of the Museum by staff members at scientific meetings with a consequent wider dissemination of Museum interests and activities and a corresponding benefit to the staff member.

Cooperation with various national and state agencies in investigations of animal life. Illustrated by cooperation with the United States Biological Survey in bird-banding activities.

A certain amount of various types of cooperation also is effective between the Office of Zoology and the State Conservation Department.

OFFICE OF BOTANY

BY HOMER D. HOUSE, *State Botanist*

(Figures 34-37)

Accomplishments

The 40 years' incumbency of the late Dr C. H. Peck was mainly a pioneer period in the study of American fungi. Doctor Peck with an almost virgin field for his researches named and described about 3000 species of fungi, many of economic importance. He later brought most of his studies together in the form of generic monographs, especially for the higher or fleshy fungi. Many of the latter were illustrated with colored plates.

The importance of Doctor Peck's contribution and service to the State and to science is indicated by the fact that almost all specialists today in the study of fungi and plant diseases caused by them find it necessary to examine the types of Peck's species and the numerous other specimens collected and named by him.

With the late Dr C. S. Sargent, of the Arnold Arboretum, Peck cooperated in the study of the genus *Crataegus* (native or wild thorns) in this State.

Doctor Peck published an unbroken series of Annual Reports from 1866 to 1912, containing the results of his investigations not only on fungi but on other groups of plants.

Doctor Peck built up a valuable reference collection of all groups of plants found in New York State, which numbered at the time of his death around 20,000 specimens.

The present Botanist, Dr H. D. House, his assistants and donors have added to the herbarium, until at present (1937) the collections number about 109,000 specimens, distributed as follows:

- 42,000 mounted plants of New York State
- 14,000 unmounted plants of the State
- 28,000 specimens of fungi
- 6,000 specimens of mosses, lichens, algae, etc.
- 21,000 mounted specimens of plants, extralimital to the State

In conjunction with this large herbarium there has been developed a card index system showing the distribution in the State of every known species of fern and flowering plant. Notation of specimens in this and other institutions is entered on the card, while on the reverse side occurs an outline map of the State, dotted to show the locality from which each specimen comes, and thus shows at a glance the known distribution in this State of the particular plant of which this card is a record.

This index and the herbarium are of service to many investigators in studying the distribution of native plants, the variations of certain species, the positive identification of plants collected, including weeds, medicinal plants, economic and ornamental plants, trees, shrubs, ferns etc. It is made use of by members of the State Departments of Agriculture and Markets and of Conservation as well as by specialists from other institutions. It serves also as a check in naming the hundreds of specimens sent in annually from various sources to be identified. This last constitutes one of the most important services rendered by the office.

The Wild Flowers of New York, in two volumes, has met with great popular favor, and no other similar publication can approach it in number and excellence of colored plates. It is estimated that some 50,000 copies have found their way into private ownership.

A complete bibliography of the botanical publications relating to the flora of the State was published several years ago and is kept revised to date in card catalog form, where it is frequently consulted by those interested.

In this connection a large reference library has been built up consisting of some 300 volumes and several thousand reprints, separates and pamphlets relating to the flora of the State and closely related subjects. These are arranged according to subjects, and are frequently consulted by those interested in the subjects covered.

Botanical surveys have been published on certain areas, and assistance has been extended to outside investigators working on local floral problems.



Figure 34 Dr John Torrey (1796-1873), Botanist of State Geological and Natural History Survey



Figure 35 Dr Charles H. Peck (1833-1917).
From the Journal of Mycology.



Figure 36 Dr Charles H. Peck in his office in Geological Hall about 1910



Figure 37 Memorial exhibit of fleshy fungi to Dr Charles H. Peck

Special Services

In general, the State Botanist's Office endeavors to be of greatest possible service to anyone seeking information or assistance in any botanical line, and this includes plant diseases, medicinal, economic and theoretical botany, ornamental plants, wild gardens, tree surgery and aquatic vegetation. Work relating to such service takes precedence over all other activities.

OFFICE OF ARCHEOLOGY

BY NOAH T. CLARKE, *State Archeologist*

(Figures 38-43)

Accomplishments

The Office of Archeology and Ethnology of the New York State Museum is the outgrowth of several donations from private collectors of so-called "Indian relics" to the Natural History Survey in 1847. Since that time, and until 1904, all research and curatorial duties were performed by an honorary curator. Collections and manuscripts were purchased through special legislative appropriations. In 1904 an archeologist was added to the Museum staff and since then the personnel of this office has consisted of only the Archeologist; with an occasional appointment of temporary assistants.

Research. In spite of the above handicap, this office has achieved an enviable reputation in its field of research which is limited to the boundaries of the State. The study of material cultures through field investigations of aboriginal camp, village and burial sites has enlarged public knowledge of the history and prehistory of early human activity. Through these studies considerable knowledge has been contributed toward questions involving the origin, political and economic development, manners, modes of living, customs, arts, industries, religious and mental characteristics of our New York State Indians. All such information has been recorded and made available to the public through the Museum exhibits and through the archeological publications, which have been distributed to such an extent that the supply, with two exceptions, has long been exhausted by reason of the constant popular demand for them. Exclusive of the special articles appearing in the Annual Reports of the Director, the archeological bulletins comprise some 3436 pages and 669 plates.

Collections. To replace the almost total loss of the archeological and ethnological collections, suffered in the Capitol fire in 1911, it became necessary for the Museum to purchase the more important

private collections then available. These, with gifts of collections from public-spirited citizens, all helped to replace the loss. But through the persistent efforts in field work the present collections of this section of the Museum far excel anything, both in numbers and instructive value, previously owned by it. There are now approximately 100,000 specimens in the collection, of which more than half are systematically arranged in museum cases. Of these, 146 cases are confined to the science of archeology and 29 cases devoted to that of ethnology. The collections which are not on display are in orderly arrangement in storage which is made readily available to the public and the Archeologist's office by means of a well-indexed card system. Some of the duplicate specimens are reserved for loan and exchange purposes.

It is safe to say that the State Museum through its efforts has developed a synoptic and representative collection of New York State aboriginal cultural materials equal, if not superior, to that found in any other similar institution.

One of the outstanding accomplishments of the Museum is the series of six natural size Iroquois habitat groups. These striking exhibits were conceived and worked out under the immediate supervision of the archeological section and are today regarded as the finest of their type ever attempted and they probably attract more attention and have been of more general interest than any other feature of the Museum.

Special Services

Besides the dissemination of results of research in the Museum publications, the archeological section has served the public through the medium of the press, radio, lectures, talks to school children and other groups at the Museum. It has supplied facts to such public officers as the Governor, Attorney General and the Department of the Interior. It has supplied technical information to writers of music, plays, pageants and novels and to artists, sculptors, historians and collectors. The section has also supplied Indian names for organizations, public grounds and private estates etc. It has held an informative relationship with many professional and instructional institutions and organizations throughout the United States and abroad, and is considered a clearing house for archeological and ethnological data pertaining to the State of New York.

The law making it a misdemeanor to make and sell fraudulent archeological artifacts was proposed by this office. Also, through its efforts the New York State Archeological Association was organized



Figure 38 Lewis H. Morgan (1818-81) "father of modern ethnology."
From *Researches and Transactions* New York State Archeological
Association.

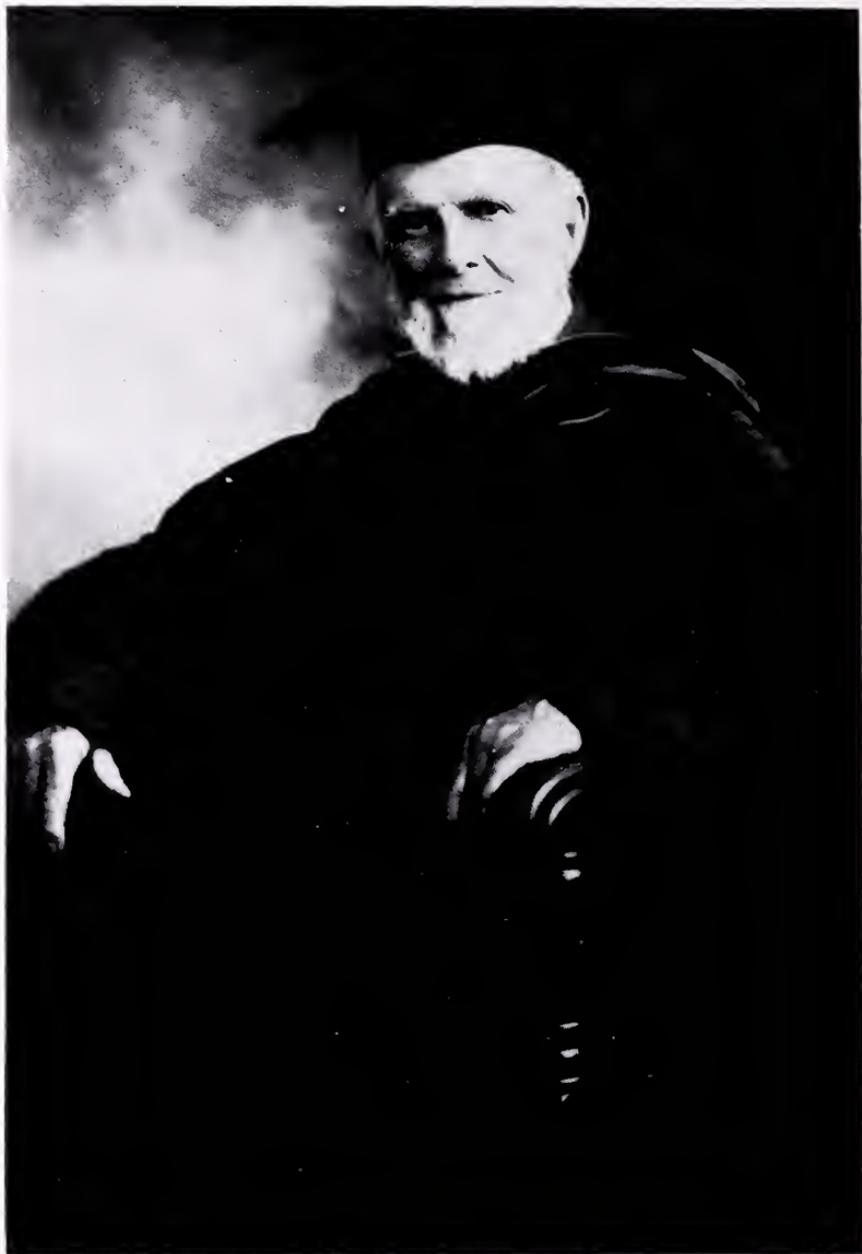


Figure 39 Dr W. M. Beauchamp, author of many State Museum publications
on New York Indians



Figure 40 The Seneca Hunting Group. The preparation of food and skins. Illustrating a method of felling trees by fire and stone hatchet. Courtesy of J. A. Glenn.



