ADMINISTRATIVE REPORTS.

SEVENTH ANNUAL

Report of the State Geologist.

IOWA GEOLOGICAL SURVEY,
DES MOINES, December 31, 1898.

To Governor Leslie M. Shaw and Members of the Geological Board:

GENTLEMEN—As during preceding years, so during the past year, the work of the Survey has been mainly along the line of detailed mapping and the preparation of county reports. In all, six parties were in the field. The work in Dubuque county was under my immediate charge, the economic studies being carried on by Mr. Bain, assisted by Mr. W. H. Guilford. Mr. Bain also conducted the survey of Carroll county. Prof. W. H. Norton, after finishing the survey of Scott county, moved into Cedar and devoted the remainder of the field season to that area. Prof. T. H. Macbride undertook the work in Humboldt county, and carried it vigorously forward to an early completion. In Muscatine county we were fortunate in securing the services of Prof. J. A. Udden, of Agustana College, at Rock Island, Ill. Professor Udden had had experience in geological work in connection with the United States Survey and the Illinois Board of World's Fair Commissioners. His residence at Rock Island had led him to study the surrounding region, and he was accordingly exceptionally well qualified to take up the work in Muscatine. After a field conference with Professor Norton, in Scott

county, he moved south and devoted his attention to the area assigned to him. His work here has been very thorough, and has led to the discovery of many new and interesting things.

Dr. S. W. Beyer devoted the field season to studies in Story and Hardin counties, and since the close of the season has been occupied in the Survey office at Des Moines. The survey of Story county has occupied his attention in the intervals of his work at the college at Ames, since the organization of this department. Since, however, Story is a prairie county with few outcrops, so that the most interesting problems of the region are those connected with the drift, it was thought better to defer the publication of a report upon it until the surrounding region had been studied. Accordingly, Boone, Polk and Marshall counties have been reported on, and the mapping of Hardin county is now complete. The report upon Story county, herewith submitted, fills an important gap in our scheme of mapping, and at the same time is of considerable intrinsic interest. Dr. Beyer's discovery of large bodies of loess below the drift of the region lends confirmation to some of the earlier results of the Survey, and at the same time may prove of considerable economic interest in affording a suitable brick clay in a region where such clay has not been previously known.

In Hardin county Dr. Beyer began the work with a field conference with Mr. Bain. He also had for a time the assistance of Mr. E. C. Hecker, as local assistant. The results of his work here are fully detailed in his report as appended.

The reports on Carroll, Humboldt, Story, Scott, and Muscatine counties are now well in hand, the maps are in the hands of the engraver and the illustrations are being prepared. The reports on Cedar and Hardin counties are being pushed and can probably be submitted within a few weeks. The Dubuque report will hardly be ready until after another field season, as the region is one of considerable interest and some difficulty, and it is expected that the report will be of more than usual detail.

The eastern part of the county lies in the driftless area, and the bold erosional topography developed in preglacial time has not been modified by the action of glaciers or the distribution of drift. On this account the mapping of the geological formations requires an amount of detailed field work greatly in excess of that necessary in the drift covered counties of the state. Furthermore, the economic problems are of unusual importance.

The field work of the past year has been carried forward along the same general lines as those heretofore followed. Scott county, mainly surveyed in 1897, was completed; and in addition, Cedar, Muscatine, Hardin, Story, Carroll, Dubuque and Humboldt counties, in all an area of 3,774 square miles, were mapped. In Cedar, Hardin and Dubuque counties certain details are yet unfinished, and the work is now being prosecuted so far as the weather permits. The mapping is, however, substantially complete. At the close of the present season the Survey has accordingly finished the mapping in thirty-three counties. These are indicated upon the accompanying map and are listed below. The total area surveyed up to date is 18,936 square miles, and includes much of the more difficult portion of the state.

COUNTIES SURVEYED AND MAPPED.

