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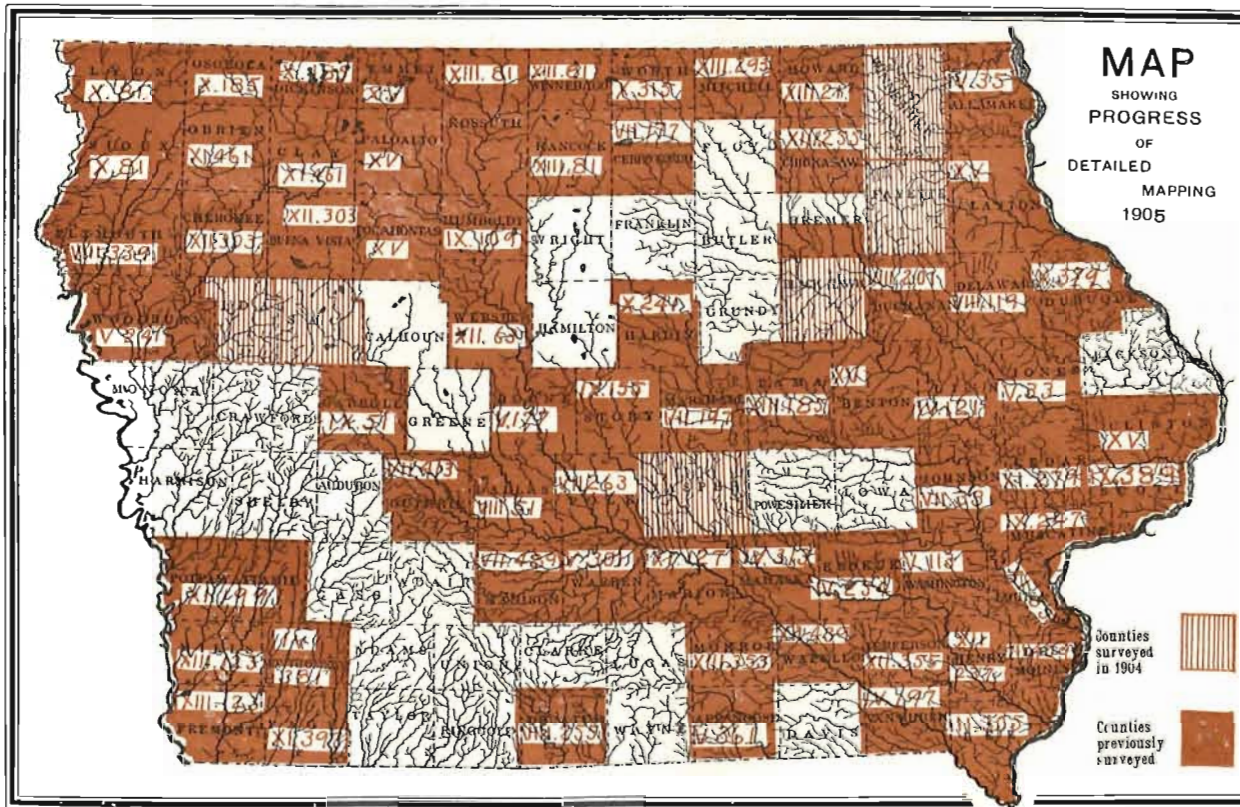
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# ADMINISTRATIVE REPORTS.

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THIRTEENTH ANNUAL  
Report of the State Geologist.

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IOWA GEOLOGICAL SURVEY,  
DES MOINES, DECEMBER 31, 1904.

*To Governor Albert B. Cummins and Members of the Geological Board:*

GENTLEMEN:—It is my privilege to report the progress that has been made during the past year in carrying out the plans for work that were approved by you a year ago. The resignation of Professor Calvin, who submitted these plans to you and who has guided the investigations of the Survey from its beginning, was a matter of keen regret to all those who are interested in the work of the Survey throughout the state and the country at large. It is fitting at this time to call attention to the high plane to which the Survey has been raised during his administration. I can not do so more appropriately than by quoting a reliable writer for the Mining Reporter of Denver for February 23, 1903. "For types of successful University Surveys it is only necessary to refer to the magnificent history of the Wisconsin Survey, whose publications have come to be regarded as classics in Geological literature; the Iowa Survey under the charge of Professor Calvin, of the State University, whose work has been so favorably commented on by the Geological and Engineering Journals; the Maryland Survey, in charge of the department of Geology in Johns Hopkins University, has been a model of economy and economic efficiency as well as scientific excel-

lence. Among the many others may be specifically mentioned the present New York Survey, and the Texas Survey established within the past few years at the State University, and already recognized as an important factor in the recent development of the state."

