State of Connecticut

PUBLIC DOCUMENT NO. 47

TWENTY-THIRD BIENNIAL REPORT
OF THE COMMISSIONERS OF THE

STATE GEOLOGICAL AND NATURAL HISTORY SURVEY

EDWARD L. TROXELL, Ph.D., Director

Bulletin No. 72

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State Geological and Natural History Survey of Connecticut

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State Comptroller

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Twenty-third Biennial Report of the Commissioners

OF THE

State Geological and Natural History Survey

1947-1948

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LETTER OF TRANSMITTAL

Hartford, Connecticut

January 24, 1949

His Excellency, Chester A. Bowles,
Govenor of Connecticut
Hartford, Connecticut

Sir:

I have the honor to transmit to you herewith on behalf of the Commissioners of the State Geological and Natural History Survey for the General Assembly, in compliance with past custom, the twenty-third biennial report of the Survey, covering the two years ending December 31, 1948.

Respectfully submitted,

EDWARD L. TROXELL,
Director.

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TWENTY-THIRD BIENNIAL REPORT OF THE GEOLOGICAL AND NATURAL HISTORY SURVEY OF CONNECTICUT

EDWARD L. TROXELL, Ph.D., *Director*

INTRODUCTION

Personnel Of The Survey:

With the exception of His Excellency, Governor Bowles, who serves as Commissioner, *Ex Officio*, the Connecticut Geological and Natural History Survey has the same commissioners who were appointed to office in 1946 and whose professional standings were sketched in the last biennial report, Bulletin 71, published two years ago. It is worthy of note that Commissioner Chester R. Longwell, Professor of Geology in Yale University, was elected President of the Geological Society of America for 1949, an honor without peer in the geological fraternity of the western world.

The Director, Dr. Edward L. Troxell, Professor of Geology in Trinity College, serves the State on a part-time basis for a modest stipend. All Survey records are kept in his college office, relieving the State of any housing expenses for the operations of the Survey office. The Commissioners, who plan and direct the professional work, serve without compensation. Such professional specialists as may be required are retained for brief, temporary periods, being paid on a piece-work basis or actual expenses for research performed (See Appendix A).

Functions Of The Survey:

The Survey is charged with examination of all geological and natural history resources of the State and with making these data available to the public by publication and distribution of such maps, reports and bulletins "*As Science May Demand*". In actual practice the distribution and sale of published reports is handled by James Brewster, State Librarian, acting as Distribution and Exchange Agent for the Survey.

The major purposes of the Survey may be classified as (1) *Purely Scientific*, (2) *Economic* and (3) *Educational*. Under "purely scientific" might be included the preparation of detailed areal geologic maps, the geochemistry of a given igneous rock formation or research on animals and plants of the State, including archaeological studies. Examples of purely economic research would include reports on available quantities (with quality and costs correlated) of concrete aggregate, clays, mica, beryl or other minerals.

Pure and Applied Scientific Research:

The public is prone to consider scientists as mental doodlers or impractical dreamers working in ivory towers insulated from the real world of dollars and cents. In most branches of natural history, it is difficult to separate *Pure* science from economic or *Applied* science. Indeed, one may innocently be transformed to the other by force of circumstances. Two excellent examples of this occurred within our own commission's experience. Nearly twenty years ago Commissioner Lucke studied the Barnegat Inlet shoreline of New Jersey and Commissioner Peoples the Stillwater area of southern Montana as pure research projects while in graduate school. Years later the New Jersey report formed a basis for a half-million dollar harbor erosion control project by the U. S. Army Corps of Engineers. From the Montana study sprang a multi-million dollar chromite mining project of the Federal Govenment early in World War II.

Massachusetts has recently been spending large sums, in cooperation with the Federal Government, to prepare areal geologic maps, quadrangle by quadrangle. Of high scientific interest though they be, these maps are proving of incalculable value to that state in public works projects such as highways, bridges, and water supply.