	Area sq. miles.		Area sq. miles.
Allamakee	658	Lee	512
Appanoose	576	Linn	720
Boone	576	Madison	576
Buchanan	576	Mahaska	576
Carroll	576	Marshall	576
Cedar	576	Montgomery	432
Cerro Gordo	576	Muscatine	437
Dallas	588	Plymouth	860
Decatur	576	Polk	585
Delaware	576	Scott	455
Des Moines	415	Story	576
Dubuque	601	Van Buren	484
Guthrie	593	Warren	569
Hardin	576	Washington	655
Humboldt	432	Woodbury	873
Johnson	618		
Jones	576	Total	18,936
Keokuk	576		

The work of mapping the Pleistocene formations has been continued, and numerous minor corrections have been made on the preliminary map compiled by Mr. Bain for the last report. The study of these surface deposits has its chief economic interest in the fact that they are the basis of the soil which has made Iowa famous among the agricultural states. The Survey has planned from the first a systematic study of the soils as one of the most important phases of its work. The mapping of the surface formations is a necessary preliminary. The latter having, however, progressed so satisfactorily, application was made in 1897 to the United States Department of Agriculture for aid in the study of the soils themselves. The Department found itself unable at this time to take up the Iowa work, but we were fortunate in enlisting the co-operation of the experiment station of the Iowa State College, and the work is now well under way.

A complete series of both mechanical and chemical analyses of the various soil types of the state is planned, and a thorough study of both the scientific and agricultural problems is to be made. The field work will be done by the regular Survey assistants, and the laboratory work will be done at the experiment station under the direction of Dr. J. B. Weems. The object of the work is to make a thorough study of the physical and chemical properties of the most important and typical soils in Iowa, adapted to the different staple crops, such as grass, wheat, corn, etc. Important features of the work will be a careful study of the texture of the soils, or the amount of sand, silt and clay, and the relation of the soils to moisture and heat. The soils selected for sampling for these investigations are to be typical, and each will represent fairly well a considerable area of land. They are expected to represent either the very best type of land for the staple crop or crops of the locality or the very poorest lands for these same crops. Both of these extremes are desired for contrast. For example, if the staple crop of the locality is wheat or corn the assistant is to select the best adapted to this staple crop and

another soil if possible, in the same locality, representing a considerable area of land upon which this staple crop cannot successfully be grown on account of the small yield of inferior quality, or the time of ripening of the crop. It is desired to have the samples taken from fields which are now, or have recently been, under actual cultivation, in the crop or crops best adapted to it, so that the real agricultural value of the land can be accurately known.

The samples are taken inside the field, some distance away from houses, fences, roads, or trees. In fields planted to corn or similar large crops, the samples should be taken about midway in the open spaces. They should be taken where they will represent fairly well the average soil of the field and of the large area of land which they are to represent. They should not be taken where the soil has been washed, nor where the soil has accumulated to an unusual depth. In collecting the samples the assistants are instructed to remove all grass, leaves, or litter, from the surface, and then dig a hole like a post hole, twenty-four inches deep, scrape the sides clean and notice the depth at which the change of color occurs between the soil and the sub-soil. "Take a sample of the soil from above this, by cutting off a slice of soil three or four inches thick, down to the change in color, and mix this thoroughly together. Fill a cloth sack with this well-mixed soil, tie it securely, and fill out the label on the back of the tag. Then clean out the hole again, and scrape the sides so as to get rid of every particle of the soil, and take a sample of the sub-soil in like manner by cutting down a slice of the sub-soil and thoroughly mixing it together so that the samples shall contain particles of the sub-soil from immediately below the soil, to a depth of at least twenty-four inches. Put this sample of sub-soil into a separate sack, tie it securely, and fill out the label on the back of the shipping tag. If there is no apparent difference between the soil and the sub-soil, take a sample of soil, nevertheless, to a depth of six inches from the surface, and a

sample of the sub-soil from below this to a depth of twenty-four inches, and put them into separate sacks as above. Fill out the form on the back of the shipping tag with the number of the sack, the name, locality, kind of soil, etc. Give as full information as possible as to what staple crop or crops are best adapted to this land and the reason why the staple crops, adapted to the locality, such as grass, wheat, corn, fruit, truck and the different types of tobacco cannot be successfully grown, so that we can compare the general agricultural value of the land with other samples. Give the geological formations, to which the soil belongs, if possible."