It gives me great pleasure to report that Professor Calvin will retain an active interest in the work of the Survey, and the relief afforded him from routine and executive duties will enable him to push forward the important monographs that he has undertaken on the stratigraphy and paleontology of the state.

On account of the removal of Prof. J. B. Weems from the state, Prof. Louis G. Michael of the Iowa State College, at Ames, was appointed Survey Chemist by you and is serving in that capacity.

In addition to the preparation of a number of county reports during the past year, more time than heretofore has been devoted to some of the larger economic problems with the purpose of publishing results in a convenient form to meet a real and growing demand for information in regard to the quarry and cement materials; the coal; and the gypsum of the state. A preliminary report on the Portland cement industry and Iowa's natural resources with reference to Portland cement, prepared by Edwin C. Eckel and H. F. Bain of the United States Geological Survey, is published this year. This report is a product of the helpful co-operation of the State and National Geological Surveys, a co-operation which has been efficient along a number of lines during the year. The report shows plainly that the limestones and clays of Iowa are a proper field for the careful study of the cement manufacturer, and it is believed that this preliminary report will attract the attention of capital seeking investment along this line. A number of urgent requests for this report, from responsible parties, are already on file. A more thorough study, looking to a complete report on Portland cement possibilities in Iowa, is now being undertaken by Dr. S. W. Beyer in connection with his investigation of quarries and quarry products within the state. The field work on these reports will require at least another summer.

The series of coal tests that have been undertaken by the Iowa Geological Survey, co-operating with the United States Survey, promises to bring out facts that will be of interest to every user of coal. The coal was in all cases donated by mine operators and in every instance but one carried without charge by the railroad companies. Five car loads of coal from as many important mines in Iowa have already been tested, and with the results obtained it will be possible to illustrate the nature and significance of the work. For the first time in the history of the country coal from practically all of the coal producing states has been brought to a single, well equipped plant, and has been tested under the same conditions and by the same men, whose position guarantees a fair and impartial statement of results.

A study of the figures which follow will lead to the conclusion that in general the coals imported into Iowa are selling at a price that is too high, when their efficiency is compared with the Iowa coals which are put on the home market at a price considerably below the imported commodity.

When burned under the boilers at the Saint Louis testing plant, the Iowa coals, on the average, yielded energy sufficient to maintain a horse-power for an hour for each 3.9 pounds of fuel burned. For six samples of Illinois coal, the average amount of coal burned per horse-power hour was 3.7; for one sample of Pennsylvania coal, 3.1; and for thirteen samples of West Virginia coal, 3 pounds per horse-power hour.

The conditions under which these tests were made represent fairly the conditions that prevail in the average power plant of moderate size. The Illinois coals, from the fields tested, which are extensively used in the eastern part of the state, and are often given a decided preference over Iowa coals, should sell at practically the same price as the average Iowa coal. A study of the chemical analyses of the coals from the two states, made in connection with these tests, indicates that for domestic purposes the same statement is true, for the content in sulphur and ash in the coals from the two states is about the same, and certainly the advantage is not with the Illinois coals in these particulars.

The laboratory tests as to the heating qualities of the coals tallies with the tests in the power plant. The Iowa coals gave

on the average 6,300 calories, and 11,000 British thermal units, and the same figures represent the value of the Illinois coals in these tests. The Pennsylvania coal tested gave results one-twelfth better, and twelve samples of West Virginia coal were one-sixth higher.

