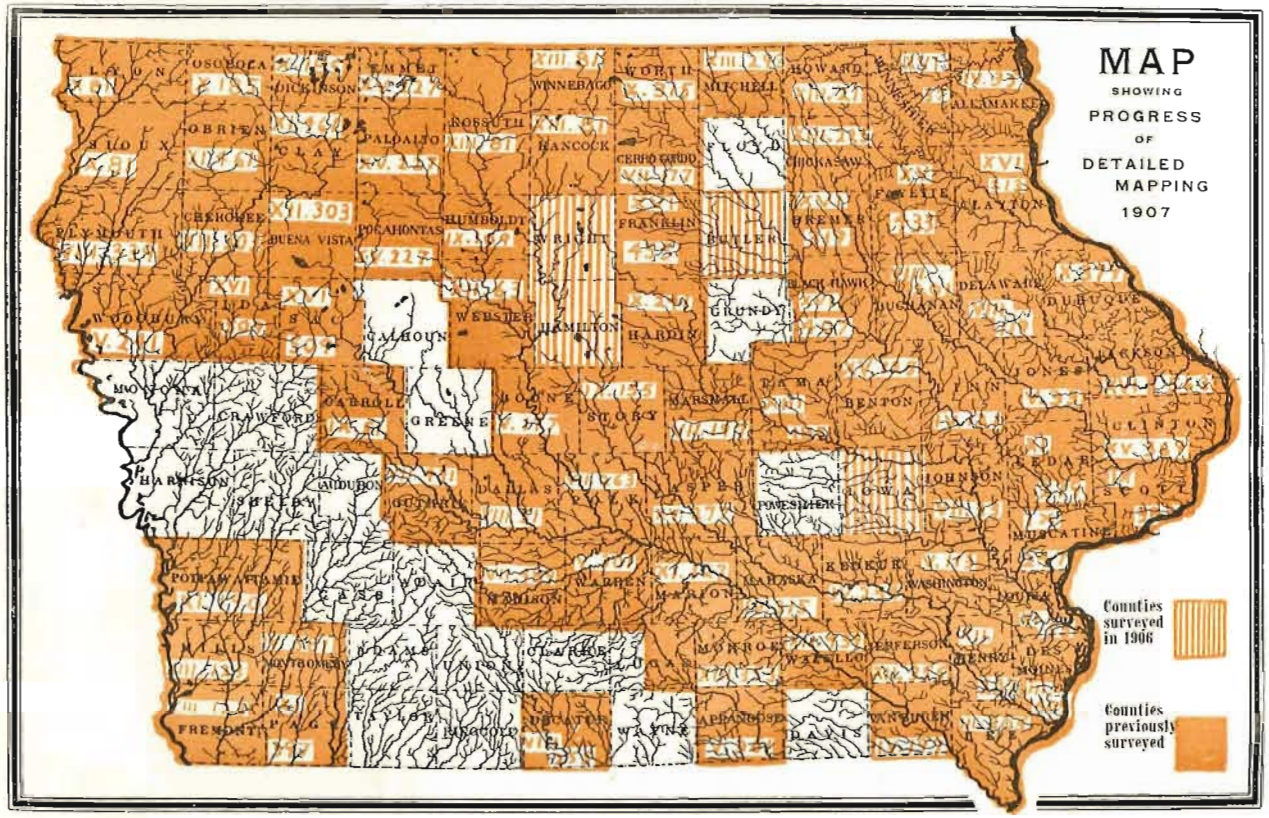
ADMINISTRATIVE REPORT

IOWA GEOLOGICAL SURVEY.



FIFTEENTH ANNUAL

Report of the State Geologist

IOWA GEOLOGICAL SURVEY,
DES MOINES, IOWA, DECEMBER 31, 1906.

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

GENTLEMEN:—Greatly to the regret of all concerned, Professor F. A. Wilder found it necessary to resign the Directorship of the Iowa Geological Survey during the year 1906, his resignation taking effect on the first of May last. The plans he had formulated for the season's work were, however, carried out as far as possible. For more than two years Professor Wilder had been engaged in a study of the coals of Iowa. Through his efforts the Iowa coals were among the first to receive attention at the Coal-Testing Plant of the United States Geological Survey at Saint Louis, and it was his plan to prosecute the work of investigation continuously till it should be completed. This personal work was, of necessity, suspended by his removal from the state. It is expected, however, that Professor Wilder will soon return to finish the investigation and prepare the report on Iowa coals in accordance with the original plans. Furthermore, about the beginning of the working season, and when it was too late to find suitable substitutes, some of the men who had been employed to take up certain other lines of work, found it impossible to carry out their engagements. Accordingly the field corps of the Survey during the last working season was smaller than usual. This condition was still further aggravated by the fact that un-