Educational Functions:

The Director's office serves as a clearing house for scientific data. Specimens are continually sent in for identification. Inquiries of all sorts are answered either personally or by mail. The Survey is now (see below under "Immediate Plans") preparing boxed suites of rocks and minerals to be made available to schools, in answer to repeated requests. It is also planning educational highway signs to give historical or scientific sketches at points of wide scenic interest. The greatest educational contribution the Survey can make is by publication of appropriate bulletins, guidebooks and circulars. In order to carry out this long-overdue function it must have regular publication funds administered by the Director of the Survey.

ACCOMPLISHMENTS OF THE 1947-48 BIENNIUM

Publications:

The Survey has published three bulletins during the past two years. Bulletin No. 69 on the *Asilidae*, more popularly known as the robber flies, is a work of 50 pages with 31 figures and plates by Dr. Stanley W. Bromley. The report describes the biology, food habits, ecology and taxonomy of these interesting insects, together with particulars of the Connecticut species, the collecting and preserving of specimens and keys to the various life stages of this type of fly.

Bulletin No. 70, *Spiders Of Connecticut*, is a monumental work of 874 pages, including 144 photographic plates and drawings by Dr. Benjamin J. Kaston. This treatise will be of interest the world over and will be one of the very important reference works on this group of animals.

Although largely concerned with classification of native spiders, the first fifty pages deal with other aspects of the group, such as economic importance and natural history.

Bulletin No. 71 is the 22nd Biennial Report of the Commissioners of the Geological and Natural History Survey, prepared by Dr. Edward L. Troxell, Director.

The present report, Bulletin No. 72, is the joint work of the Commissioners making it, for the first time, a report "of the Commissioners" in fact and not in theory.

Research Pursued — Geologic:

Miss Janet M. Aitken, Assistant Professor of Geology at the University of Connecticut, completed her report on the geology of the *Hebron Gneiss* in the Bolton, Columbia, Willimantic area in May, 1948, as her dissertation for the Ph.D. degree at The Johns Hopkins University.

The late Professor W. G. Foye of Wesleyan University left valuable maps, notes and manuscripts on the *Geology Of The Eastern Highlands Of Connecticut.* The Survey has prevailed upon Professor Adolph Knopf of Yale University to revise and edit these data in a form suitable for publication, and this is now completed.

Dr. W. M. Agar had studied the geology of the western highlands of Connecticut for years previous to the late war but is now no longer active. The Survey encouraged Dr. Eugene Cameron of the University of Wisconsin (formerly of Columbia University) to salvage Agar's unpublished work and to enlarge the area mapped. Dr. Cameron has been particularly concerned with the detailed geology of the *Mt. Prospect Area*, the manuscript for which should be ready for publication in the early spring of 1949.

Working with Dr. Cameron, and under his supervision, Robert M. Gates was retained to decipher the geology of the *Woodbury Granite*, west of Watertown. A preliminary report has been received, and the complete manuscript will be ready by June, 1949.

Dr. Cameron is using these new studies, plus Agar's older data and any other reliable information he can find to compile a revised *Geologic Map Of The Western Highlands Of Connecticut* for the Survey. This will fill a sore need and should be completed and ready for the lithographer in 1949.

Mr. Ralph Digman, now Instructor of Geology at Syracuse University (formerly at Wesleyan University) has pushed almost to completion his geologic studies of the *Guilford* (15 minute) *Quadrangle* for his doctoral dissertation at Syracuse University. The report and map will be readied for publication and submitted to the Survey in 1949.

Mr. Charles B. Sclar, graduate student in geology at Yale University, has had survey support in his field work on the geology of the *Preston Gabbro* which should be completed in the spring of 1949 as his doctoral

dissertation. The final report should be published by the Survey as a bulletin of wide scientific and possibly of considerable economic importance.