By washing the Iowa coal, as is done commonly in the east, at a cost of six cents a ton, the per cent of ash was reduced four per cent, and the amount of sulphur one per cent. Coking tests were made on four of the Iowa coals, in the ordinary beehive oven. On the average, 8,500 pounds of coal yielded 3,500 pounds of coke, of a rather inferior quality, and these tests were not encouraging.

In the briquetting tests, it was found advantageous to use eight per cent of tar as a binder, and it was satisfactorily shown that the fine coal waste of Iowa can be prepared and put upon the market as a satisfactory fuel by this process.

The important producer gas tests are yet to be made with the Iowa coals, and the probabilities are that they will be successful, though there will exist the necessity of washing the gas to remove the excess of sulphur. This process, however, is simple and inexpensive.

It is hoped that coal from a number of important localities may be tested at the Saint Louis plant during the coming summer.

During the past summer I was engaged in selecting and securing the donation of these car-load samples, and in negotiations which led to the granting, in most cases, of free transportation from the mine to the testing plant at Saint Louis. In addition, while in the coal fields engaged in this work, considerable new light was gained in regard to extensive coal beds particularly in Marion and Lucas counties.

Preliminary tests to determine the economic temperature for calcining gypsum, were carried on at the laboratories of the State University during the summer of 1904. The gypsum industry in Iowa has an annual output valued at more than \$500,000, and the state should assist other producing states, notably Michigan and Kansas, by contributing her part to an important technical literature on this subject. It is believed



that the Iowa gypsum industry will admit of a considerable expansion, and that a knowledge of newer methods applicable to the making of hard wall plasters will result in profit not only to the gypsum industry but to the whole state.

Professor Calvin has been engaged throughout the year in work on stratigraphic problems, and in collecting and compiling data for a final report on the drift. He has identified fossils for a number of Survey assistants and has rendered them important aid in the field.

Desiring to aid the high schools of the state in their science work, and appreciating their need of illustrative material, the Survey early in the fall proposed to share with the schools some of the material that it has brought together. To determine the interest of the high schools in the movement, the following circular letter was addressed to the high school principals:

The Iowa Geological Survey, through its representatives in the field, is able to bring together at little expense, an excellent collection of the rocks, fossils and minerals of Iowa.

The Survey proposes to send a set of thirty labeled specimens to each high school in the state. A detailed account of the specimens intended to be helpful to teachers and pupils will accompany each set. The high school receiving the specimens will be asked to pay \$1.00 for specimen trays and packing, and the express charges. The purpose of this nominal charge is primarily to insure the Survey of a reasonable interest in the material on the part of the recipients.

Before undertaking the work an expression of opinion from the high schools is desired. Will your school care to co-operate if the plan is carried out?

Very truly yours,

FRANK A. WILDER,  
University of Iowa,  
Iowa City, Iowa.

More than one hundred and twenty schools sent in requests for the collections, this number exceeding considerably the anticipated demand. One hundred sets, representing 4,000 specimens were sent out and were well received by the high school authorities. At a later date it will be possible to supply the remaining applicants and others who may apply.

The following specimens were included in each collection:

SAMPLE.

Sioux quartzite.  
Maquoketa shale.  
Shell limestone.  
Carboniferous sandstone.  
Carboniferous shale.  
Striated glacial pebble.  
Glacial granite.  
Decayed granite.  
Loess and loess kindchen.  
Lead ore from Dubuque.  
Waukon iron.  
Quartz geode.  
Calcite geode.  
Rock gypsum.  
Selenite.  
Satin spar.  
Iron pyrites.  
Peat.

FOSSILS.

*Pentamerus oblongus.*  
*Favosites favosus.*  
*Halysites catenulatus.*  
*Orthoceras sociale.*  
*Acervularia davidsoni*  
*Orthis impressa.*  
*Orthis iowensis.*  
*Atrypa reticularis.*  
*Spirifer pennatus.*  
*Spirifer hungerfordi.*  
*Spirifer mucronatus.*  
*Athyris spiriferoides.*  
*Ptyctodus calceolus* (teeth).  
*Spirifer keokuk.*  
*Athyris subtilita.*  
*Inoceramus labiatus.*

Pasteboard trays and carefully prepared labels were furnished with each specimen and each set was accompanied by a descriptive pamphlet of ten pages.