usual delays and difficulties, wholly unnecessary as far as appeared on the surface, were met in the printing of the annual report. The result was that the Assistant State Geologist was detained in the office during the entire working season, supervising work that should have been finished early in August at the latest. With all that could be done, the field season, in the case of this member of the geological staff, was lost. The most important line of investigation carried on by the Survey during 1906 related to the quarry products of the state. This work was done under the efficient direction of Dr. S. W. Beyer, who had as assistants in the field and laboratory Mr. Ira A. Williams and Mr. Walter B. Cole. Especial attention was given to the location, characters and extent of materials suitable for the manufacture of Portland cement. At present the people of Iowa, in common with the people of the civilized world, are interested in the question of cement materials as in scarcely any other question of purely geologic import. There is a practically unlimited market for Portland cement, its uses and applications are increasing in number and importance almost daily, and Iowa possesses the materials for its manufacture in almost limitless quantities. Letters by the score, making inquiry concerning the suitability of materials for cement making, have been received at this office during the year, and the geographical distribution of the post offices from which the letters were mailed clearly indicate an interest reaching to every corner of the state. At the present time the Mason City region is attracting more attention than any other. One company, financially strong, has located here, and others are studying the situation. The coming year will witness at least one plant in this locality in full operation. A strong company has options on lands containing coal as well as the raw materials for cement, at Harvey in Marion county, and preliminary work is progressing in a number of other localities. Iowa has been slow in recognizing her advantages in this direction, but there is now fair promise that our state will soon occupy a leading place in the production of one of the most necessary and important of modern structural materials. Professor Beyer's report on the quarries and quarry products of Iowa is herewith submitted for publication as volume XVII of the Reports of the Iowa Geological Survey.

The coal industry has flourished during the year, and the output for 1906 will show a substantial increase over that of former years. The commercial value of peat fuel has not yet been generally recognized, but the number of inquiries coming to the office would indicate an awakening of interest, and it should not be long until the resources of the state in this direction will be exploited and made to contribute to the wealth and comfort of the people. Experiments carried on in the Province of Ontario, Canada, render it practically certain that, with properly constructed machinery, peat may be made to compete with coal in economy and efficiency as a fuel for ordinary purposes of heating, while the Saint Louis experiments with the producer gas engine indicate the high value of this fuel as a source of power. The alarming and distressing effects of the fuel famine which now prevails in some of our neighboring states, emphasize the desirability of conserving and utilizing to the utmost each and all of our fuel resources.

The United States Geological Survey has continued its work in topographic mapping in Iowa, during the past season. The extent of the work so accomplished can be best set forth by quoting from the Annual Report of the Director of the National Survey for the fiscal year 1905-6. Speaking of Iowa he says "Two parties were engaged in field work during the season. The survey of the Des Moines quadrangle, in Polk and Warren counties, and of the Nebraska City (Nebraska-Iowa-Missouri) quadrangle, in Fremont county, was completed. This work is for publication on the scale of 1 : 62,500, with a contour interval of 20 feet. There were mapped in the course of this work 256 square miles in the above named quadrangles, and in addition 35 square miles beyond quadrangle limits; 587 miles of spirit levels were run, in the course of which 19 permanent bench marks and 4,466 elevations were determined; and 772 miles of linear road traverse were run."

In northeastern Iowa the topography has been developed by erosion of the indurated rocks, and the geologic mapping of the region becomes impossible without a topographic base map. This the United States Geological Survey has furnished by work done in the state during the past ten or twelve years, and the geological maps of Dubuque, Clayton, Fayette, Winneshiek and

most of Jackson are based on the topographic work of the National Survey. At the request of the Iowa Survey the topographic survey in Iowa has recently been transferred to the region of productive coal measures near Des Moines. Many of the problems relating to the occurrence of coal can be best studied in connection with an accurate topographic map, and it is the hope that the great productive coal area from Fort Dodge southward to the Missouri line will soon be covered with the topographic sheets of the United States Survey. By the action of the Legislature the State Survey may co-operate with the national bureau in hastening the work of topographic mapping. The State Survey will pay not more than half of the field expenses, while the National organization will pay the remainder and will assume all the expense of engraving and printing the topographic sheets.