Figure 41 The Seneca Corn Harvest Group. Corn pone in the making. Courtesy of J. A. Glenn.



Figure 42 The Iroquois Industry Group

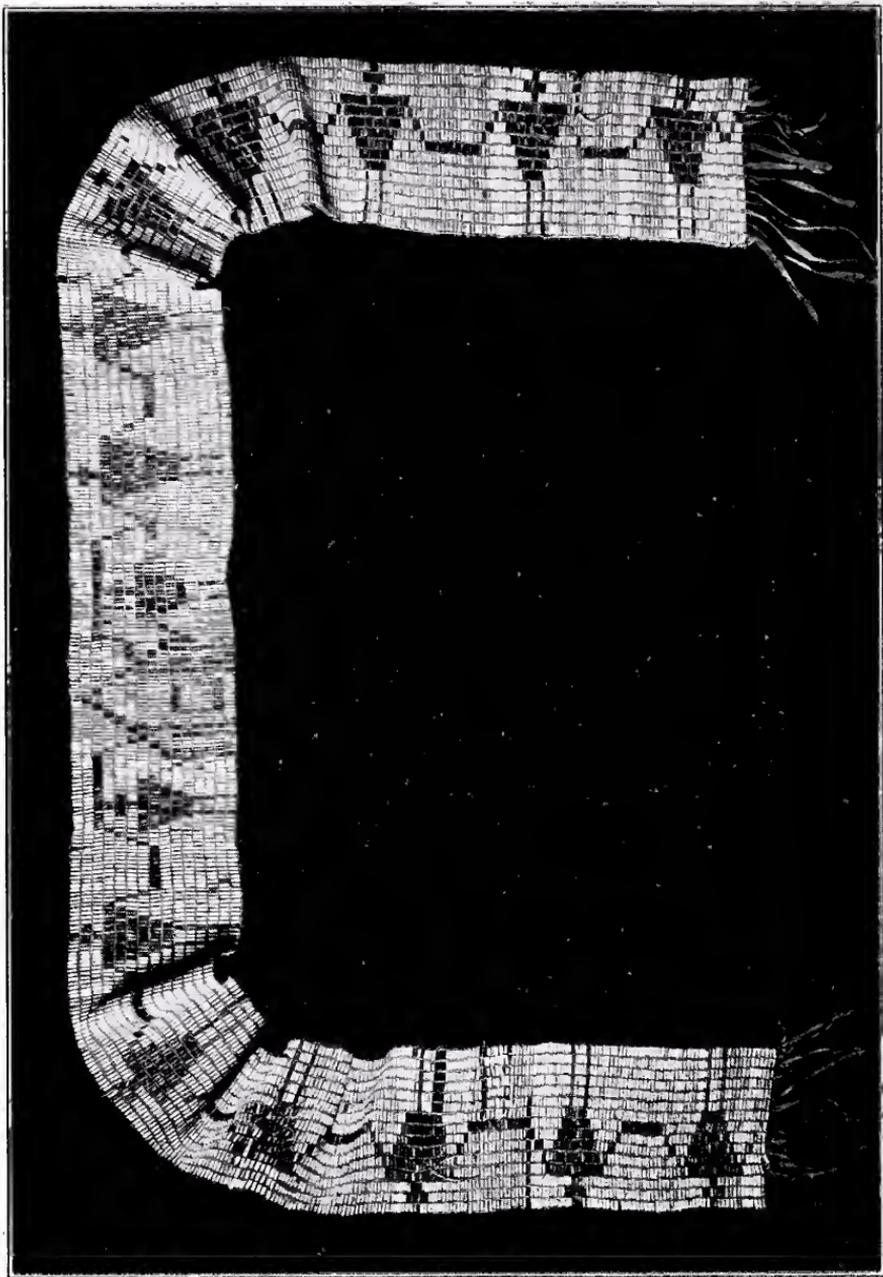


Figure 43 The Washington Covenant Belt. Used during the presidency of George Washington as a covenant of peace between the Thirteen Original Colonies and the Six Nations of the Iroquois. This is one of the finest examples of workmanship of this nature.

with headquarters at the State Museum. Through this organization earnest interest and study of New York State archeology has been aroused and encouraged to such an extent that several students have chosen the field of archeology as a life profession. The Board of Regents' appointment of the Archeologist as a member of the New York State Committee on Geographic Names aids the office in contributing to the public service of maintaining and supplying historical and appropriate names in geographical localities in the State. The extension service has also included the loan of exhibits to schools, churches, clubs, expositions, lecturers etc.

All of the above public service is in addition to the constant requests for information, through correspondence and personal callers to the office, on matters pertaining to the increasingly popular sciences of archeology and ethnology.

COLLECTIONS OF HISTORY, INDUSTRY AND ART

BY CHARLES C. ADAMS, *Director, State Museum, and*
WILLIAM L. LASSITER, *Temporary Curator of History*

(Figures 44-46)

Accomplishments

The accomplishments of the State Museum and its antecedents with regard to history, industry and art, distinct from the field of New York Indian ethnology and archeology, have been frankly not very creditable to the wealthy State of New York. The activities of the Museum have been devoted largely to the preservation, collecting, cataloging, recording and storing of these materials. The State Library and the State Historian's office, within the Education Department, are concerned with historical documents, and the State Museum with historical objects.

Limitations of help and space have permitted only the exhibition of small or temporary exhibits. These exhibits, however, have uniformly aroused keen public interest, which is prophetic of what might be reasonably expected, provided the State Museum had the facilities for the extension of such exhibits and collections.

The limitation of storage has been equally embarrassing in making it impossible to accept important donations.

The outstanding historic and art acquisitions may be roughly classified as belonging to the following groups:

Agricultural history. The agricultural history collection contains a series of soil samples, which were made by the Van Rensselaer-

Eaton soil survey of 1818, and represents the first important soil survey ever made in America. This is of unusual interest and importance.

There is a rather extensive and truly valuable collection of agricultural equipment, consisting of old plows of many kinds, mowing machines, hay rakes, corn shellers, agricultural tools and allied equipment, including dairy utensils and harness making.

Household history. Closely associated with the agriculture of the early days is an extensive series of household utensils related to the preparation of food and clothing, and to the simple home industries, such as looms, textiles, candle-making equipment, old coverlets, quilts and costumes.

Spanish War. The historic collections of the Museum contain only a very limited amount of material devoted to wars, other than the Spanish War. Rear Admiral Charles D. Sigsbee, who was in charge of the battleship "Maine" in Havana Harbor, was born in Albany. Through the donation of his friend, Mrs Nellie Garetson Milligan, the State Museum has received a very extensive and valuable collection of Sigsbee material, and of other Spanish War materials, including photographs, Sigsbee's sword and many other items of interest. The daughter of Rear Admiral William P. Potter, Miss Catharine Eights Boies Potter, has also donated a very valuable collection. Admiral Potter investigated the sinking of the "Maine" for the United States Navy. The Potter collection includes silverware by Isaac Hutton, an early and distinguished Albany silversmith, an heirloom in the Potter family.

Shaker Historical Collection. The industrial history of the Shakers is one of unusual interest. This religious sect with a definite economic and social system, which isolated it from the local community, through its unique cooperative organization, developed certain special industries, such as the manufacture of herbs, prepared and canned foods, chairs, brooms, and certain textiles, all on a larger scale than the common household industries of the time. Thus the Shakers became originators of mass production in the United States. The rise, culmination and decline of this sect, as it became assimilated by the community, illustrated an important aspect of the industrial history of this State. The Museum has the most extensive collection of Shaker objects in any museum (figure 44).

Medical history. The medical history collection, although small, is being built up by the active cooperation of physicians and surgeons who believe that the State should have such a collection. This series



Figure 44 Characteristic types of Shaker buildings at the Watervliet Shakers, near Albany, N. Y.