The following list includes the schools receiving the material:

Adel.	Bellevue.
Akron.	Belmont.
Albia.	Boone.
Alton.	Brighton.
Anamosa.	Brooklyn.

Burlington.	Lake Mills.
Boynton.	Lamoni.
Cedar Rapids.	Manson.
Charles City.	Manchester.
Centerville.	Maquoketa.
Coon Rapids.	Marengo.
Correctionville.	Marshalltown.
Corning.	Montezuma.
Clinton.	Missouri Valley.
Cincinnati.	Monticello.
Corydon.	Mount Pleasant.
Council Bluffs.	Muscatine.
Davenport.	Nevada.
Decorah.	Newton.
Des Moines, Capital Park School.	Oelwein.
Des Moines, Oak Park School.	Onawa.
Des Moines, West High School.	Ottumwa.
Eagle Grove.	Pella.
Eddyville.	Pomeroy.
Eldora.	Randolph.
Emmetsburg.	Red Oak.
Exira.	Reinbeck.
Fairview.	Rock Valley.
Farmington.	Rockwell City.
Fonda.	Sanborn.
Fort Dodge.	Seymour.
Garner.	Spencer.
Glenwood.	Sioux City, High School.
Grand River.	Sioux City, Cathedral School.
Grimes.	Sioux Rapids.
Grundy Center.	State Center.
Guttenberg.	Storm Lake.
Hawarden.	Story City.
Hedrick.	Sumner.
Hiteman.	Tama.
Holstein.	Tipton.
Ida Grove.	Walnut.
Iowa Falls.	Wapello.
Keokuk.	Washington.
Kirkman.	Waukon.
Knoxville.	Waverly.
La Porte.	Woodbine.

No phase of geologic work has greater significance than the preparation of topographic maps. On account of the expense involved the State Geological Survey has, up to the present, not felt justified in entering this field. Considerable work however, has been done by the United States Geological Sur-

vey in the eastern part of the state. As a result of a conference with officers of the Iowa Geological Survey, the topographic branch of the United States Geological Survey will begin active operations in the central part of the state as well as along the eastern border. In order to aid in the more careful study of the coal resources of Polk county a topographic survey of the area within the Des Moines quadrangle will be completed this summer. Some work will be done also in Fremont county. A line of precise levels will be run between the Mississippi and Missouri rivers, crossing Iowa from east to west through Des Moines. The engineers of the state will be given a fair example of topographic work in a center where engineering enterprises are important, and the measure of their appreciation of this work will be a fair guide for future activity along this line.

The newly organized soil survey at the Iowa State College of Agriculture and Mechanic Arts has found that its reconnaissance work has been satisfactorily done by the Geological Survey in connection with its glacial studies. At the request of Doctor Wilcox, of the Soil Survey, the field assistants of the Geological Survey will continue their observations on soils, and will report more fully on this topic than has been the custom in the past. Similarly, at the request of the State Historical Society and the Iowa Anthropological Society, more complete notes will be made on prehistoric mounds and fortifications.

Volume XV of the regular series of reports is submitted herewith. Papers by Savage, Macbride and Udden, on Benton, Fayette, Emmet, Palo Alto, Pocahontas, Sac, Ida and Clinton counties are included in this volume. Professor Arey of the State Normal School joins the Survey staff for the first time, and presents in this volume an excellent report on Black Hawk county. The report on Jasper county is the work of Mr. Williams. The mineral statistics have been compiled by Doctor Beyer, as usual, and form an essential part of the report.

The second volume of the report on The Grasses of Iowa, prepared by Prof. L. H. Pammel, has just been distributed. It is a work of lasting value, given to the state without cost, except for publication, and even here a portion of the expense for illustrations was borne by the author. The two volumes on The

Grasses of Iowa will long be a standard reference book in schools of higher grade, and form another instance of genuine scientific work which has also an economic value, contributed by this state to an important technical literature. Iowa is not alone in undertaking work of this kind, and it is generally admitted that if it were not for state support of this sort an important element in scientific literature would be lacking.