Apart from the work incident to the study of the cement materials and other quarry products, field work has been prosecuted in a number of counties. Prof. M. F. Arey has completed a survey of Butler county, Prof. S. W. Stookey has worked in Iowa county, and Prof. T. H. Macbride has completed the field work in Wright and Hamilton counties. In addition to the work in the two counties named Professor Macbride has made a careful study of the distribution of flowing wells which have their origin in the Pleistocene deposits, extending his observations from the Minnesota line as far south as Poweshiek and Iowa counties. The information so collected is of very great interest and value.

The study of the underground waters of Iowa has been continued under the direction of Professor Wm. H. Norton, the expenses of the field work having been met by the U. S. Geological Survey. A very full report will soon be ready for publication.

With your sanction the Iowa Survey has co-operated with the Geological Survey of Illinois in the study of certain physiographic and geologic problems, of especial value from a scientific and educational point of view, found on both sides of the Mississippi river between Dubuque and Davenport.

Professor B. Shimek has continued his studies of the loess, gathering material for an exhaustive monograph on this important and exceedingly interesting formation. The loess constitutes the soil over a very large area of Iowa, and loess soil

A GEOLOGICAL MAP OF IOWA

SHOWING COMMERCIAL QUARRIES, LIME KILNS AND PORTLAND CEMENT PLANTS IN IOWA.

1907.

SAMUEL CALVIN,
STATE GEOLOGIST.

LYON · OSCEOLA · DICKINSON · EMMET · KOSSUTH · WINNEBAGO · WORTH · MITCHELL · HOWARD · WINNESHIEK · ALLAMAKEE

Rock Rapids · Sibley · Spirit Lake · Estherville · Northwood · Cresco · Decorah · Waukon

SIOUX · O'BRIEN · CLAY · PALO ALTO · HANCOCK · CERRO GORDO · FLOYD · CHICKASAW

Sheldon · Primghar · Spencer · Emmetsburg · Algona · Garner · Forest City · Mason City · Osage · Charles City · New Hampton

Hawarden · Orange City

PLYMOUTH · CHEROKEE · BUENA VISTA · POCAHONTAS · HUMBOLDT · WRIGHT · FRANKLIN · BUTLER · BREMER · FAYETTE · CLAYTON

Le Mars · Cherokee · Pocahontas · Dakotah · Humboldt · Clarion · Eagle Grove · Hampton · Allison · Waverly · West Union · Elkader · Guttenberg

Storm Lake

WOODBURY · IDA · SAC · CALHOUN · WEBSTER · HAMILTON · HARDIN · GRUNDY · BLACK HAWK · BUCHANAN · DELAWARE · DUBUQUE

Sioux City · Fort Dodge · Webster City · Iowa Falls · Eldora · Grundy Center · Cedar Falls · Waterloo · Independence · Manchester · Dubuque · Spechts Ferry

Sac City · Rockwell City · Ida Grove · Oelwein

MONONA · CRAWFORD · CARROLL · GREENE · BOONE · STORY · MARSHALL · TAMA · BENTON · LINN · JONES · JACKSON · CLINTON

Onawa · Denison · Carroll · Jefferson · Boone · Ames · Nevada · Marshalltown · Toledo · Tama · Le Grand · Vinton · Stone City · Anamosa · Hurstville · Maquoketa · Marion · Cedar Rapids · Belle Plaine · Clinton

Perry

HARRISON · SHELBY · AUDUBON · GUTHRIE · DALLAS · POLK · JASPER · POWESHIEK · IOWA · JOHNSON · SCOTT · CEDAR

Logan · Harlan · Audubon · Guthrie Center · Adel · DES MOINES · Newton · Colfax · Grinnell · Iowa City · Davenport · Marengo · State Quarry · Cedar Valley · Tipton

Missouri Valley · Stuart · Earlham · Montezuma · Red Rock · MUSCATINE · Muscatine

Atlantic · Winterset · Indianola · Whatcheer · Sigourney

POTTAWATTAMIE · CASS · ADAIR · MADISON · WARREN · MARION · MAHASKA · KEOKUK · WASHINGTON · LOUISA

Council Bluffs · Greenfield · Knoxville · Harvey · Oskaloosa · Washington · Wapello

Stennett · Pera

Glenwood · Creston · Afton · Osceola · Albia · Yarmouth

MILLS · MONTGOMERY · ADAMS · UNION · CLARKE · LUCAS · MONROE · WAPELLO · JEFFERSON · HENRY · DES MOINES

Red Oak · Corning · Chariton · Ottumwa · Fairfield · Mt Pleasant

Villisca · Eldon

Sidney · Shenandoah · Clarinda · Bedford · Mount Ayr · Corydon · Centerville · Bloomfield · Keosauqua · Burlington · Augusta

FREMONT · PAGE · TAYLOR · RINGGOLD · DECATUR · WAYNE · APPANOOSE · DAVIS · VAN BUREN · LEE

Leon · Ft Madison · Keokuk

INDUSTRIES.