Bulletin 51 on the "*Minerals Of Connecticut*" promptly went out of print, so great was the demand for it. At the Survey's request Dr. Horace Winchell of Yale University has been engaged in rewriting this work and bringing up-to-date a new bulletin on the minerals of Connecticut for which we have received many requests.

Research Pursued — Biologic:

Dr. Charles T. Berry of the University of Connecticut has undertaken a study of the marine mollusks along our shores and intends to extend this investigation to include all the land and fresh water forms. A more or less popular guide or handbook to these clams, oysters, and their relatives, intended to have a wide interest as well as value for those who visit the shore or follow this phase of zoology as a hobby, is in preparation.

During the past two years the Survey has given some financial support to the chestnut breeding project which is being carried on by Dr. Arthur H. Graves at Mount Carmel. The purpose of this project is to combine the disease-resistant qualities of the oriental chestnuts with the valuable timber and nut characteristics of our now nearly extinct native chestnut. This investigation was initiated many years ago, but because of the necessity of waiting years for a tree to reach reproductive age, progress is necessarily slow. Dr. Graves reports that some of his hybrid trees appear to be quite resistant to the chestnut blight and give promise of forming good timber, but much more work must be done before a true breeding tree can be successfully introduced into our woodlands.

With this thought in mind, the Commissioners of the Survey have helped to bring about a long-range agreement between Dr. Graves and the Connecticut Agricultural Experiment Station which is working out to mutual advantage for both parties. This agreement insures that the work on this project will continue when Dr. Graves is no longer able to take an active part in the project and that Dr. Graves' scientific data and the trees in his plantations will be available to the workers at the Experiment Station.

Under the direction of Commissioner Richard H. Goodwin of Connecticut College, Mr. Kaleb P. Jansson is collecting and labelling woody plants of the State for the Connecticut Arboretum at New London. Trees and shrubs in the Arboretum are being marked with zinc tags giving the scientific and common names. Many native plants have already been gathered and successfully established. One especial group, the genus *Rubus* — the brambles, blackberries, and raspberries — now includes over sixty species. A cytological study of this material has been planned by Dr. Katherine Heinig. A list of all the species of woody plants in the Arboretum is now in preparation.

The Yale Conference:

It became apparent early in the last biennium that some unified long-range program of mapping and geologic research was needed, over and above the worth-while local projects which had engaged our attention in the past. At the instance of Commissioner Goodwin the entire Commission and the Yale University Department of Geology jointly sponsored a conference at Yale on May 8th, 1948. All who were apt to have real interest in the geology of Connecticut were invited and fifty-four registered as delegates. The purpose was to (1) review the geology of Connecticut, (2) to clarify ideas on the outstanding problems and how to attack them, and (3) to lay the groundwork for a program which would result in a revised modern bulletin and an adequate map of the geology of the State of Connecticut. The day-long conference discussed the following topics under the leadership indicated:

Historical Summary of Geologic Work in Connecticut, COMMISSIONER LONGWELL (presiding);

Role of the State Survey in Promoting a Program of Geologic Study, DIRECTOR TROXELL;

Bedrock Problems of Western Connecticut, DR. E. N. CAMERON, University of Wisconsin;

Problems of Granitic Intrusives, as illustrated by the *Stony Creek Granite Gneiss*, DR. HARRY MIKAMI, E. J. Lavino & Co.;

Glacial Problems of Connecticut, DR. RICHARD FOSTER FLINT, Yale University;

Bedrock Problems of Eastern Connecticut, DR. ADOLPH KNOPF, Yale University and COMMISSIONER PEOPLES;

Problems Common to Connecticut and Massachusetts, DR. L. W. CURRIER, U. S. Geological Survey; and

Status of Topographic Mapping in Connecticut, COMMISSIONER HUGHES.