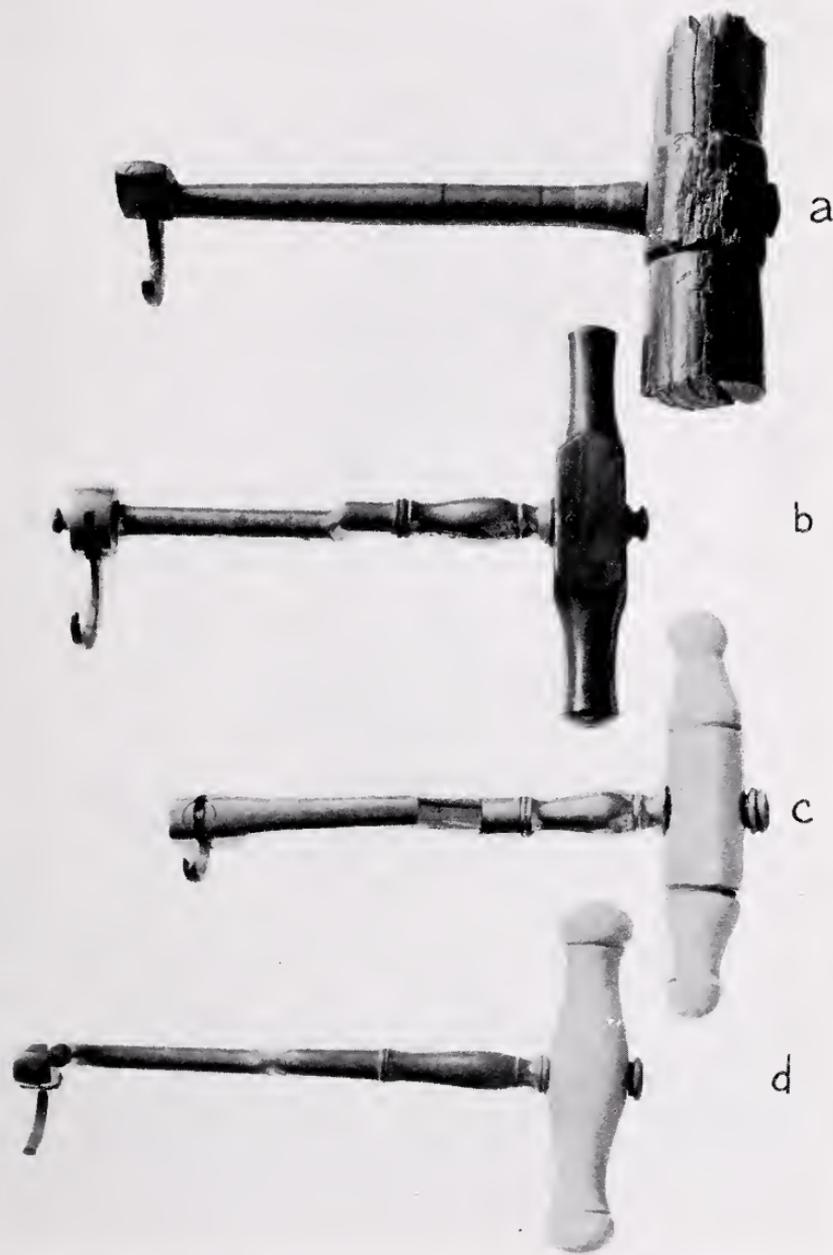


Figure 45 A series of turnkeys, used by early dentists for extracting teeth; *a* and *b* presented by Dr C. D. Van Alstine; *c* by Dr C. E. Allen, and *d*, by Dr L. S. Blatner. Medical History Collection.

FIGURE 46 SUPPLEMENTARY LEGEND

(By C A. Hartnagel)

The photograph shows a part of the original apparatus contrived and used by Joseph Henry (1799-1878) and his associate, Dr Philip Ten Eyck, in their experiments upon electromagnetism, in the Albany Academy, 1827-32, which resulted in the invention of the electric telegraph, wireless telegraphy and wireless telephony.

The two magnets shown were used by Henry in his experiments which led to the first discovery of induced currents.

The little bell was rung at the end of one mile of copper wire which circled the walls of one of the upper rooms of the Albany Academy. Through this wire the circuit from the battery at one end caused the magnet at the other to attract a swinging bar which struck the bell, sending forth a tinkle whose echoes are still resounding.

Gift of the late James Ten Eyck, Albany, N. Y.

Objects shown in photograph

Top left. Magnet attached to small battery. The outer copper plate is one piece entirely surrounding the inner plate.

Top center. Battery with nest of three circular copper plates.

Bell. This bell was rung by electricity at the Albany Academy.

Top right. Electromagnet. Both magnets shown are wound with double strand, rather coarse, white silk thread.

Below at right and left are two swinging bars seven inches long. Also a galvanometer or compass, needle and other small articles as horseshoe magnets, armatures and thin iron rods.

comprises medical equipment, catalogs, herbs (Shakers), physicians' equipment of various kinds and surgical instruments of considerable variety. This of course includes the field of dentistry, and also educational equipment for teaching medicine. Several interesting models of old friction electric machines are in this collection (figure 45).

Industrial arts. In the industrial arts a valuable collection of old stoneware has been secured. Examples of old glass include window glass, blown, pressed, and bottles. There is an extensive series of Shaker carpenters' and metal-working tools; shingle-making tools and coopery, with examples of churns, tubs, pails, barrels, firkins, and finally a representative series of basketry. There are good examples of coaches and sleighs. The drawings and photographs of Shaker buildings have special value. The Weeber automobile and various automobile parts form the nucleus of that series. Surveying instruments and allied scientific instruments, such as the laboratory equipment of Joseph Henry (figure 46) and microscopes and compasses, are included in this series. A substantial beginning has been made in securing materials to illustrate the history of photography; thus cameras, daguerreotypes, negatives, films, prints and studio equipment illustrate the character of this collection.

Historical arts. Lack of facilities to exhibit and store historical art has resulted in its being the least important part of the historical collection. The collection includes, however, paintings and drawings, glass, silver, jewelry, pewter, china and period furniture. Included also are water color drawings by J. W. Hill for the State Geological Survey of the Adirondacks in 1840, interesting pen and ink drawings by Professor Rufus A. Grider, the teacher and famous collector and illustrator of old powder horns, and oil paintings by T. B. Pope of early scenes along the Hudson. The State Museum should certainly have a representative collection illustrating the history of the fine arts in this State, if it is to truly represent the history of the State.

Public Services

As previously stated, the main services are the preservation, cataloging and storing of the collections. A special effort has been made to work toward a state policy for the preservation and administration of historic objects and materials in the same manner as local educational museums care for such exhibits.

Special temporary exhibits have for several years been prepared. These exhibits have necessarily been confined to smaller objects, but have stimulated a wide interest in historical and art objects and bring many inquiries to the Museum staff throughout the year.

CONCLUDING REMARKS

BY THE DIRECTOR

The outstanding accomplishments of the New York State Museum during the past 100 years have been the study of the natural and human resources of the State in relation to science, education and public welfare. This organization, as the State Geological and Natural History Survey, was the first scientific and fact-finding agency of the State Government. The results of its activity may be concisely summarized as follows:

1 "This [New York State Geological and Natural History Survey] led to an organization which has left a more lasting impression upon American geology than any that has followed or had preceded it. As fate ordained, the locality was one of the most favorable that could have been selected for working out the fundamental principles of stratigraphic geology; moreover, those appointed to do the work proved equal to the occasion. The New York Survey gave to American geology a nomenclature largely its own; it demonstrated above everything else the value of fossils for purposes of correlation, and incidentally it brought into prominence one man, James Hall, who was destined to become America's greatest paleontologist." Merrill, George P. *The First One Hundred Years of American Geology*, p. 187. 1924.

2 The sequence of certain Paleozoic formations, as worked out in New York State, has become the standard throughout the world, and has made even the early geological reports of unusual value today.

3 The numerous economic reports on limestone, clays, iron ore, salt, gypsum, oil, gas, building stones, water and similar mineral resources have laid a firm foundation for many important industries.

4 The main energies of the State Museum have gone into research or fact finding, in the general field of geology and paleontology, and in the publication of technical and popular publications within that field.

5 Through the activity of the early geologists, and their organization in Albany, the foundation was laid for what became the American Association for the Advancement of Science, the leading scientific society in America today.

6 The early natural history reports on the plants and animals of the State were the first important series of publications on these subjects in America.

7 The colored illustrated reports on birds and wild flowers set a new standard for popular educational reports. The State Museum

Handbooks made another advance in popularizing the natural history resources of the State, and particularly those of the state parks.

8 Dr Asa Fitch was the first state entomologist in America. Today there are hundreds of official entomologists in the United States and elsewhere.

9 Dr Charles H. Peck laid the foundation of our knowledge of fleshy fungi in America, a work that commands respect even today.

10 The exhibits of the State Museum have been outstanding in several respects; among them are the Iroquois Indian Groups, the restoration groups of the animals of the sea bottom of the geological past, the Indian Wampum collection, the fossil Gilboa forest group, and the exhibit of mushrooms and toadstools. The invertebrate fossil exhibit is distinctly outstanding, and possibly unexcelled. The other exhibits of birds, mammals, fish and insects and other invertebrates, although somewhat old, are good.

11 The extensive series of entomological reports on aquatic insects, including mosquitoes, forest and shade tree insects, plant galls and gall midges, are outstanding in their field.

12 The ethnological and archeological reports on New York Indians by Morgan, Beauchamp and Parker require special mention in that field.

13 That only a beginning has really been made in the field of history and art is a lamentable fact, considering that this is the outstanding State in the field of art. The State should have an adequate policy for scientific and historic sites, so that they would be conducted as branch museums, with all the advantages of modern museum administration.

Public Functions

1 The State Museum is the central scientific agency of the State Government, and is the central bureau of information on the natural history resources of the State, in the most general sense of the term.

2 It is the central state repository for scientific, historical and art objects, not otherwise provided for by specific law.

3 The exhibition halls of the State Museum provide a general public exposition of the natural and human resources of the State, and are regularly visited by about 200,000 visitors annually. In a single year more than 12,000 school children visited these halls from about 40 counties in the State.

4 The State Museum assists in providing a fact-finding foundation for certain educational policies, certain public policies regarding natural resources, and assistance to local county planning boards and also for state planning.

A Glance toward the Future

This summary should not be closed without reference being made to the outstanding requirements of the New York State Museum if in the future it is to serve the public adequately. These are:

1 A new modern building should be built and adapted exclusively for the New York State Museum, with offices, laboratories, exhibition halls and modern storage facilities.

2 An enlarged staff and increased funds are greatly needed for the scientific study of natural resources, thus providing a sound basis for public policies and planning. Endowment and trust funds are necessary in order to provide fluid funds. Special funds approximating a revolving fund, are also needed for publication. Provision should also be made for an adequate repository and exhibit of the history and art of the State.

3 Branch museums and research field stations are very desirable.

4 Facilities are needed for modern extension work with the schools and other organizations; for loan and traveling exhibits by automobile, bus and for local cooperative demonstrations.

5 The State Museum should have its own trustees, as is the case with the various state colleges, who will devote themselves energetically to building up the research and educational work of the State Museum.

REPORT ON GEOLOGICAL MAPPING OF SEDIMENTARY ROCKS (EXCLUSIVE OF GRENVILLE) AND GLACIAL AREAS IN NEW YORK STATE

BY WINIFRED GOLDRING Sc.D.