- ⚒ QUARRY.
- ⊙ LIME KILN.
- ⚒ CRUSHER PLANT.
- × PORTLAND CEMENT PLANT.

NOTE: Symbols indicate general distribution rather than numbers or exact location of plants

LEGEND.

- CRETACEOUS
- PERMIAN
- CARBONIFEROUS
  - PENNSYLVANIAN
  - MISSOURI
  - DES MOINES
  - MISSISSIPPIAN
- DEVONIAN
- SILURIAN
- ORDOVICIAN
- CAMBRIAN
- PROTEROZOIC

IOWA LITHO. CO.

on surfaces of moderate slope is one of the most valuable, the most productive, the most easily cultivated. The supremacy of Iowa in the production of corn and all related products of the farm, is due in no small degree to the peculiarities of the loess and to the very extensive area over which it is spread. All studies, therefore, that can throw light on its history and origin are to be encouraged, and it is a pleasure to recognize the fact that in Professor Shimek we have the man best qualified by long observation and experience to undertake a thorough investigation of this remarkable and much misunderstood deposit. The results of his work will soon be ready for your consideration.

Dr. Charles R. Eastman of Harvard University has, for some time, been at work on a study of the Devonian fishes of Iowa. In no other state has such a large and interesting assemblage of fossil fish remains of Devonian age been found, and it is with pleasure and no small degree of pride that we look forward to the time, in the near future, when the unique types and full scientific significance of our Devonian fish fauna will be given to the world through the medium of the publications of the Iowa Geological Survey.

Our whole Devonian system deserves the most careful study. On the one hand are its extensive deposits of clays, cement rocks and other economic materials demanding attention on account of their commercial importance, and on the other hand are its many remarkable groups of ancient forms of life inviting study from a more purely scientific point of view. The Iowa Devonian differs in marked ways from Devonian sections in other parts of our country. It is already a standard in the world of geologic science, but it still needs thorough, detailed investigation and description to bring out all the characteristics of economic and scientific importance, which for the benefit of the future citizen and student, should be placed on permanent record. To Iowa the scientific world has learned to look for the standard American section of the deposits of the great ice age, for here the records of the successive glacial invasions of the Pleistocene period are most complete and have been most satisfactorily deciphered. The unusually favorable opportunities afforded by the geological formations of the state to shed light on a number of important world problems, impose obligations that ought not to be

neglected. Iowa owes it to herself and to science to make known to the world her wealth of scientific facts, as well as her economic products.

The increasing use made of the reports of the Survey in High Schools and Colleges, in connection with studies relating to the Geography, Physiography, Geological structure and Economic resources of the state, is very encouraging; for the general call for literature descriptive of Iowa, in a form that may be used in classes, indicates the growth of clearer knowledge on the part of the citizens to be, concerning the state and its possible geologic products. Many thousands of dollars have, in the past, been spent in uninformed efforts to discover deposits of commercial importance at points where such deposits could not possibly exist. To help our people to see what our resources are and how to proceed intelligently to develop them, is to render them a service of the highest value. Among the educators of the state there is a great demand at present, a demand that is sure to grow as the years go by, for a moderate sized volume descriptive of the state as a whole, and I recommend that, as soon as possible, an effort be made by the Survey to meet this demand.

Progress has been made during the year in collecting and arranging the material for the general volume on the Geology of Iowa. It will be some time before the work can be completed. This volume will necessarily be larger, fuller and more technical than the educational volume contemplated in the preceding paragraph.

I have the honor to remain, gentlemen,

Yours very sincerely,

SAMUEL CALVIN.

REPORT OF THE ASSISTANT STATE GEOLOGIST

IOWA GEOLOGICAL SURVEY,
DES MOINES, DECEMBER 31, 1906.

DEAR SIR:—I have the honor to submit the following report of my work during the year 1906:

I was called to take charge of the Des Moines office of the Survey on the first of May upon the resignation of Mr. Savage and at once began assisting him in the compiling of the large geological map of the state which accompanies volume XVI of the reports. After this the work of proof-reading the Supplementary Report on Portland Cement Materials in Iowa, by Professor S. W. Beyer, occupied some time. This report constitutes Bulletin No. 3 of the Survey reports.