This highly informative conference, attended by distinguished experts from New England, adjacent states and points as distant as Washington, D.C., and Madison, Wisconsin, enabled the Survey Commission to lay well-advised plans (see below) with the highest expectations that the greatest benefits will accrue to the people of Connecticut. The meeting culminated in passage of the following minute:

(a) Resolved: That the consensus of this meeting be hereby recorded, to the effect that geological mapping of the State of Connecticut, including bedrock and surficial deposits, on U.S.G.S. topographic base-maps of 7½-minute quadrangles, scale 1:31,680, should be prosecuted quadrangle by quadrangle, with all possible dispatch, and

(b) Resolved: That the importance of publishing reports, with adequate maps, is hereby recognized, and that we urge all possible effort to obtain funds necessary to publish such reports now completed, or to be completed in future, on the geology of Connecticut, and

(c) Resolved: That we urge replacement, as soon as possible, of the present topographic maps in the southwestern part of Connecticut on the scale 1:25,000, with new U.S.G.S. 7½-minute quadrangle maps, scale 1:31,680, and 10-foot contour interval.

GEOLOGICAL AND NATURAL HISTORY SURVEY PLANS

The Commission has reviewed its legal and scientific obligations to the State with deliberate care over the past biennium, the first in which it has existed as a working body of public-spirited scientists. Tentative long-range and immediate goals have been set, progress toward which will either revivify the Survey as a going concern in accordance with Statutes, or demote it to a moribund State appendage resting largely upon past glories in any review of accomplishments, or public service.

A. LONG-RANGE PLANS

1. Publication Program of the Survey.

In common sense as well as State law, it is unthinkable that the Survey should support worthy research projects with no sure means of publishing and distributing the results thereof. Hitherto the Survey has had to beg, on bended knee, for monies from the General Publication Fund, for the publication of its reports. In the coming biennium, for the first time, we initiate regular requests for a continuing Survey Publication Fund, to be administered by the Director, beginning with $10,000. This sum is far insufficient to publish the "ready to publish" manuscripts (see Appendix) in our files, but it is not deemed wise to attempt to wipe out our entire backlog at one stroke, especially in view of today's inflated printing costs.

It is eminently proper to emphasize that the newly requested regular Survey Publication Fund is not, in any way, an added expense to the State. The above-described Bulletin No. 70 on the "Spiders of Connecticut" cost about $9,000 to publish. To be sure, few of our bulletins would be that expensive, but if the Survey is to meet its commitments with respect to publications, it must be able to plan *far in advance*, for a regular flow of publications, data for which have already been bought by the State, in accord with the Statutes, at a cost, incidentally, which is pathetically low *only* because our contributing scientific experts place their services at our disposal for bare expenses, *in the expectation* that their reports will be published promptly with the well-recognized imprimatur of the Connecticut Geological and Natural History Survey upon them. This is their just right.

2. Topographic Maps of Connecticut

Thanks largely to World War II, the State of Connecticut has been two-thirds remapped topographically by the U. S. Geological Survey, in cooperation with the War Department. The new maps, covering the eastern and central part of the State, total 52 quadrangles on a scale of 1/31,680 (about: one half mile equals one inch) and with ten-foot contour lines. These maps are *superb*, cost Connecticut nothing, and are already in widespread use by public works officials, city and zoning planners, water supply experts, geologists, geographers, foresters, and educators of all grades. Some twenty additional quadrangles of the northwestern part of the State need only editing and reproduction to be available to the public. Unfortunately, about 1,300 square miles of the southwest part of the State, bordering Long Island Sound, were mapped by a private firm for the War Department, issued by the Army Map Service. These maps have only 20-foot contours, are in general much too generalized to be put in a class with modern maps. For efficiency, this area must be remapped to conform to U.S.G.S. standards.

The principal uses to which accurate topographic maps are adapted include:

(a) bases for geologic mapping since both bedrock and surficial geology are intimately reflected in the texture or form of the land's surface and drainage patterns;

(b) bases for planning and zoning with especial application to power utilization and public works;

(c) study of water supply problems;

(d) aids to wholesale and retail marketers who cover large areas or all of the State (every rural house is accurately located, except those built within the past one-four years);

(e) educational purposes, particularly secondary and higher education.