Samples have been collected, as directed above, in Dubuque, Carroll, Cedar, Scott, Muscatine, Story, Hardin and Humboldt counties, and are now in the hands of the chemist. It is hoped that the results of some at least of these analyses may be in in time to publish in connection with the papers accompanying this report.

Since the resignation of Prof. G. E. Patrick as chemist to the Survey we have had no regular chemist, and our investigations along that line have been somewhat limited. The work of the present year has, however, necessitated the making of numerous analyses and tests, and I have the pleasure of announcing that Dr. J. B. Weems, of the experiment station at Ames, has been employed to do this work.

The collection of statistics of production in the state was taken up last year, and the first tables were published in volume VIII. In order to have them ready for publication in that volume it was necessary to estimate the production in a few cases where unusual delay was met. These estimates were checked in every possible way, and the returns coming in later show that they were substantially correct, except that the total value of the clay output should have been slightly larger. In the collection of these statistics the Survey had the heartiest co-operation from the producers, and the letters of commendation received since indicate that the work met a real want. The total value of the mineral pro-

duction of the state in 1897 was about $7,500,000, and important and encouraging advances along several lines were reported.

The statistics reported last year were obtained by personal letters or visits to each producer. This entailed a large amount of extra work, since the number of individual producers is large, and the operations are usually small. It also put upon each producer the burden of filling out a separate blank for this office, in addition to the one sent to the United States Geological Survey, and, in the case of the coal operators, to the mine inspectors. To avoid this duplication of work, and to insure as accurate results as possible, arrangements have been made whereby the work this year will be carried on in co-operation with the United States Geological Survey. In consultation with Messrs. E. W. Parker and Jefferson Middleton of that organization, who visited Des Moines for that purpose, terms mutually advantageous to both Surveys have been arranged, and the expense of the work will hereafter be divided. It is believed that this will meet with your hearty approval. The returns for the year 1898 are expected to be in hand in time to permit them to be appended to this report.

The law governing the Survey gives the director authority to investigate natural history subjects other than those directly relating to geology. So far it has not seemed possible to take up this work farther than the preparation of forestry notes on the various counties surveyed. For some time, however, Professor Pammel, of Ames, has had in preparation for the Survey a complete monograph on the grasses of Iowa, and it is a pleasure to be able to report the probable early completion of this valuable paper. At present it is being held awaiting the completion of a series of chemical analyses by Dr. J. B. Weems, which will add greatly to the value of the report, in the light which they will shed on the forage value of the various plants. Grasses, because of their intimate relation to the great stock raising and dairy inter-

ests of the state, are one of Iowa's most valuable products, and it has been thought better, for the sake of the greater value of the report, to allow this delay.

Other natural history monographs of economic value are promised or in contemplation, and will add greatly to the usefulness of the work which this organization is doing for the state. It is recommended that Professor Pammel's report be issued as a separate publication of the Survey.

Within the year volume VIII of the reports of the Survey was printed and distributed. Its table of contents will be found in the list below. As usual there has been a strong demand for the report and the edition is being rapidly exhausted. The original law governing the distribution of the reports of the Survey contemplated the sale of the bulk of the edition at a price sufficient to cover the cost of the printing and binding, and the proceeds of such sales have been from time to time covered into the state treasury. In the work of code revision the law was changed a little, so that the number which may be gratuitously distributed has been considerably increased. The volumes are now sent out upon the request of members of the general assembly, and at present copies of volumes VI to VIII, inclusive, may be obtained in this manner. A certain number of copies of each volume are reserved and are distributed only by sale, thus making it possible for any one, by the payment of a nominal sum, to complete his set. Some of the separate papers are now out of print and cloth bound copies of the earlier volumes cannot now be supplied. A price list of the publications on hand is appended.