After the completion of this work the preparation of the different papers of volume XVI for the printer was undertaken, also the supervision of the making of the plates for illustrating the volume. A task which involved a great amount of time and detailed work was that of revising and correcting the proofs of the county and state maps which were made this year, including those for Winneshiek, Jackson, Bremer and Franklin counties. Especial care has been taken to have these maps uniform in color schemes and patterns with the best maps of previous volumes. In the case of the wall map of the state the colors used are the same as those adopted for the recent geological map of North America issued conjointly by the Canadian, United States and Mexican Surveys.

Owing to great delay in setting up the material of the report, the printing was not completed until late in the autumn and hence there was no opportunity for carrying on any field work, but the entire summer had to be spent in the office. It is now clear that at least two months spent in expectation of proof

from the printer might have been used to good advantage in the field and the report published as early as was ultimately the case. As it was, the report was not delivered to this office until the close of the year. It is much to be hoped that future volumes can be issued without so much unnecessary delay.

The last few days of the year have been spent at Iowa City in making a complete set of photographs from the negatives in the possession of the Survey and of the Director. This set when bound will be a valuable addition to the library of the Survey. A similar but somewhat less complete set will be mounted in a case in the Survey museum for more ready inspection by visitors.

A large amount of correspondence has been carried on with persons who are interested in the natural resources of the state. Many persons and corporations are desirous of learning the advisability of investing capital in the Portland cement industry and we have been called upon to furnish such information as we possess. This we have done and have in this way distributed a large number of copies of Bulletin No. 3, and of the paper by Bain and Eckel on Cement and Cement Materials of Iowa, which appeared in volume XV of the annual reports. Interest in the clay and other industries of the state is also active both within and without our state and we are frequently in receipt of requests for reports and other data.

In addition there have been sent to the office numerous samples concerning the economic value of which, information has been desired. So far as possible this information has been furnished and considerable time and labor have been given to this part of the work and to making such qualitative determinations as are possible with the equipment at hand.

During the current year there has been collected and turned into the State Treasury from the sale of reports, as required by law, $62.79.

The following publications have been added to the library of the Survey:

United States Geological Survey: 26th Annual Report, 1904-1905.
Monograph 48; Status of Mesozoic Floras of U. S., Ward.
Mineral Resources of the United States, 1904.
Bulletins 268-301.
Water Supply Papers 153-186.
Professional Papers 43-55.

Annual Report of the Smithsonian Institution, 1904.
Proceedings of the U. S. National Museum, Vols. 29 and 30.
Geological Survey of Ohio, Bulletins 4, 5 and 6.
Topographic Survey of Ohio, 1904.
Geological Survey of New Jersey, Annual Report, 1905.
North Carolina Geological Survey, Building and Ornamental Stones.
Department of Geology and Natural Resources of Indiana, 30th Annual Report, 1905.
North Dakota Agricultural College Survey: Biennial Report, 1903-4.
Maryland Geological Survey; Report on Pleistocene and Pliocene.
Kentucky Geological Survey; Report of Progress, 1905, Bulletins 1, 2, 4, 5.
Illinois Geological Survey, Bulletins 1-3.
Missouri Botanical Garden, 1906.
Bulletins of Ohio Department of Agriculture.
Bulletins of Georgia State Board of Entomology.
Ohio State University, Mycological Bulletins.
Bulletins of the University of Montana.
Colorado College Publications.
Bulletins of the Department of Geology of the University of California, Vol. 4.
Science Bulletin of the University of Kansas, Vol. III.
Proceedings of the Davenport Academy of Sciences, Vol. XI.
Missouri Historical Society Collections, Vol. 2.
Transactions of the Academy of Sciences of St. Louis, Vol. XVI.
Proceedings of the Rochester Academy of Sciences, Vol. 4.
Journal of the Cincinnati Society of Natural History, Vol. XX.
Transactions of the American Institute of Mining Engineers, Vol. XXXVI.
Technology Quarterly, Vol. XIX.
Coal Trade Journal, Vol. XLV.
Black Diamond, Vols. 36 and 37.
Engineering and Mining Journal, Vols. 81 and 82.
Cement and Engineering News, Vol. XVII.
Rock Products, Vol. V.
Clay Record, Vols. 28 and 29.
Clay Worker, Vols. XLV and XLVI.
Brick, Vols. XXIV and XXV.
American Producer, Vol. V.
Mines and Minerals, Vols. XXVI and XXVII.
Geological Survey of Canada, Vols. XIV and XV.
Ontario Bureau of Mines, 1904.
Ontario Agricultural and Experimental Union, 27th Annual Report, 1905.
Memoirs of the Geological Survey of Great Briain, 1905.
Proceedings of the Geologists' Association, London, Vol. XIX.
Transactions of the North of England Institute of Mining and Mechanical Engineers, 1906.
Memoirs and Proceedings of the Manchester Literary and Philosophical Society, Vol. 50.
Transactions of the Royal Geological Society of Cornwall, England, Vol. XIII.
Proceedings of the Royal Society of Edinburgh, Vols. 25 and 26.
Proceedings of the Royal Philosophical Society of Glasgow, Vol. XXXVI.
Geological Commission of the Cape of Good Hope; 10th Annual Report, 1905.
Geological Society of South Africa, 1906.

