

REPORT OF

JAMES HALL,

IN RELATION TO THE

**GEOLOGICAL SURVEY,**

OF THE

STATE OF IOWA:

To the Governor and Eighth General Assembly.

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DES MOINES, IOWA:

JOHN TEESDALE, STATE PRINTER.

1860.

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JAMES HALL,

STATE GEOLOGIST.

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To the Governor and Fifth General Assembly.

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REPORT.

To His EXCELLENCY,

THE HON. RALPH P. LOWE,

GOVERNOR OF IOWA:

SIR:—In conformity to the requirements of the law authorizing the Geological Survey of Iowa, I submit herewith a statement of the condition of the work at this time.

The Report already communicated, as the result of the survey of the eastern half of the State, was completed and the volume ready for delivery near the end of 1858; at which time I brought to your Excellency, and to the State Officers at the Capitol, copies of the work. I have subsequently distributed the copies as directed by yourself, and by the advice of Prof. Agassiz, to such European Societies as were best entitled to receive them; while the greater part remaining of the 3000 copies have been forwarded to the Hon. E. Sells, Secretary of State, or to other addresses according to his order.

As nearly all my time to the month of December was occupied in the publication of the Report and the superintendence of the engraving, I was not able to perform any field labor. During the season, however, two Assistants were employed, mainly in working out the details of some portions of the country before explored, and which seemed to require further examination. Mr. E. A. Cooley, of Marion, Linn county, was occupied in the counties of Linn, Benton and Cedar; and has communicated his Report and

Maps of the same, for incorporation in the next volume of the Report.

Regarding it of great importance to be able to present a continuation of the explorations of the counties known to be occupied by the coal measures, I employed Mr. B. S. Lyman to go on with the work as begun by Mr. Worthen in the adjacent counties; and he communicated to me his reports on the counties of Lucas, Monroe and Appanoose, together with geological maps of the same, and numerous carefully measured sections, in which all the known openings and exposures of the coal are shown, with accurate measurements of all the coal seams. These reports, with the maps and sections, I shall lay before your Excellency at an early period.

The examinations thus carried on I regarded as of essential importance to the economic interests of the Survey; and all that I was able to do, with the amount of money at my disposal; which, after paying some charges due, was not sufficient to allow me to form any effective organization for working out the Geology of the western part of the State. I hope, therefore, that the plan may meet with your approval.

The volumes of the Report intended for foreign distribution, have been sent, through the Smithsonian Institution, to the following Societies, Libraries and Institutions. A few only to the sovereigns\* of these countries.

## SWEDEN.

Lund—Kongliga Universitetet.

Stockholm—Kongliga Svenske Vetenskaps Akademien.

Upsala—Kongliga Universitetet.

## NORWAY.

Bergen—Bergenske Museum.

Christiania—Kongelige Norske Universitet.

## ICELAND.

Reykjavik—Islands Stifisbokasafu.

\*Having had no opportunity of consulting you in regard to this matter, I have preferred to await your directions, except in the few instances mentioned.

## DENMARK.

Kiobenhavn (Copenhagen)—Kongelige Bibliothek.  
Kongelige Danske Videnskabernes Selskab.  
Skandnaviske Naturforskeres Forsamling.

## RUSSIA.

Dorpat—Dorpater Naturforscher-Gesellschaft.  
Helsingfors—Societas Scientiarum Fennica.  
Moskwa (Moscow)—Societe Imperiale des Naturalistes.  
St. Petersburg—His Imperial Majesty the Emperor of Russia.  
Academie Imperiale des Sciences.  
Kais. Ruso. Mineralogische Gesellschaft.  
L' Estat. Major In Corpes Ies Ingenieure des  
Mines de Russie.

## HOLLAND.

Amsterdam—Koninklijke Akademie von Wetenschappen.  
Groeingen—Commission General pour la Reconnaissance Geologique de la Neerlande.  
Haarlem—Hollandsche Maatschappij des Wetenschappen.  
Leyden—Museum d'histoire Naturelle.  
Utrecht—Provinciaal Utrechtsch Genootschap von Kunsten en Wetenschappen.

## GERMANY.

Berlin—Seine Majestat der Konig von Preussen.  
Deutsche Geologische Gesellschaft.  
Gesellschaft Naturforschender Freunde.  
Koniglek Prussische Akademie der Wissenschaften.  
Bonn—Universitats Bibliothek  
Prania Wiegmann's Archiv fur Naturgeschichte.  
Breslau (Prussia)—Kaiserliche Leopoldinisch-Carolinische.  
Akademie der Naturforscher.  
Universitats-Bibliothek.  
Cracau (Austria)—K. K. Universitats Bibliothek.  
Darmstadt (Hessia)—Grossherzogliche Bibliothek.

Dresden (Saxony)—Seine Majestat der König von Sachsen Gesellschaft "Isis."

K. Sammlung für Kunst Wissenschaften.

Düsseldorf (Prussia)—Gesellschaft Naturforschender Freunde Westphalens.

Emden (Hanover)—Naturforschende Gesellschaft.

Erlangen (Bavaria)—Universitäts Bibliothek.

Frankfort am Main (Hansetown)—Sechenbergische.

Naturforschende Gesellschaft.

Freiberg (Saxony)—Königlich Sachsische Bergakademie.

Freiburg (Baden)—Universitäts Bibliothek.

Gießen (Hessia)—Universitäts Bibliothek.