The edition now published by the Survey consists of 3,000 copies. A portion of this edition, 2,000 copies of recent volumes, is bound in cloth, 500 are bound in paper, and the remaining 500 are cut up and bound in paper as separate pamphlets. Three hundred copies of each county report are placed at the disposal of the senator and representatives from the county, serving in the general assembly at the time the

report is issued. The remaining copies are distributed by the Survey upon request. A very large number of these pamphlets have found their way into the schools and are being used as text-books. There is probably no place where they will be more useful, and so far as the supply at the disposal of the Survey permits we are glad to honor requests for them for such use.

VOLUME I. FIRST ANNUAL REPORT, 1892.

480 Pages, 10 Plates, 26 Figures.

Price, in paper, 70 cents; postage, 26 cents.

CONTENTS:

VOLUME II. COAL DEPOSITS.

BY CHARLES ROLLIN KEYES.

536 Pages, 18 Plates 251 Figures.

Price, in paper, 70 cents; postage, 31 cents.

CONTENTS:

Chapter XII. Description of the Coal Beds of the Outliers in Eastern Iowa.
Chapter XIII. Composition of Iowa Coals.
Chapter XIV. Waste in Coal Mining.
Chapter XV. The Coal Industry.

VOLUME III. SECOND ANNUAL REPORT, 1892.

501 Pages, 37 Plates, 34 Figures.
Price, in cloth, $1.10; postage, 35 cents.
In paper, $1.00; postage, 30 cents.

Certain of the individual papers comprising this volume will be sent postpaid, bound in paper, upon receipt of the amount set opposite them.

CONTENTS:

Administrative Reports:
- Report of State Geologist.
- Report of Assistant State Geologist
- Report of Chemist.

Work and Scope of the Geological Survey; by Charles Rollin Keyes.
Cretaceous Deposits of the Sioux Valley; by Harry Foster Bain. 5 cents.
Certain Devonian and Carboniferous Outliers in Eastern Iowa; by William Harmon Norton. 10 cents.
Geological Section Along Middle River in Central Iowa; by J. L. Tilton. 5 cents.
Glacial Scorings in Iowa; by Charles Rollin Keyes. 10 cents.
Thickness of the Paleozoic Strata of Northeastern Iowa; by William Harmon Norton. 15 cents.
Composition and Origin of Iowa Chalk; by Samuel Calvin. 10 cents.
Buried River Channels in Southeastern Iowa; by C. H. Gordon. 10 cents.
Gypsum Deposits of Iowa; by Charles Rollin Keyes. 20 cents.
Geology of Lee County; by Charles Rollin Keyes. 30 cents.
Geology of Des Moines County; by Charles Rollin Keyes. 30 cents.

VOLUME IV. THIRD ANNUAL REPORT, 1894.

467 Pages, 11 Plates, 6 Maps, 54 Figures.
Price in cloth, $1.25; postage, 34 cents.
In paper, $1.00; postage, 28 cents.

The individual papers of this volume will be sent postpaid, bound in paper, upon receipt of the amount set opposite them.

CONTENTS:

Administrative Reports.
Geology of Allamakee County; by Samuel Calvin. Out of print.
Geology of Linn County; by W. H. Norton. 20 cents.
Geology of Van Buren County; by C. H. Gordon. 20 cents.

Geology of Keokuk County; by H. F. Bain. 20 cents.
Geology of Mahaska County; by H. F. Bain. 20 cents.
Geology of Montgomery County; by E. H. Lonsdale. 20 cents.

VOLUME V. ANNUAL REPORT, 1895.

452 Pages, 14 Plates, 7 Maps, 72 Figurss.
Price, in cloth, $1 00; postage, 34 cents.
In paper, 85 cents; postage, 28 cents

The individual papers of this volume will be sent postpaid, bound in paper, upon receipt of the amount set opposite them.

CONTENTS:

Administrative Reports.
Geology of Jones County; by S. Calvin 20 cents.
Geology of Boone County; by S. W. Beyer. Out of print.
Geology of Warren County; by J. L. Tilton. 20 cents.
Geology of Washington County; by H F. Bain. 20 cents.
Geology of Woodbury County; by H. F. Bain. 20 cents.
Geology of Appanoose County; by H. F. Bain. 20 cents.