The Survey is bending every effort to effect completion of the State on the new modern basis, also to establish a regular schedule for revising the culture (man made works) on such maps at periodic intervals in the future, following the excellent example set by Massachusetts.

3. Geologic Mapping of Connecticut

Local maps of bedrock and surficial geology are essential for any highly developed civilized area. From them can be compiled a geologic map of the entire State. The last such map made was in 1906, was frankly labelled "provisional", and has been out of print so long it is virtually a collector's item. Ideally the map of the whole State should be based upon detailed maps of the individual quadrangles and, because of obsolescence, should be completed in a period of not over twenty years.

The Commissioners have reviewed three methods of completing such a "twenty-year" plan:

1. By use of trained geologists from our colleges and universities, including graduate students working on theses;

2. By cooperative agreement with the Federal Geological Survey under terms of which the Federal Survey would furnish all the necessary personnel and meet half the expenses;

3. By hiring trained personnel by the State of Connecticut.

The third method would seem to involve a prohibitive cost to Connecticut. Plan 2 seems most efficient and feasible, perhaps with the aid of plan No. 1 where possible. Both Massachusetts and Rhode Island now have cooperative agreements with the U. S. Geological Survey. It is recommended that the Connecticut Survey, enlisting aid from all other agencies of the State concerned, take appropriate steps to arrange a similar agreement between the State and the Federal Government so that the mapping program be initiated in the present biennium to be pursued at a rate of not less than ten quadrangle maps (five geologic and five surficial) per year until the whole state is mapped, in accordance with the resolution (a) passed at the Yale Conference.

B. IMMEDIATE PLANS

1. Publication of Completed Maps and Manuscripts.

In general, the Survey favors a policy of publishing our many excellent completed manuscripts (see Appendix) in order of priority of date submitted. However, exception should be made in those cases where it would prove highly beneficial scientifically and financially, to the fruition of our Long-Range Plans. The works of Cameron, Foye and Gates previously cited all include geologic maps, as does Krynine's "Geology of the Connecticut Valley". Prompt publication of these studies and maps will be a long step forward towards a new geologic map of the State. They are therefore assigned top priority in the publishing plan of the Survey for the new biennium.

2. Project Analysis of New Researches.

Heretofore the Survey has farmed out research projects in a completely informal way, each case being handled personally by the Director who used his best judgment in the absence of any established rules. Beginning in 1949, the Commission has adopted a formal analysis sheet to guide progress of new research, which all professional specialists will fill out for the information of the Commission. It includes such data as: objectives and purpose of the project, personnel (itemized with qualifications of each), estimated cost itemized by fiscal years, estimated date of completion, supervisor, whether or not he is a member of the Commission.

3. Biologic Studies.

The Survey will continue its support of the botanical work at the Connecticut Arboretum and the study of mollusks by Dr. Charles T. Berry of the University of Connecticut. All biologic work is directly supervised by Commissioner Goodwin. Thus far, biologic studies have not lent themselves to a long-range plan such as that outlined for the mapping of the State.

4. Educational Service.

The suites of 36 common minerals and rocks of Connecticut have been collected and labelled. As soon as the explanatory manual can be printed, these will be made available to schools and other educational groups as a public service, for a modest handling and packaging charge of one dollar for the specimens and manual.

5. Information Service.

As in the past, the Survey stands ready to serve the people of Connecticut in any purely informational capacity. Questions relative to minerals (particularly economic deposits), animals and plants of Connecticut are invited. In the absence of any full time staff or laboratory supported by the State to perform Survey functions, the Director may refer elaborate questions to private sources, but he will either provide the answer or refer the questioner to a reliable source. The Survey is *not*, however, permitted to offer free consulting service at State expense. Questions, for example, as to the value of a private mineral deposit, or advice on location of a water well, will be politely rejected as improper and beyond the functions of this agency.