Assistant State Paleontologist

New York State Museum

(Figure 47)

I BRIEF HISTORY AND DESCRIPTION OF GEOLOGICAL MAPS

Geological mapping in New York State started in the early nineteenth century. The first geological map of New York was part of a *Map of the United States of America*, colored geologically, which accompanied Observations on the Geology of the United States by William McClure, 1809 (Amer. Philos. Soc. Trans., ser. 1, v. 6 (front); 54 x 45 cm; scale 1 in. to 76 m.). Various geological sections and geological maps of smaller areas were issued in the following years; and in 1842 Emmons, Vanuxem, Mather and Hall published a *Geologic Map of the State of New York*. This was a colored map published separately on the scale of 1 inch to 12 miles, measuring 92 x 99 cm. The making of geological maps and sections for limited areas continued. These include:

- 1 Geological Map of Clinton County (Emmons 1842)
- 2 Geological Map of Jefferson County (Emmons 1842)
- 3 Geological Map of New York or Manhattan Island (Cozzens, 1843)
- 4 Geological and Mineralogical Map of Part of Orange County (Mather, 1843)
- 5 Geological and Topographical Map of Onondaga County (Geddes, 1860)
- 6 Limestone Areas of Westchester County (Dana, 1880)
- 7 Limestone Areas of Dutchess, Westchester and Putnam Counties (Dana, 1880)
- 8 Geological Map of Richmond County, N. Y. (Britton, 1881)
- 9 Geological Map of Southern Westchester County and Northern New York Island (Dana, 1881)
- 10 Map of Greene County (Davis, 1884)
- 11 Map of Yates County (Wright, 1884)
- 12 Geological Map of Ontario County (Clarke, 1885)
- 13 Geologic Map of the Taconic Region (Dana, 1885)
- 14 Geological Map of Essex County (Hall, 1885)
- 15 Geological Map of New York City (Martin, 1888)
- 16 Region between the Taconic Range and the Hudson Valley (Dale, 1893)
- 17 Lake Champlain and Its Pleistocene Area (Baldwin, 1894)
- 18 Map of Southern Part of Kingston Region (Davis, 1894)
- 19 Geological Map of a Part of Southeastern New York (Merrill, 1895)
- 20 Geologic Map Showing the Distribution of the Portage Group, etc. (Clarke, 1897)

- 21 Geologic Map of a Part of Chenango and Cortland Counties (Clarke, 1897)
- 22 Map of Clinton County (Cushing, 1897)
- 23 Preliminary Geologic Map of Albany County (Darton, 1897)
- 24 Geological Map of Onondaga County (Luther, 1897)
- 25 Map of Central New York Showing Distribution of the Hamilton and Chemung Series (Prosser, 1897)
- 26 Geologic Map of Orange County (Ries, 1897)
- 27 Map Showing Glacial Geology of Western New York (Fairchild, 1898)
- 28 Geological Map of Franklin County (Cushing, 1899)
- 29 Map of Portion of Tarrytown and Ramapo quadrangles (Kümmel, 1899)
- 30 Geologic Map of Amsterdam quadrangle (Prosser, Cumings and Fisher, 1900)
- 31 Geological Maps of Portions of Clinton County (Cushing, 1901)
- 32 Pleistocene Maps of Western New York (Leverett and Taylor, 1901)
- 33 Pleistocene Map of Part of Dunkirk, Cherry Creek and Silver Creek quadrangles (Leverett, 1901)
- 34 Map of Portions of Albany and Rensselaer Counties (Ruedemann, 1901)
- 35 Geologic Map of Portions of St Lawrence and Jefferson Counties (Smyth, 1901)
- 36 Map of Oyster Bay and Hempstead quadrangles, Long Island (Woodworth, 1901; Pleistocene)

In addition to sectional maps and geological sections several geological and economic maps for the State as a whole were issued between the publication of the map of 1842 and 1901. These are:

- 1 Agricultural and Geologic Map of the State of New York. (Emmons, 1844; Same as "1842" map of the four geologists but contains the Taconic system)
- 2 New York State (Hall, 1882; a black and white map, scale 1 inch to 38 m., in report of Public Service of the State of New York)
- 3 Preliminary Geologic Map of New York (Hall, 1894; published separately; compiled by W. J. McGee and known as the McGee map)
- 4 Economic and Geologic Map of New York State. (Merrill, 1894; 1895 (2d ed.); scale 1 in. to 14 m.)
- 5 Map of New York State Showing Distribution of Rocks Useful for Road Material (Merrill, 1897)
- 6 A Relief and Geologic Map of New York State (Merrill, 1898; in color, 83 x 43 cm; scale 1 inch to 24 m.)

Between 1809 and 1901, there were published 235 geologic maps and sections pertaining to New York State, in whole or in part. These and later maps to 1908 are all listed by Dr Henry Leighton in his *Chronological List of Maps Showing Geology of New York State* (N. Y. State Mus. Bul. 133: 124-49; Fifth Report of the Director for 1908). In 1901, while Dr F. J. H. Merrill was State Geologist, there was published the *Geologic Map of New York State* on the scale of 5 miles to 1 inch. This map is in the form of an atlas of 12 separate sheets. It is still available but in need of revision, particularly in the Upper Devonian. In the early 1900's a few quadrangles were mapped under the direction of the United States Geological Survey and the results were published in the form of a monograph or folio of that Survey. Dr J. F. Kemp mapped the area

around Lake Placid and the region to the east, using the topographic map as a base (Mus. Bul. 21, 1898; Mus. Rep't 52 for 1898, 1900; and Dr H. B. Kummel mapped the Triassic rocks covering portions of Tarrytown and Ramapo quadrangles (Geol. Rep't for 1898, 1899; Mus. Rep. 52 for 1898, 1900). The first complete quadrangle map, published in 1900, was the *Geologic map of the Amsterdam quadrangle* (Mus. Bul. 34) by Prosser, Cumings and Fisher. Under the directorship of Dr John M. Clarke (1904-25) substantial progress was made in the detailed geologic mapping of the State, for which the base used was the topographic quadrangle on the scale of a mile to the inch issued by the United States Geological Survey. This work has been continued under the directorship of Dr Charles C. Adams (1926-) down to the present day with the result that about one-third of the whole State has been mapped, the larger portion of the quadrangles dealing with sedimentary rocks (exclusive of Grenville) in whole or in part. Each quadrangle map has been accompanied by a bulletin dealing in greater or less degree with the descriptive and structural geology, geological history, physiography, glacial geology and economic geology.

Geological maps show in black and white or in color the rock formations underlying the area studied and their relations. In the case of quadrangle mapping the rock formations are shown in color.

A certain color is by agreement used for each period and variations of this color with patterns are used for the different rock formations of each period. As far as possible this color scheme is used on the New York State quadrangle maps. Besides the rock formations in color may be shown, in black, fault lines, strike and dip, occurrence of ores and quarries. The geologic quadrangle map, of course, takes the name of the topographic sheet used as a base.

2 NEED OF GEOLOGICAL MAPS

The need for the completion of the geologic mapping of the State is emphasized by the constant demand from the public, in letters and in person, for information about the geology of certain areas. At present, for many areas, we can only refer to the generalized map for New York State, published in 1901 and much in need of revision, especially as regards the Upper Devonian, the few old county maps and studies of particular sections. Most of these older maps are out of print and the publications in which they appear available, if at all, only in the larger libraries.

3 VALUE OF GEOLOGICAL MAPPING

The value of the geological quadrangle maps with their accompanying bulletins can not be overemphasized. The accompanying bulletins now are required to cover not only descriptive and structural geology but the physiography, glacial geology and economic geology as well. They are useful in studies for water supply, in location of wells, for locating road-metals and building stone. They have been found very useful in soil studies and are invaluable where buildings are being put up in giving a knowledge of what is to be expected underground. Besides these uses they have a great cultural and educational value which is increasing rapidly with an aroused public interest.

4 STATUS OF GEOLOGICAL MAPPING

About one-third of the whole State has been mapped, the larger part of the mapping in areas underlain by sedimentary rocks. There are 258 quadrangles (35 in part) covering the area of the State of New York, 217 of which, in whole or in part, are underlain by sedimentary rocks. Of this number, 70 have been mapped and reports published upon the areas; 58 cover sedimentary rocks (exclusive of the Precambrian), 38 entirely and 20 in large or small part (see table 1). In addition 20 quadrangles have been covered for glacial geology (see table 2); 38 geological quadrangles are prepared or in preparation, all but four of them sedimentary in whole or in part (see table 7).

In monographs and folios the United States Geological Survey has covered for glacial deposits 13 and for rocks 15 New York State quadrangles (see tables 3, 4).