VOLUME VI. LEAD AND ZINC, ARTESIAN WELLS, ETC.

487 Pages, 28 Plates, 57 Figures.
Price, in cloth, 85 cents; postage, 34 cents.
In paper, 70 cents; postage, 28 cents.

The individual papers of this volume will be sent postpaid, bound in paper, upon receipt of the amount set opposite them.

CONTENTS:

Lead and Zinc Deposits of Iowa; by A. G. Leonard. 10 cents.
The Sioux Quartzite and Certain Associated Rocks; by S. W Beyer. 10 cents.
Artesian Wells of Iowa; by W. H. Norton. 55 cents.
Relations of the Wisconsin and Kansan Drift Sheets in Central Iowa, and Related Phenomena; by H. F. Bain. 10 cents.

VOLUME VII. ANNUAL REPORT, 1896.

550 Pages, 11 Plates, 11 Maps, 81 Figures.
Price, in cloth, $1.30; postage, 34 cents.
In paper, $1.15; postage, 30 cents.

The individual papers of this volume will be sent postpaid, bound in paper, upon receipt of the amount set opposite them.

CONTENTS:

Administrative Reports.
Geology of Johnson County; by S. Calvin. 30 cents.
Geology of Cerro Gordo County; by S Calvin. 30 cents.
Geology of Marshall County; by S. W. Beyer. 30 cents.
Geology of Polk County; by H. F. Bain. 30 cents.
Geology of Guthrie County; by H. F. Bain. 30 cents.
Geology of Madison County; by J. L. Tilton and H. F. Bain. 20 cents.

VOLUME VIII. ANNUAL REPORT, 1897.

427 Pages, 32 Plates, 6 Maps, 13 Figures.
Price, in cloth, $1.30; postage, 30 cents.
In paper, $1.15; postage, 26 cents.

The individual papers of this volume will be sent postpaid, bound in paper, upon receipt of the amount set opposite them.

CONTENTS:

Administrative Reports.
Geology of Dallas County; by A. G. Leonard. 25 cents.
Geology of Delaware County; by S. Calvin. 25 cents.
Geology of Buchanan County; by S Calvin. 25 cents.
Geology of Decatur County; by H. F. Bain. 25 cents.
Geology of Plymouth County; by H. F. Bain. 25 cents.
Properties and Tests of Iowa Building Stones; by H. F. Bain. 25 cents.

The museum and library of the Survey have continued to grow and several valuable periodicals have been added to our exchange list. Among the more important are the following:

Trans. Australian Inst. Ming. Eng. (Melbourne.)
Technology Quarterly. (Boston.)
Proc. Philos. Soc. of Glasgow. (Glasgow.)
Jour. Western Soc. Eng. (Chicago.)

An important donation of fossils was received from McKeesport Scientific and Philosophical Society, representing the common fossils of the Pennsylvania coal measures.

In the office there has been the usual heavy correspondence relating to exchanges, distribution of reports, inquiries, etc. The copying and revising of manuscript, proof reading and the preparation of advance notes for the newspapers and the articles for the scientific and technical press, calling attention to Iowa's resources have also absorbed much time. This

office work has been carried on as in previous years except that we have had the aid of Dr. Beyer during the winter months.

My personal work has involved the constant supervision of the operations of the Survey. The large amount of office work incident to the position, the revision of all manuscripts, the study of the fossil forms collected by all the parties in the field, together with the field work and study of structural problems which engaged my attention during the working season. The greater part of the field season was spent in Dubuque county. This is one of the most important counties, geologically speaking, in the state. A proper solution of all the problems presented by Dubuque county demands much more time and labor than will be necessary in many of the other counties of Iowa. In the driftless portion of the county, every square mile must be examined in detail. The borders of two of Iowa's drift sheets pass through Dubuque county; the county has long been noted as the seat of the lead and zinc industry of the state; and the building stones and lime-burning rocks are of especial importance. The work in this county was divided, Mr. Bain taking up the study of the economic problems, while my investigations were devoted to the geological structure—including both indurated rocks and superficial deposits—and to the detailed mapping of the several geological formations. Besides the time spent in Dubuque county, some time was spent with the several geologists having direct charge of the work in each of the following counties, namely, Scott, Cedar, Muscatine and Humboldt.