The correspondence of the State Geologist and of the Assistant Geologist growing out of inquiries from within the state with reference to deposits or finds which are regarded as important by the finders, and from without the state in connection with inquiries from capital seeking investment in connection with Iowa's mineral wealth, has been considerable, and is growing in bulk yearly.

At the request of the state census bureau, the Survey is preparing statements of the mineral output and resources of the state, in text and diagrams, which will appear in connection with the census publications.

The field work for the coming year will be pre-eminently along economic lines. A substantial and wholly necessary foundation for this work has been laid in the earlier stratigraphic studies of the Survey.

FRANK A. WILDER,  
Iowa City, Iowa.

## REPORT OF ASSISTANT STATE GEOLOGIST.

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IOWA GEOLOGICAL SURVEY,  
DES MOINES, DECEMBER 31, 1904.

MY DEAR SIR:—I have the honor to submit to you a report upon my work of the past year as follows:

During the months of January and February the time was largely occupied with office duties, in addition to which the report on the Geology of Benton county was completed. An excursion was made into Carroll county for the purpose of studying the drift sections exposed in the cuts recently made along the Chicago Great Western railroad. Some data were collected bearing upon the age and distribution of the loess deposits, and their relation to the drift sheets exposed in this portion of the state.

Search for coal in the southwestern counties of the state has been actively carried on during the past several months. Prospect holes, several hundred feet in depth, have been put down at Tingley in Ringgold county, Carbon in Adams county, and near Creston in Union county. After the drill had penetrated to a considerable depth at each of the above mentioned points, the Survey was requested to send a representative to examine the conditions in that immediate locality, and to advise with regard to a continuance of the work. In none of these drillings were coal seams of workable thickness discovered, but an accurate log of each drilling was made and a definite knowledge of the deeper strata of the Coal Measures in these localities has been obtained.

Notwithstanding the repeated failures that have attended the search for commercial quantities of oil and gas in our state, a company was recently organized for that purpose, and a drill-

ing was made at Coin, in Page county. It is sufficient to say that no oil or gas was found, but a coal seam twenty inches in thickness was encountered at a depth of about two hundred feet.

The writer was called to investigate a gas reservoir that was discovered in putting down a well near the town of Glidden, in Carroll county. The gas-bearing stratum, as at other points in the state, was found to consist of a bed of sand that was enclosed above and below by a sheet of boulder-bearing clay. The gas that escaped from the pipe showed a good pressure and burned with a strong flame. From indications that were shown in other wells in this neighborhood it seemed probable that the sand bed in which the gas had accumulated extended over a number of square miles. The parties were advised not to form a company with a view of exploiting the gas on a commercial scale, but to pipe it to the town of Glidden, a distance of two and one-half miles, and, without expensive equipment, utilize the gas at home. This has been done and a number of families have been supplied with light and fuel from this source during the last few months.

During August, in company with Dr. S. W. Beyer, an excursion was made for the purpose of studying the distribution of the Iowan drift in the counties of Marshall, Tama, Poweshiek and Jasper, and quite satisfactory conclusions were reached.

The supervision of the illustrating and printing of volume XIV of the Survey reports occupied some months of the year. After that volume was through the press field work was taken up in Fayette county. Notwithstanding necessary interruptions this work was pushed to completion by the early part of December, and the manuscript of the report on the Geology of Fayette County is submitted herewith for publication.

During October work in the field was suspended at your request in order to accompany and assist Mr. John Groves, the representative of the United States Geological Survey, in the collection and shipment to the United States Geological Survey Coal Testing Plant at the World's Fair Grounds, Saint Louis, Missouri, six car loads of coal that had been generously donated by Iowa producers for testing purposes.

Throughout the year the office has looked after a large volume of correspondence relating to the examination of samples and specimens, information with regard to economic deposits and locations, and advice to prospective investors both within and outside of our state. In many cases the sending of printed matter will not furnish the specific information desired, and not infrequently the satisfactory reply to a single communication has involved a search of several hours. In this line of work the survey is enabled to render very practical service to the people of the state; a service that is appreciated as is testified by the numerous letters of thanks which reach this office.

Very respectfully yours,

T. E. SAVAGE,

Assistant State Geologist.

TO PROF. FRANK A. WILDER,

State Geologist.