The Commissioners especially invite inquiries leading towards closer cooperation between the Geological and Natural History Survey and other State agencies. In the past, the Survey has enjoyed collaboration with the Development Commission, Agricultural Experiment Stations, Highway and Education Departments, among others. Modern science and its applications are increasingly complex. Many problems of Public Service which seem insurmountable to a single agency may become easy of solution by broad cooperative efforts — leading to better service to the State.

FUTURE OF THE SURVEY

The Commissioners of the Geological and Natural History Survey are sensible of the honor of that office. However, being active, conscientious scientists, they are vastly more sensible of the duties and responsibilities of the office. They would be derelict in their duties if they did not report here that the Survey is sinking to a low ebb under present budgetary restrictions. The Survey can no more perform its legal functions with no control over publications than can modern war be waged without petroleum. The Commissioners consider it futile and wasteful to continue to support worthy research projects if the Survey is denied the means to make the data available to the citizens of Connecticut and the world by prompt publication. They believe that the very life of the Survey depends upon transferring funds hitherto in the General Publication Fund to a regular Survey Publication Fund, to be administered by the Director and the Commission.

If this recommendation becomes accepted as a regular procedure the Survey has a real opportunity to serve Connecticut and science in general in manifold ways, plans for which are here outlined. The Commission is ready and eager to abide by the Statutes. Without the proposed Survey Publication Fund and substantial expansion of the research and services budget in the immediate future, its hands are tied.

APPENDIX A

Professional Specialists and Projects Under Way 1947-48:

Name	Project
AITKEN, J. M.	*Geology of the Hebron Gneiss*
KNOPF, ADOLPH	*Revision of Foye's "Eastern Connecticut"*
CAMERON, E.	*Mt. Prospect Area*
GATES, R. M.	*Woodbury Granite*
CAMERON, E.	*Western Highlands Geol. Map*
DIGMAN, RALPH	*Geology — Guilford Quadrangle*
SCLAR, C. B.	*Geology of the Preston Gabbro*
BERRY, C. T.	*Mollusks of Connecticut*
GRAVES, A.	*Chestnut Breeding*
JANSSON, K. P.	*Plant Classification — Connecticut Arboretum*
WINCHELL, H.	*Revision of "Minerals of Connecticut"*

APPENDIX B

Manuscripts Prepared Wholly or In Part at State Expense — Unpublished

List 1 — approved and now ready for publication:

KRYNINE, PAUL D.	*Geology of the Connecticut Valley*
MIKAMI, HARRY M.	*Stony Creek Granite Gneiss*
DIGMAN, RALPH E.	*The Killingworth Dome*
FOYE, WILBUR	*Geology of the Eastern Highlands*
CLENCH, WILLIAM J.	*A Check List of the Mollusca*
AITKEN, JANET M.	*Geology of the Hebron Gneiss*
FRIEND, ROGER B., et al.	*Diptera of Connecticut*
SHAW, F. R., FISHER, E. G.	*The Fungivoridae*
JOHANNSON, O. A., et al.	*The Tendipedidae (except Tendipedini)*
JOHANNSON, O. A., et al.	*The Ceratopogonidae*
TOWNES, H. K.	*Tendipedidae: Tendipedini*
JOHANNSEN, O. A.	*Heleidae (Ceratopogonidae)*
VAN DUZEE, E. P.	*Dolichopodidae*
FAIRCHILD, G. B.	*Tabanidae*
BRUES, C. T.	*Phoridae*

To this list, in the coming year will be added the researches outlined above under "Accomplishments of the 1947-48 biennium", raising to fourteen those reports at the top of the Survey backlog. In the Director's files are nearly forty additional reports, technical memoranda, or maps which are not all destined for publication but are of doubtful utility in their present form. All these data are available for use upon inquiry to the Director.