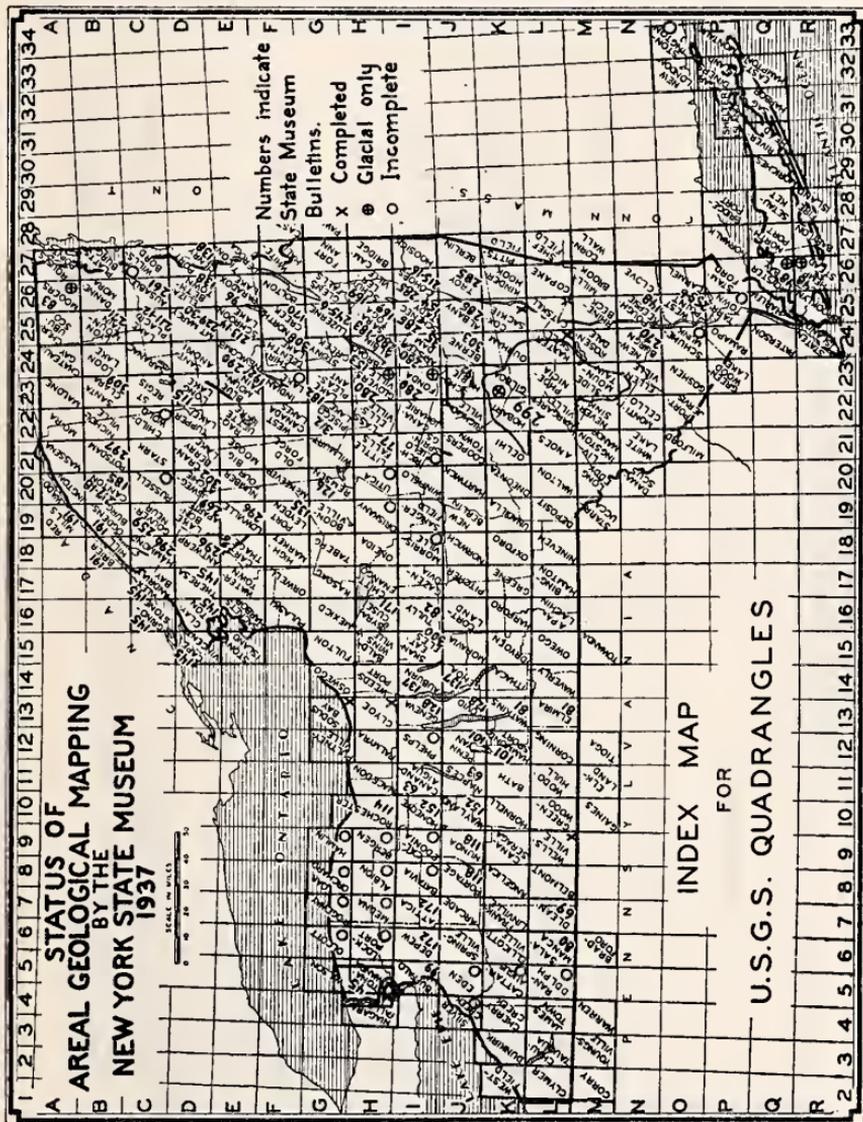


Figure 47 Map showing status of areal geological mapping of the State by the New York State Museum, 1937

TABLE I
New York State geological quadrangles: sedimentary rocks
Published by New York State Museum

YEAR	QUADRANGLE	BULLETIN NO.	AUTHOR	AVAILABILITY
1900	Amsterdam	34	C. S. Prosser, E. R. Cummings & W. L. Fisher	Out of print
1901	Parts of Wilson, Niagara Falls, Tonawanda — Niagara Falls and vicinity	45	A. W. Grabau	Out of print
1903	Olean	69 (in part)	L. C. Glenn & C. Butts	Out of print
1904	Canandaigua, Naples	63	J. M. Clarke & D. D. Luther	Out of print
1905	Little Falls ¹	77	H. P. Cushing	Out of print
1905	Salamanca	80 (in part)	L. C. Glenn & C. Butts	Out of print
1905	Watkins, Elmira	81	J. M. Clarke & D. D. Luther	Out of print
1905	Tully	82	J. M. Clarke & D. D. Luther	Out of print
1906	Schoharie (in part) — Schoharie valley	92	A. W. Grabau	Out of print
1906	Buffalo	99	D. D. Luther	Out of print
1906	Penn Yan, Hammondsport	101	D. D. Luther	Out of print
1907	Rochester, Ontario Beach	114	C. A. Hartnagel	Out of print
1908	Nunda, Portage	118	J. M. Clarke & D. D. Luther	Out of print
1909	Remsen ¹	126	W. J. Miller	Out of print
1909	Geneva, Ovid	128	D. D. Luther	Out of print
1910	Port Leyden ¹	135	W. J. Miller	Out of print
1910	Auburn, Genoa	137	D. D. Luther	Out of print
1910	Elizabethtown, ² Port Henry ²	138	D. D. Luther	Out of print
1910	Thousand Island Region ¹ — Alexandria Bay, ¹ Cape Vincent, ¹ Clayton, Grindstone, ² Theresa	145	J. F. Kemp & R. Ruedemann	Out of print
			H. P. Cushing, R. Ruedemann & C. H. Smyth	Out of print

1911.....	Poughkeepsie ¹	148	C. E. Gordon.....	Out of print
1911.....	Honeoye, Wayland.....	152	D. D. Luther.....	Out of print
1911.....	Broadalbin ¹	153	W. J. Miller.....	In print
1914.....	Saratoga Springs, ¹ Schuylerville ¹	169	H. P. Cushing & R. Ruedemann.....	In print
1914.....	Syracuse.....	171	T. C. Hopkins.....	Out of print
1914.....	Attica, Depew.....	172	D. D. Luther.....	In print
1916.....	Brier Hill, Ogdensburg, ¹ Red Mill.....	191	H. P. Cushing.....	In print
1920.....	Canton.....	217-18	G. H. Chadwick.....	In print
1921.....	West Point ²	225-26	C. P. Berkey & M. Rice.....	Out of print
1925.....	Gouverneur ²	259	H. P. Cushing & D. H. Newland.....	Out of print
1925.....	Ausable ²	261	J. F. Kemp & H. L. Alling.....	Out of print
1926.....	Newburgh ¹	270	F. Holzwasser.....	Out of print
1930.....	Albany, Cohoes, Troy, Schenectady.....	285	R. Ruedemann (Glacial ch. by J. H. Cook).....	In print
1934.....	Lowville ²	296 (in part)	R. Ruedemann.....	In print
1934.....	Potsdam ²	297	J. C. Reed.....	In print
1935.....	Skaneateles.....	300	Burnett Smith.....	In print
1935.....	Berne.....	303	W. Goldring (Glacial ch. by J. H. Cook).....	In print

¹ Sedimentary in large part.

² Sedimentary in small part.

TABLE 2
 New York State geological quadrangles: glacial deposits
 Published by New York State Museum

YEAR	QUADRANGLE	BULLETIN NO.	AUTHOR	AVAILABILITY
1901	Oyster Bay, Hempstead	48	J. B. Woodworth	Out of print
1905	Moore's	83	J. B. Woodworth	Out of print
1911	Schenectady	154	J. H. Stoller	Out of print
1916	Saratoga	183	J. H. Stoller	Out of print
1920	Cohoes	215-16	J. H. Stoller	In print
1929	Gloversville, Broadalbin, Fonda, Amsterdam	280	A. P. Brigham	In print
1935	Delhi (in part), Hobart (in part), Gilboa (largely), Durham (in part), Margaretville, Phoenicia, Kaaterskill (in part), Neversink (in part), Slide Mountain (largely), Rosendale (in part), Ellenville (in part)			
1935	Skaneateles (Cenozoic map accompanying geologic map)	299	J. L. Rich	In print
		300	Burnett Smith	In print

TABLE 3
New York State geological quadrangles: sedimentary rocks
Published by U. S. Geological Survey

PUBLICATION	YEAR	QUADRANGLE	AUTHOR
Folio 83 (in part) (New York).....	1902	Harlem, ¹ Staten Island, ¹ Brooklyn ²	F. J. H. Merrill and assistants
Folio 157 (in part) (Passaic).....	1908	Staten Island ¹	N. H. Darton, W. S. Bayley, R. D. Satisbury, H. B. Kummel
Folio 169 (Watkins Glen-Catatonk).....	1909	Watkins, Elmira, Ithaca, Waverly, Dryden, Owego, Harford, Apalachin.....	H. S. Williams, E. M. Kindle
Folio 190 (Niagara).....	1913	Wilson, Olcott, Tonawanda, Lockport.....	E. M. Kindle, F. B. Taylor

¹ Sedimentary in large part.
² Sedimentary in small part.

TABLE 4
New York State geological quadrangles: glacial deposits
Published by U. S. Geological Survey

PUBLICATION	YEAR	QUADRANGLE	AUTHOR
Monogr. 41.....	1901	Olean.....	F. Leverett
Monogr. 41.....	1901	Dunkirk, Cherry Creek, Silver Creek.....	F. Leverett
Folio 83 (New York).....	1902	Staten Island, Brooklyn, Harlem.....	R. D. Salisbury, C. E. Peel, H. B. Kimmel
Folio 157 (Passaic).....	1908	Staten Island.....	R. D. Salisbury, C. E. Peel, H. B. Kimmel
Folio 169 (Watkins Glen-Catatonk).....	1909	Watkins, Elmira, Ithaca, Waverly, Dryden, Owego, Harford, Apalachin.....	R. S. Tarr and assistants
Folio 190 (Niagara).....	1913	Wilson, Olcott, Tonawanda, Lockport.....	E. M. Kindle, F. B. Taylor

TABLE 5

Alphabetical list of all sedimentary quadrangles published

NAME	YEAR	PUBLICATION ²	NAME	YEAR	PUBLICATION ³
Albany	1930	Bul. 285	Nunda	1908	Bul. 118
Alexandria Bay ¹	1910	Bul. 145	Ogdensburg ¹	1916	Bul. 191
Amsterdam	1900	Bul. 34	Olcott	1913	U. S. G. S. Folio 190
Apalachin	1909	U. S. G. S. Folio 169	Olean	1903	Bul. 69
Atica	1914	Bul. 172	Ontario Beach	1907	Bul. 114
Auburn	1910	Bul. 137	Ovid	1909	Bul. 128
Ausable ²	1925	Bul. 261	Owego	1909	U. S. G. S. Folio 169
Berne	1935	Bul. 303	Penn Yan	1906	Bul. 101
Brier Hill	1916	Bul. 191	Portage	1908	Bul. 118
Broadalbin ¹	1911	Bul. 153	Port Henry ²	1910	Bul. 138
Brooklyn ²	1902	U. S. G. S. Folio 83	Port Leyden ¹	1910	Bul. 135
Buffalo	1906	Bul. 99	Potsdam ²	1934	Bul. 297
Canandaigua	1904	Bul. 63	Poughkeepsie ¹	1911	Bul. 148
Canton	1920	Bul. 217-18	Red Mill	1916	Bul. 191
Cape Vincent ¹	1910	Bul. 145	Remsen ¹	1909	Bul. 126
Clayton	1910	Bul. 145	Rochester	1907	Bul. 114
Cohoes	1930	Bul. 285	Salamanca	1905	Bul. 80
Depew	1914	Bul. 172	Saratoga Springs ¹	1914	Bul. 169
Dryden	1909	U. S. G. S. Folio 169	Schenectady	1930	Bul. 285
Elizabethtown ²	1910	Bul. 138	Schoharie (in part)	1906	Bul. 92
Elmira	1905	Bul. 81 &	Schuylerville ¹	1914	Bul. 169
Geneva	1909	U. S. G. S. Folio 169	Skaneateles	1935	Bul. 300
Genoa	1909	Bul. 128	Staten Island ¹	1902	U. S. G. S. Folios 83 & 157
Gouverneur ²	1910	Bul. 137	Syracuse	1908	Bul. 171
Grindstone ²	1925	Bul. 259	Theresa	1914	Bul. 145
Hammondsport	1910	Bul. 145	Tonawanda (in part)	1910	Bul. 145
Harford	1906	Bul. 101	Tonawanda	1901	Bul. 45
Harlem ¹	1909	U. S. G. S. Folio 169	Troy	1913	U. S. G. S. Folio 190
Honeoye	1902	U. S. G. S. Folio 83	Tully	1930	Bul. 285
Ithaca	1911	Bul. 152	Watkins	1905	Bul. 82
Little Falls ¹	1909	U. S. G. S. Folio 169	Waverly	1905	Bul. 81 &
Lockport	1903	Bul. 77	Wayland	1909	U. S. G. S. Folio 169
Lowville ²	1913	U. S. G. S. Folio 190	West Point ²	1909	U. S. G. S. Folio 169
Naples	1934	Bul. 296	Wilson (in part)	1911	Bul. 152
Newburgh ¹	1904	Bul. 63	Wilson	1921	Bul. 225-226
Niagara Falls (in part)	1926	Bul. 270	Wilson (in part)	1901	Bul. 45
	1901	Bul. 45	Wilson	1913	U. S. G. S. Folio 190