Mr. Roy Mosnat, of Belle Plaine, as volunteer assistant, has made a detailed study of the Belle Plaine Artesian Basin, has mapped the several wells, and has collected data of very great interest respecting the quality and volume of water supplied by this important hydrographic area.

Dr. Charles R. Eastman, of Harvard, is prosecuting studies on the interesting, and in some cases unique, collections of fossil fishes supplied by the geological formations of Iowa.

The United States Geological Survey extended its topographic work in Iowa, completing the sheet west of that which was surveyed last year. This work is of especial importance to the Iowa Survey, inasmuch as it will greatly reduce the expense of correct geological mapping in the Driftless Area. This area includes, so far as relates to Iowa, all or part of the counties of Jackson, Dubuque, Clayton, Fayette, Allamakee and Winneshiek. Of these important counties, Allamakee and Dubuque are the only ones so far studied. I have the honor to remain, gentlemen,

Your obedient servant,

SAMUEL CALVIN,
State Geologist.

REPORT OF ASSISTANT STATE GEOLOGIST.

IOWA GEOLOGICAL SURVEY,
DES MOINES, December 30, 1898.

MY DEAR SIR—I have the honor to submit the following report upon my work for the past year. The earlier months of the year were, as usual, taken up with office duties, including the supervision of the printing of volume VIII of the Survey reports. This required more or less attention throughout the first six months of the year. In April, when the weather became suitable, out-of-doors field work was taken up and was continued, so far as office duties would allow, until December 18th. My personal field work for the year was mainly in Carroll and Dubuque counties. Excursions were made in Hardin county, in company with Dr. Beyer; in Johnson and Tama counties, in your company, and in Pottawattamie and numerous other counties alone. In September a trip was made through the northwestern portion of the state, in company with Prof. J. E. Todd, state geologist of South Dakota, and Mr. Frank Leverett, of the United States Geological Survey. Carroll, Sac, Ida, Crawford, Woodbury, Plymouth, Sioux and Lyon counties, and adjacent portions of Minnesota and South Dakota were visited, attention being especially directed to a study of the drift formations. The discovery of fossiliferous clays of Buchanan age, at Sioux Falls, was one of the gratifying results of the trip. More extended studies of the interloessial till at Sioux City developed the fact that the beds found below the till are fine water-

laid silts, and are probably different from the loess proper. Mr. Leverett traced the morainic hills of the Wisconsin drift into the northeast corner of Lyon county, and it seems probable that other changes in the mapping of the drift sheets of that region will be necessary.

In Carroll county one of the interesting results of the season's work has been the demonstration that much of the extra-morainic drift, heretofore believed to be young and provisionally correlated with the Iowan, belongs to an anomalous phase of the Kansan. What may be the correct age of the extra-morainic drift north and west of Carroll county can not yet be stated. A full report on the geology of Carroll county has been prepared, and is submitted herewith.

In Dubuque county my attention has been devoted mainly to a study of the economic features of the district. The excellent building and limestones of the region were studied, and the specimens collected for analyses are now in the hands of the chemist. The clays of Dubuque county have not heretofore received the attention which they deserve, and it is hoped that their development may be stimulated. A series of tests was carried on to determine the temperatures at which the brick now made were being burned. The major attention was necessarily devoted to a study of the lead and zinc mines, and a large scale map is now being prepared, showing the location of the various crevices and openings. In this work the Survey has had the aid of Mr. W. H. Guilford, whose long acquaintance with the region as a surveyor makes his assistance particularly valuable. The various miners and mine owners have also done all in their power to aid in the work.