Geological Survey of Queensland, Report, 1905, 1906.
South Australia, Mining Operations in, 1905, 1906.
South Australia Geological Survey, 1906.
Western Australia Geological Survey, 1906.
Victoria Department of Mines, Annual Reports, 1905, 1906.
New South Wales, Geological Survey, Vol. VIII, 1905.
New South Wales, Department of Mines, Annual Report. 1905.
Memoirs, 1905.
Proceedings of the Royal Society of Victoria, Vol. XVIII, 1906.
Transactions of the Australian Institute of Mining Engineers, Vol. XI, 1906.
New Zealand Geological Survey, Bull. No. 1, 1906.
Boletins del Instituto Geologico de Mexico, 1905, 1906.
Publications of Sociedad Cientifica "Antonio Alzate," Mexico, 1905.
Anales de la Academia de Ciencias de la Habana, Vol. XLII, 1906.
Bulletins Commisao Geog. and Geol. do Sao Paulo, Brazil.
Revista da Sociedade Scientifica de Sao Paulo, 1905.
Boletin del Cuerpo de Ingenieros de Minas del Peru, 1906.
Anales del Museo Nacional de Buenos Aires, 1905.
Mitteilungen des Vereins für Erdkunde zu Leipzig, 1903, 1904.
Geognostische Jahreshefte, 1904.
Jahrbuch der St. Gallisches naturwissenschaftlichen Gesellschaft, 1905.
Verhandlungen der schweizerischen naturforscheiden Gesellschaft in Luzern, 1905.
Vierteljahrschrift der naturforscheiden Gesellschaft in Zurich, 1906.
Sammlungen des Geologischen Reichsmuseums in Leiden, Vol. VIII, 1906.
Tromso Museum Publications, 1904.
Sveriges Geologiska Undersökning, 1906.
Nyt Magazin for Naturvidenskaberne, Christiania, Vol. 44, 1906.
Bulletin de la Commission Geologique de Finlande, 1905.
Publications of Bergen Museum, 1905, 1906.
Verhandlungen der russisch kaiserlichen mineralogischen Gesellschaft zu St. Petersburg, 1905.
Annales Historico-Naturales Musei Nationalis Hungarici, Vol. IV, 1906.
Jahresbericht der königl, böhmischen Gesellschaft der Wissenschaften, 1905.
Acta Universitatis Lundensis, 1902-1905.
Bulletin of Geol. Institution of University of Upsala, 1905.
Bulletins de la Societe Belge de Geologie, 1905, 1906.
Commission Geodesique Neerlandaise; Determinations of Latitude and Azimuth.
Bulletin Museum D'Histoire Naturelle, Paris, 1906.
Bulletin Societe Neuchateloise des Sciences Naturelles, No. XXXII, 1903, 1904.
Bulletin de la Societe Geologique de Normandie, Vol. XXV, 1905.
Bulletin de la Societe Vaudoise des Sciences Naturelles, Vols. XLI and XLII, 1905, 1906.
Le Globe, Journal Geographique, Vol. XLV.
Revista de la Real Academia de Ciencias de Madrid, Vol. IV, 1906.
Memorias of above Academia, Vols. 22 and 24, 1905, 1906.
Publications of Commissao do Servico Geologico de Portugal, Vol. VI, 1904-1905.
Societa Geographica Italiana, Vol. VII, 1906.
Atti della Societa Italiana di Scienze Naturali, Milan, Vol. XLV, 1906.
Publications of Geological Survey of Japan.

Very sincerely yours,
JAMES H. LEES.

TO PROFESSOR SAMUEL CALVIN, State Geologist.