¹ Sedimentary in large part.

² Sedimentary in small part.

³ N. Y. State Museum publication, unless indicated as United States Geological Survey folio

TABLE 6
Alphabetical list of all glacial quadrangles published

NAME	YEAR	PUBLICATION ¹	NAME	YEAR	PUBLICATION ¹
Amsterdam.....	1929	Bul. 280	Lockport.....	1913	U. S. G. S. Folio 190
Apalachin.....	1909	U. S. G. S. Folio 169	Margaretville.....	1935	Bul. 299
Broadalbin.....	1929	Bul. 280	Moers.....	1905	Bul. 83
Brooklyn.....	1902	U. S. G. S. Folio 83	Neversink (in part)	1935	Bul. 299
Cherry Creek.....	1901	U. S. G. S. Monogr. 41	Olcott.....	1913	U. S. G. S. Folio 190
			Olean.....	1901	U. S. G. S. Monogr. 41
Cohoes.....	1920	Bul. 215-16	Owego.....	1909	U. S. G. S. Folio 169
Delhi (in part).....	1935	Bul. 299	Oyster Bay.....	1901	Bul. 48
Dryden.....	1909	U. S. G. S. Folio 169	Phoenicia.....	1935	Bul. 299
Dunkirk.....	1901	U. S. G. S. Monogr. 41	Rosendale (in part)	1935	Bul. 299
			Saratoga.....	1916	Bul. 183
Durham (in part).....	1935	Bul. 299	Schenectady.....	1911	Bul. 154
Ellenville (in part)	1935	Bul. 299	Silver Creek.....	1901	U. S. G. S. Monogr. 41
Elmira.....	1909	U. S. G. S. Folio 169			
Fonda.....	1929	Bul. 280	Skaneateles.....	1935	Bul. 300
Gilboa (large part)	1935	Bul. 299	Slide Mountain (large part)	1935	Bul. 299
Gloversville.....	1929	Bul. 280	Staten Island.....	1902	U. S. G. S. Folios 83, 157
Harford.....	1909	U. S. G. S. Folio 169			
Harlem.....	1902	U. S. G. S. Folio 83	Tonawanda.....	1908	U. S. G. S. Folio 190
Hempstead.....	1901	Bul. 48	Watkins.....	1913	U. S. G. S. Folio 169
Hobart (in part).....	1935	Bul. 299	Waverly.....	1909	U. S. G. S. Folio 169
Ithaca.....	1909	U. S. G. S. Folio 169	Wilson.....	1913	U. S. G. S. Folio 190
Kaaterskill (in part)	1935	Bul. 299			

¹ N. Y. State Museum publication, unless indicated as United States Geological Survey folio or monograph.

TABLE 7

Quadrangles prepared or in preparation by and under the supervision of
the New York State Museum

1 Albion	20 Medina
2 Batavia ¹	21 Morrisville
3 Bolton ³	22 Oak Orchard
4 Brockport	23 Olcott
5 Caledonia ¹	24 Oriskany
6 Catskill	25 Phelps
7 Cattaraugus	26 Randolph
8 Childwold ³	27 Richfield Springs ¹
9 Chittenango	28 Ridgeway
10 Clyde	29 Russell ^{1, 3}
11 Coxsackie	30 Silver Creek ¹
12 Eden ¹	31 Schunemunk
13 Fort Ann ²	32 Sodus Bay
14 Glens Falls ²	33 Tarrytown ²
15 Gloversville ^{1, 2}	34 Ticonderoga ²
16 Hamlin	35 Utica ²
17 Indian Lake ³	36 Wellsville
18 Kaaterskill	37 Whitehall ²
19 Lockport	38 Willsboro ²

¹ In need of revision.

² Sedimentary in part.

³ Precambrian and crystalline only.

NOTE. Certain quadrangles will appear as one bulletin, as follows: (1) Silver Creek-Eden; (2) Lockport, Olcott, Medina, Ridgeway; (3) Albion, Oak Orchard, Brockport, Hamlin; (4) Batavia, Caledonia; (5) Sodus Bay, Clyde; (6) Catskill, Kaaterskill; (7) Whitehall, Ticonderoga.

5 PROGRAM OF MAPPING

The geological mapping of the sedimentary quadrangles will be continued by the paleontological staff in cooperation with the colleges and universities and the Federal Survey. It is planned, when funds permit, to bring the New York State Geological Map (Merrill, 1901) up to date and republish it. Our goal is the completion of the geological mapping of the State, with revision of older maps in areas where there has been considerable revision of the formations. Mapping will be held up in certain areas, such as the western Upper Devonian, for the completion of faunal studies and correlations of the formations. This is now under way and advancing with gratifying rapidity.

GEOLOGICAL MAPPING OF NEW YORK STATE

THE PRECAMBRIAN FORMATIONS

BY D. H. NEWLAND Ph.D., *State Geologist*
New York State Museum

I DISTRIBUTION OF THE MAPPING

About one-fourth of the surface of New York State, roundly 12,000 square miles altogether, is occupied by very ancient rocks of the igneous and metamorphic groups that are collectively known as the Precambrian formations. The lack of any fossil remains or other specific features that serve readily to fix their order of occurrence and position in the geologic time scale is a circumstance that distinguishes them from the bedded or stratified formations of the subsequent Cambrian and later periods. They consist of a large assemblage of materials which originated under widely different conditions and which for the most part have undergone great changes since they were first formed. Hence, their study involves difficulties not found to a comparable extent in the sedimentary rocks.

There are two principal districts or geologic provinces in which the Precambrian formations predominate over the stratified series. These are the Adirondacks on the north and the Highlands in the southeast, the latter comprising parts of Orange, Rockland, Putnam and Westchester counties. The Adirondacks, of course, contain much the larger area, spreading over large parts of Essex, Clinton, Franklin, St Lawrence and Hamilton counties and occupying smaller areas in a number of others. Of the 258 quadrangles issued by the United States Geological Survey for the whole State a total of some 72 are occupied by the Precambrian formations, wholly or in part. The districts along the borders of the Adirondacks and Highlands, naturally, have representatives of both the Precambrian and the later sedimentary series.

2 HISTORICAL SKETCH

Geological study in New York State began in the early part of the 19th century. The early geologists gave very little attention to the Precambrian regions, which to them presented insoluble problems. Such investigations as were made in the Adirondacks were directed mainly to a few important mining districts. The rocks usually were all grouped together without classification under some general term like primary or hypogene, significant of their basal position with

respect to the sedimentary succession or their deep-seated origin. A few investigations attempted a rough grouping of important members by physical characteristics. Thus Mather (1842) and Emmons (1843) of the First Geological Survey designated certain representatives of the Precambrian group by specific names like granite, syenite and hypersthene rock, but did not attempt to map their extent or bounds in any detail.

It was not until 50 years later, in the 1890's, that the first steps were taken toward the exploration and study of the Precambrian regions on a more than local basis, and the principles were then gradually established on which to base conclusions as to the origin, relative age and structural relations of the constituent formations. This delayed progress may be explained by the inadequacy of facilities up to about that time to carry on research of the intricate problems involved in these rocks.

The initial maps prepared for the Adirondack region were in the nature of reconnaissance maps on a small scale, usually two or more miles to the inch. The base was the somewhat crude township and county map, the only one then available, which exhibited the principal cultural features but not the topography. They were necessarily inaccurate but represented the most important advance in the investigation of the Precambrian up to this time. Those town and county geological reconnaissance maps were issued between 1894 and 1902.

The next stage, which began about the opening of the present century, was to undertake geological mapping on the topographic base of a mile to the inch in conformity with the quadrangle sheets published by the United States Geological Survey. Such detailed mapping of the Precambrian has been carried on by the New York State Museum from 1904 to date as funds were available. Progress has been slow because of limited appropriations but on the whole has been continuous.

3 STATUS OF THE MAPPING

The first quadrangle map on the United States Geological Survey base of a mile to the inch (approximately) that covers some part of the Precambrian area was issued by the State Museum in 1905. The work started in the Adirondack region, for which altogether 36 quadrangles have been so far mapped geologically and described in bulletins. One quadrangle (West Point) in the Highlands region has been covered, making 37 quadrangles in all that have been surveyed and plotted geologically. A list of published maps and descriptive bulletins with the name of the responsible geologist and date of publication is given in the accompanying table.