While it is too soon to present conclusions, it may be stated that the outlook for the field seems very good. The area is limited and the operations are small, but several of the mines are yielding nicely, and there is a large amount of ore in sight. There are also considerable tracts of country wholly unexplored. It is believed that the future production of the

region, particularly in zinc, will be large, and that the general impression that the region is worked out is wrong. Some facts which are believed to have an important bearing upon the genesis of the ores have been observed.

In June, a favorable opportunity occurring, a few days were spent in Joplin, Mo., studing the zinc mines of that region, and in December a similar visit was made to the lead region of southeastern Missouri to study the desseminated ores of that region. Points in Wisconsin have also been visited. The larger and often older mines of these regions show many facts which cannot be so readily observed at Dubuque, and many suggestions as to ore treatment were also obtained. A full report upon the subject is now being prepared. What the Dubuque mines need most at present is more buyers and a larger share in the rise in the price of zinc ores which has been so marked a feature of the year's markets. The prices paid for ore in the Dubuque region have not been such as would stimulate development. The result has been small, poorly developed mines and an uncertain supply of ore which has discouraged buyers and still further depressed the price. In the main the isolated position of the mines and the poor milling of the ores have been the reason of the low price. Recent developments have shown that considerable bodies of ore are present, and with proper organization of the industry the mines should receive considerable attention.

The usual routine work of the office has been carried on throughout the year. Specimens sent in from various parts of the state have been examined, investors have been advised, the preparation of manuscript, maps and illustrations has been supervised, etc. With the assistance of Doctor Beyer a dark room has been prepared, and hereafter the photographic work will not need to be sent out.

Respectfully yours,

H. F. BAIN,
Assistant State Geologist.

TO PROF. SAMUEL CALVIN,
State Geologist.

REPORT OF MR. SAMUEL W. BEYER.

IOWA GEOLOGICAL SURVEY,
DES MOINES, December 30, 1898.

SIR—I have the honor to submit to you the following report of work done by me during the year ending December 31st.

It was my good fortune to represent the Survey at the International congress which convened at St. Petersburg late in August, 1897. After traveling several thousand miles in Russia, and visiting many of the classic localities in that country, I spent some time at Freiberg, Munchen and Berlin, and returned to the United States late in February of the present year.

During March, April and May, I put in as much time as I could spare from my college duties in pushing forward my field work in Story county, and made two, more extended trips. The first, in company with Mr. Bain, to investigate the "Marble Beds" reported to have been discovered between Iowa Falls and Alden, on the Iowa river. The second was made in company with yourself, Mr. Frank Leverett of the United States Geological Survey, Professors Chamberlain and Salisbury of the University of Chicago, and Messrs. Udden and Bain of this Survey; the object being to study the drift of Illinoian ice sheet as exhibited in the vicinity of Peoria in Illinois, and, if possible, to get some light in dealing with the multiplicity of ice sheets in Iowa.

The greater part of June and July was spent in the field in Hardin and the counties immediately adjoining. It was found

that the Wisconsin drift extends much further east than was formerly supposed. Eldora hill marks the extreme advance in this direction and the North Fork of the Iowa river was born at the time the ice invaded this region. The marble quarries previously mentioned were examined more in detail and the results are somewhat disappointing. It was hoped that a further development of the quarries would show thicker ledges. But this is not the case. It is obvious that the power that caused the shattering of the beds was also the potent influence in effecting their marmorosis. The one varies directly as the other. While the marble takes an excellent polish and possesses a pleasing color and texture, the thinness and interrupted character of the beds precludes a more than local importance for them.

The "Honestone" and "Whetstone" quarries were also investigated and found of little significance save in showing detached basins of the coal measures.

Short field trips were made from August to November, inclusive, and the field work in Story county completed. Important deposits of loess were recognized in the west-central portion of the county. They afford an abundance of first-class material for pressed brick.

At the end of the field season, about December 1st, my headquarters were transferred to Des Moines, where my time has been employed in writing up Story county and relieving Mr. Bain of a portion of the routine work of the office.

Very respectfully yours,

SAMUEL W. BEYER.

TO PROF. SAMUEL CALVIN,
State Geologist.