Quadrangle maps of Precambrian formations

QUADRANGLE	BULLETIN NO.	YEAR	AUTHOR	AVAILABLE OR NOT
Little Falls	77	1905	H. P. Cushing	No
Paradox Lake	96	1905	I. H. Ogilvie	No
Long Lake	114	1907	H. P. Cushing	No
Remsen	126	1909	W. J. Miller	No
Port Leyden	135	1910	W. J. Miller	No
Elizabethtown and Port Henry	138	1910	J. F. Kemp	No
Alexandria Bay	145	1910	H. P. Cushing and others	No
Grindstone	145	1910	H. P. Cushing and others	No
Theresa	145	1910	H. P. Cushing and others	No
Poughkeepsie	148	1911	C. E. Gordon	No
Broadalbin	153	1911	W. J. Miller	Yes
Saratoga	169	1914	H. P. Cushing and R. Ruedemann	Yes
North Creek	170	1914	W. J. Miller	Yes
Lake Pleasant	182	1916	W. J. Miller	No
Canton	185	1916	J. C. Martin	Yes
Brier Hill	191	1916	H. P. Cushing	Yes
Ogdensburg	191	1916	H. P. Cushing	Yes
Blue Mountain	192	1917	W. J. Miller	Yes
Lake Placid	211-12	1918	W. J. Miller	Yes
Schroon Lake	213-14	1919	W. J. Miller	Yes
Mount Marcy	229-30	1921	J. F. Kemp	Yes
West Point	225-26	1921	C. P. Berkeley and Marion Rice	No
Lake Luzerne	245-46	1921	W. J. Miller	Yes
Gouverneur	259	1925	H. P. Cushing and D. H. Newland	No
Lake Bonaparte	269	1926	C. H. Smyth jr and A. F. Buddington	No
Lyon Mountain	271	1926	W. J. Miller	Yes
Newcomb	290	1932	R. Belk	Yes
Hammond	296	1934	A. F. Buddington	Yes
Antwerp	296	1934	A. F. Buddington	Yes
Lowville	296	1934	A. F. Buddington	Yes
Carthage	296	1934	A. F. Buddington	Yes
Potsdam	297	1934	J. C. Reed	Yes
Oswegatchie	302	1935	N. C. Dale	Yes
Thirteenth Lake	308	1937	M. H. Krieger	Yes
Santa Clara	309	1937	A. F. Buddington	Yes
Piseco Lake	312	1937	R. S. Cannon	Yes

About one-half of the series of quadrangles on which the Precambrian rocks occur have so far been covered by maps and reports. On this basis another 25 or 30 years is likely to elapse before the work is completed, that is, unless progress can be speeded up by additional funds. Under conditions as they have existed hitherto it has been only by the personal good will and interest of those engaged in the work that the undertaking has been advanced to the present stage. Most of the actual surveying has been performed by geologists connected with colleges and universities, and at small remuneration above the allowances for field expenses. It has been impracticable, therefore, to maintain an experienced personnel for this particular task from year to year.

4 NEED FOR GEOLOGICAL MAPS

The need for geological maps of the Precambrian areas is quite manifest by the continuing demand on the part of the public, for the information they alone supply. The earlier issued reports and maps, that is, those published before 1910, are already out of print, as well as some of the later ones. It happens that the Precambrian is practically coextensive with the more rugged mountainous areas which attract tourists and health-seekers from far and wide. Not a few of these desire information about the nature of local scenic features, uncommon rock types or mineral localities. Tourists interested in natural science, students from schools and colleges and the professional scientists—all make use of these maps.

There is furthermore the fundamental need of science which requires that the little known parts be explored for their possibilities of yielding information on obscure problems of earth history.

5 VALUE OF GEOLOGICAL MAPS

The value of geological maps in general is well understood and appreciated. For the regions under present consideration it may be said that there are positive results to be obtained by mapping that amply repay the outlay of labor and expense connected with the work. Valuable ores and mineral materials are present in both the Adirondacks and the Highlands. The geological map is indispensable to their proper development and exploration. Some of the mineral products of the Precambrian are ores of iron, zinc and lead, pyrite (valuable for its sulphur), feldspar, quartz, garnet, graphite and, of course, building and structural stone in great abundance. There are still untapped resources of minerals in the two areas.

Attention also may be called to the latent possibilities for water power that exist in the Adirondack region and the indispensable aid that is rendered by adequate geological maps in the selection of sites for such developments.

Quadrangles with Precambrian Unmapped

Lasellsville	Cranberry Lake
Wilmurt	Stark
Stony Creek	Childwold
Fort Ann	St Regis
Glens Falls	Saranac
Whitehall	Plattsburg
Bolton	Dannemora
Indian Lake	Loon Lake
West Canada Lakes	Nicholville
Old Forge	Malone
McKeever	Moira
Number Four	Chateaugay
Big Moose	Churubusco
Raquette Lake	Carmel
Ticonderoga	Stamford
Santanoni	Tarrytown
Tupper Lake	Ramapo

6 PROGRAM FOR MAPPING

The accompanying list gives the quadrangles that lie wholly or partly within the Precambrian and that remain unmapped.

It is desirable to complete the work as rapidly as possible. There are practical limitations, however, to progress in this field, and it seems hardly feasible to undertake the mapping of more than two or three quadrangles each year. One of the principal difficulties in the way of speeding up the work is that of securing a sufficiently trained and experienced staff to undertake the field investigations. With adequate financial support it would be feasible to maintain three or four parties in the field each year and to complete the survey of at least two quadrangles in a season. At that rate the program could be carried out in about 10 or 12 years, in view of the fact that a number of the quadrangles are on the border of the Adirondacks, partly without the range of the Precambrian formations.

ON AMERICAN MUSEUMS

BY RICHARD KRAÜSEL¹

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(Translated by Rudolf Ruedemann)*

In his travel-letter "Chikago" (Natur u. Museum 1930, 79) Professor Drevermann has given an illuminating description of the magnificent Field Museum, and all Senckenbergers will anxiously await further descriptions by the experienced Museum expert. They can then compare "theirs" with the American museums, of whose wealth and brilliant equipment so much has been heard. I too have become acquainted with some of these museums on the occasion of a journey, supported by the "Notgemeinschaft der Deutschen Wissenschaft," through the eastern United States and Canada. But I am no specialist and so faced them, except the one division of scientific interest to me, more or less as a layman. Just for that reason perhaps it is not without some interest if I also record my impressions while visiting these museums and begin my travel accounts therewith.

It may be emphasized at the beginning, however, that I am not in a position to give anything fairly complete. My sojourn was much too short for that. In spite of the great hospitality and courtesy I found everywhere, it sufficed mostly only for a hasty survey of large parts of the collections. Paleontology and botany are the fields nearest to me; of them I shall therefore speak more than of other fields.

Not everywhere are the museums such palaces as are the Field Museum in Chicago, the Carnegie Museum in Pittsburgh, the American Museum of Natural History in New York or the National Museum in Washington. The State Museum in Albany also is indeed a stately building; like the Field Museum, of classic Greek structure. But in this building, the "Education Building," are also housed numerous other departments; as we would say, in the "Kultusministerium." Once I lost my way and wandered into the division of nurses! Only the upper stories are reserved for the Museum. The beautiful building of the Victoria Museum in Ottawa, the capital of Canada, also houses the Geological Survey. In general often very dissimilar objects are housed in the same structure. In the

¹ Professor Kräusel is a noted paleobotanist.

great hall of the Field Museum, the splendid elephant group stands peacefully alongside Roman bathtubs. Or if one goes into the National Museum in Washington from the rotunda through a wrong door, one is suddenly surrounded by old spinets and rococo furniture, or one stands in a picture gallery. The attractive Peabody Museum of Yale University looks on the outside like a Gothic church, the steeple also being present; and I heard it called jokingly the Cathedral of the Holy Dinosaur. The ghost of lack of space, so well known to us at Frankfort, is also met over there. I do not know when the museum of the great McGill University in Montreal was erected. It is certain, however, that many of its rich treasures can not be exhibited effectively, due to overcrowding. The collections in part go back to Dawson, one of the fathers of Canadian geology. This is also true in regard to the unique collection of Devonian plant remains, through whose study Dawson laid the foundation of our knowledge of this old flora that is so exceedingly important for our knowledge of the phylogeny of the plants. To get acquainted with that collection would alone repay one for the far journey! Similar material is found in the museums of Ottawa and Toronto.

Nothing attracts the average visitor so much as the extinct gigantic animals of the past. World famous are the Cretaceous beds of the Canadian province of Alberta for the Saurian remains found in them, many of which are mounted in Toronto. Professor Parks showed me there, with pride, the treasures exhumed by him. Unfortunately the majority are still packed away in the cellar! What surprises may they hold! Some species have thus far become known only in one specimen. There are among others the unique Casuary saurian with its birdlike skull or the three-horned Chasmosaurian, whose head-shield runs far down the back. I can not judge whether the skeletons are correctly mounted in the museum at Ottawa, but I stood in wonder before them, together with numerous other visitors, who were proud to see here the results of native research work. One may recall the famous Asiatic collections of the American Museum of Natural History in New York; still more indeed would visitors be interested if they had before them finds made in their own country. That I learned also before the splendid Mastodon in New York as well as in the Peabody Museum of Yale University in the case of its turtle Archelon, that is three meters high, and the peculiar Morosaurus and Stegosaurus. This museum houses still another collection, that is found nowhere else in the world: the magnificent collection of mesozoic Cyadophytæ, which Professor

Wieland has assembled there. Trunks that are spherical and erect, small or large, sometimes several meters high, let us surmise the wealth of form of these plants that are so important for the phylogenetic history of the higher classes. The Senckenberg museum received one of these Bennettites trunks through the good offices of Professor Wieland. We have already (*Natur. u. Museum*, 1925:55, 311) mentioned this collection and figured one of the trunks, as well as the beautiful glass-model of the blossom in the Field Museum. These flowers are closely attached to the stem between the bases of the shed leaves. By far most of the specimens come from the Cretaceous rocks of North Dakota, where their most noted occurrences have been made into a "National Park" protected by law. This term commonly implies to us only the sometimes very large, protected areas, so well known by their beautiful scenery (for example, Yellowstone Park or Yosemite Park in the West), but the same term is also applied to the numerous "nature monuments" placed under legal protection. The number of these "nature parks" is very large both in Canada and in the United States, a fact that is often held up to us as worthy of imitation. It is, however, forgotten at the same time that the creation of such a protected area is incredibly easier in spacious America than with us, as mostly neither present settlement nor private property rights make any difficulties. Quite often one finds notable fossil localities among these parks. For instance, the state of West Virginia has placed under protection a place in the foothills of the Alleghenies, where plant and animal remains of the Upper Devonian are common. A somewhat different procedure I found followed by the State Museum in Albany. Probably no other museum except that at Washington holds an equally rich collection of Devonian fossils. That is not surprising, for the territory of that State is largely built up of the strata of that formation. Near Gilboa, about 150 kilometers west of Albany, in the steep slopes of a deep valley the soil of a Devonian forest has been uncovered, the trunks of which are still preserved in their upright position with radiating roots in the rock. The locality is no longer accessible, for today the valley contains a reservoir, which provides water for the City of New York, some hundreds of kilometers away. But at the foot of the gigantic dam there have been brought together a number of the trunks, and striking signboards invite the traveler not to pass by carelessly "the oldest forest of the world." Most of the finds, however, have been stored in the State Museum at Albany, where they occupy much space with the fossils from the rest of the State. They have not been content with simply

accumulating the material or even wearying the visitor with a superabundance of the exhibited material. We find here only selected specimens, which in themselves are very impressive. Who would not admire the goniatites from Cherry Valley, lying in multitudes on the slabs or the delicate starfishes from Mount Marion? In some places again the ancient crustaceans seem to return to life, in others the tender branches of the alga *Thamnocladus clarki* are spread out as on a carefully prepared herbarium sheet.

In many cases, it is true, the fossil fragments speak distinctly only to the expert. It has for that reason been denied altogether that such a museum can be a valuable educational institution for a larger public and it has been believed that the pedagogic aims sought by it can be more readily attained in other ways. The paleontologic division in Albany is, however, an excellent example for the claim that such a collection can be made amenable to general educational ends and therein can not be replaced by anything else. This purpose is for instance served by exhibits with the labels "What is a fossil?" or "What is a geologic formation?" Alongside the often very much distorted or broken fossils themselves is made the attempt at their restoration. That is not only true of single animals; but in various plastic groups made by artists it is even attempted to restore the life of the Devonian sea as a whole with its peculiar types of plants and animals. The propriety of such restorations has been acrimoniously disputed and occasionally criticized disparagingly. I can not agree with that. Just as the scientific study of the fossils should not be satisfied with a more or less careful description of the preserved fragments, but should see one of its principal ends in the restoration of the life-picture, so it is correct for a museum to proceed in a similar way. In both cases the restoration may be doubtful in details and later investigations may prove it wrong in one or another place. But that is no reason to reject them *a priori*. Like the written word, also the "reconstruction" can be only the expression of a knowledge that is temporarily limited, which has to be completed and perfected by the addition of something—let us placidly mention the horrid word—artistic imagination. It is obvious that thereby the facts must not be undervalued or violated.

Restorations are hence legitimate and necessary also in the exhibited collections. They are preferable to an exhibit, which I also saw, in which the skeletons of diluvial rapacious animals gnawed on the skeletons of their prey. I found a good restoration of a landscape of the Carboniferous period in the Peabody Museum at New

Haven; still more impressive will probably become the one in the Field Museum. I saw it only in the first stages of construction. There all parts (all plants are in natural size) were produced in the laboratory of the museum. One has no conception of how difficult this work is in detail; no wonder, therefore, that the very costly construction of such a group often takes several years. But especially with the plants of the distant past the trouble is well rewarded, for they are usually preserved only in fragments. Even their most beautiful arrangement, as I saw it for instance in Washington, can be supplemented to great advantage in this way.

In the zoological divisions of the museums the way here indicated has been already followed for some time. Every visitor to the Senckenberg Museum knows the beautiful arctic bird mountain. Similar animal groups I have seen in most American museums, in Albany as well as in Pittsburgh, in Washington or in New York. I liked very much in Chicago the representations of the same species in different seasons. In New York the deepest impression was made upon me by the not yet finished hall "Life of the Sea." In it is being built up a gigantic coral reef from the Bermuda Islands with all its colorful animal and plant life. The illusion is splendidly preserved in all details. The visitor looks from above upon the reef rising from the water; if, however, he walks up to it below, he imagines he stands on the bottom of the ocean and wanders in a charmed garden. In another place again he looks through an imitation of a gigantic magnifying lens upon the minute organisms of a pool. Between the confusion of copulating algal filaments swim besides delicate crustaceans the green forms of Desmidiaceae and the balls of Volvox; rotting masses of leaves on the bottom are covered with fungi; to the shoots of the water-plants are attached polyps and vorticellas—and all that with the finest details of the transparent bodies restored in glass! A few steps farther and the visitor stands before the objective of a gigantic microscope; the life of a drop of water opens before him. Here also all the delicate forms of variously shaped protozoans are made of glass.

Later I was to get acquainted with the use of the same material on a still larger scale. As is well known, it is hardly possible to prepare living plants so that they retain their natural form and color; at least attempts made in that direction here and there have not found any further distribution. Thus one usually stands in a botanical museum before withered, brown plant remains or bleached alcohol preparations, neither of them attractive. Also from the botanical museum in New York the average visitor will gladly turn to the

splendid greenhouses or the extensive botanical gardens. These are situated in the midst of the Bronx Park, whose natural rock groups exhibit all phenomena of former glaciation. Those other methods of conservation are, however, indispensable for science. A great advantage of the New York Museum is that here living and fossil plants are united in one section, in spite of its rarity the only proper way of arrangement. Large herbariums are also found in other museums, though not always in such magnificent installation as in the Field Museum. Reflecting steel cases harbor here one of the largest herbariums of the world. Professor Drevermann has already told us something about the further botanical collections of the Field Museum. Here too may be mentioned the division given up to the palms. They are usually absent in the collections, simply because the space does not permit it otherwise. In Chicago we find in large glass cases the representatives of the most important tropical groups of palms with their often gigantic leaves, inflorescences and fruits. Most beautiful, however, are the imitations of whole plants or flowering and fruit-bearing branches, which are made of wax and other material in their own laboratory in the museum. Models, as that of *Coussapoa guianensis* fill a whole large hall. Also the Carnegie Museum in Pittsburgh possesses splendid pieces of work of this kind.

Something equally beautiful I found again only in the botanical museum of Harvard University (Cambridge-Boston). In the entrance special signs point here to the collection of the "glass-flowers," which were donated by the heirs of a former Harvard student. In numerous glass cases lie here the imitations, made of colored glass, of more than 800 American species of plants, created in more than 30 years of work by the artistic hands of a German-Bohemian glass-blower family, Blaschka, father and son. I am indebted to the management of the museum for several hundred photographs of this unique collection, of the beauty of which the photographs can give but a very imperfect conception. It is obvious that these exhibition cases are always surrounded by a dense crowd of visitors. Repeatedly I made there the observation that this one or that one searched for "his" plants, that is, those of his home state. Also here it was shown how a museum collection can do more than satisfy the curiosity. The Field Museum possesses a special division of teaching models which are lent as traveling exhibits to the schools in city and country. In another division again it has united the most important plants of the state of Illinois. I am sure that in

most cases the aim that is sought is reached. The preference of the American, even of the city-dweller, for the life in the open is thus directed to occupation with the nature of his own country—of which everyone is proud! This end is also served by various publications of the museums and similar institutions. Where else can one buy for one dollar a book with 30 plates, as that of the Canadian government botanist on the higher fungi of Canada? (Günsow, H. T. and Odell, W. S., *Mushrooms and Toadstools. An Account of the more Common Edible and Poisonous Fungi of Canada*, Ottawa, 1927.) Inexpensive also is the description of the wild flowers of New York with its 270 splendid colored plates brought out by the State Museum in Albany. Through the manner of their distribution such works frequently reach groups which with us find it utterly impossible to acquire similar books.

Of course there also is left still much to be done. As America is the country of superlatives, so it is probably also superlative here and there in the field of destruction and defacing of nature. I am thinking here of the enormous forest destruction, which can not be even excused by the semblance of right through progressive technic and civilization. Thus also the efforts of the "Wild Flower Preservation Society of America" become understandable. Starting in quite a small way, it has spread today over the whole United States, a flourishing growth that above all is due to the work of a woman, the wife of the former director of the Botanical Garden in New York. The separate exhibit of this society in this museum gives an insight into its far-reaching activity, by which it tries to reach grown people as well as school children. Some of this activity seems strange to us; for instance, when it makes use of the children's ambition for its cause by a system of premiums and badges, or demands from the members (annual fee 50 cents=2 M.) at their initiation a solemn promise:

I promise

- To protect our native plants
- Not to destroy rare flowers and ferns
- Not to injure any shrub or tree and
- Not to set fire to the fields or woods.

One must not forget, however, that hereby American people are to be reached, who differ from us in many ways. This is also shown by the pamphlets of the society, which aim to reach this end in the style of American comic sheets by grotesque exaggeration. They

probably would not be accepted by a German journal for nature protection, but in America the success speaks for this mode of propaganda.

Much more could be said about the American museums and what is connected with them. The ethnological divisions, which everywhere occupy large space, remain totally unmentioned. Above all it is the Indian life that is preserved in numerous, often very beautiful groups. Splendid pieces of old Indian industry, art and architecture are here brought together as in general the interest of the white American in the history of the "red gentleman" has grown in proportion to the gradual disappearance of the primitive life of the dwindling race of Indians in their own country. A significant monument of a vanished culture in Washington is the gigantic stone-picture from Easter island, situated lonesomely in the Pacific ocean, that like another sphinx gives us knowledge of men who have left no traces.

Herewith I close my hasty review. Of some things I did not speak intentionally; others may have remained unnoticed or may have been misinterpreted. My final word may be again my thanks to all who met the foreign visitor to their museums with his many wishes and requests always helpfully and thereby made his visit a success.

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