Göttingen (Hanover)—Universitäts-Bibliothek.

Gratz (Austria)—Universitäts-Bibliothek.

Halle (Prussia)—Universitäts-Bibliothek.

Hamburg (Hansetown)—Naturwissenschaftlicher Verein.

Heidelberg (Baden)—Universitäts-Bibliothek.

Jena (Saxony)—Universitäts-Bibliothek.

Karlsruhe (Baden) Grossherzogliche Hofbibliothek.

Königsberg (Prussia) Universitäts-Bibliothek.

Leipzig (Saxony) Dr. Felix Flügel (*Agent of Smithsonian Inst.*)

Naturhistorische Gesellschaft.

Universitäts-Bibliothek.

Luxembourg—Societe des Sciences Naturelles du Grand-Duché de Luxembourg.

Marburg (Hessia) Universitäts-Bibliothek.

München (Munich) (Bavaria) Königlich Bayerische.

Akademie der Wissenschaften.

Königlich Universitäts-Bibliothek.

Nürnberg (Bavaria) Naturhistorische Gesellschaft.

Pesth (Austria) Universitäts-Bibliothek.

Preg (Austria) Das Böhmische Museum.

Universitäts-Bibliothek.

Stuttgart (Wurttemberg) Königl. öffentl. Bibliothek.

Tübingen (Wurttemberg) Universitäts Bibliothek.

Wien (Vienna) (Austria) Kais. Akademie der Wissenschaften.

" K. K. Geologische Reichsanstalt.

Wurtburg (Bavaria) Universitäts-Bibliothek.

SWITZERLAND.

Basel—Universitäts-Bibliothek.

Bern—Universitäts-Bibliothek.

Geneve—Societe de Physique et d'Histoire Naturelle.

Lausanne—Societe Vaudoise des Sciences Naturelles.

Neuchatel—Societe des Sciences Naturelles.

Zürich—Universitäts-Bibliothek.

Ecol Polytechnique Federale.

BELGIUM.

Bruxelles, (Brussels)—Acad. Roy. des Sciences, des Lettres et des Beaux-Arts de Belgium.

Liege—Societe Royale des Sciences.

Louvain—Universite Catholique.

FRANCE.

Bordeaux—Societe Linneane de Bordeaux.

Caen—Societe Linneane de Normandie.

Lyons—Societe Imperiale d'Agriculture, d'Histoire Naturelle et des Artes Utiles de Lyon.

Societe Linneane de Lyon.

Metz—Societe d'Histoire Naturelle du Department de la Moselle.

Montpellier—Academie des Sciences et lettres a Montpellier.

Paris—Bibliotheque du Jardin des Plantes.

Ecole Imperiale des Mines.

Academie de l'Institut de France.

Societe Geologique de France.

Rouen—Academie de Science, Belles Lettres et Arts.

Strasbourg—Academie des Science Naturelles.

ITALY.

Firenze, (Florence)—Imperiale e Reale Museo di Fisica e Storia Naturale di Firenze.

Milano—Imperiale Regio Instituto Lombardo di Scienze, Lettere ed Arti.

Napoli, (Naples)—Reale Instituto d'Incorriamento alle Scienze Naturali.

Padova, (Padua)—Imperiale Regia Academia di Scienze, Lettere ed Arti di Padova.

Pisa—University Library.

Roma—Academia Pontificia dei Nrovi Lincei Bibliotheca Vaticana.

Teeino, (Turin)—Academia Reale delle Scienze.

Venezia, (Venice)—I. R. Istituto Veneto di Scienze, Lettere ed Arti.

PORTUGAL.

Lisboa, (Lisbon)—Academia Real des Sciences.

SPAIN.

Madrid—Real Academia de Ciencias de Madrid.

GREAT BRITAIN AND IRELAND.

Belfast—Library of Queen's College.

Natural History and Philosophical Society.

Berwick on Tweed—Berwickshire Naturalist's Club.

Cambridge—Cambridge Philosophical Society.

University Library.

Cork—Library of Queen's College.

Dublin—Dublin University Philosophical Society.

Geological Society of Dublin.

Library of Trinity College.

Royal Irish Academy.

Edinburgh—Edinburgh New Philosophical Journal.

Royal Society.

University Library.

Wernerian Society of Natural History.

Glasgow—University Library.

Liverpool—Free Public Library, Museum and Gallery of Art of the Town of Liverpool.

London—His Royal Highness Prince Albert.

Annals and Magazine of Natural History.

Athenæum Club.

British Association for the Advancement of Science.

British Museum.

Geological Society of London.

Library of the House of Commons.

London, Edinburg and Dublin Philosophical Magazine.

London Institution, (Fensbury Circus.)

Museum of Practical Geology.

Royal Agricultural Society of England.

Royal Geographical Society of London.

Royal Institution of Great Britain.

Royal Society of London.

University College.

Manchester—Literary and Philosophical Society of Manchester.

Maynooth—College Library.

Newcastle-upon-Tyne—Natural History Society of Northumberland, Durham and Newcastle-upon-Tyne

Oxford—Ashmolear Society.

Penzance—Royal Geological Society of Cornwall.

St. Andrews—University Library.

Salford—Salford Borough Royal Museum and Library.

York—Yorkshire Philosophical Society.

Woolwich—Military Academy.

GREECE.

Athens—University Library.

AFRICA.

Cape Town—South Africa Museum.

Mauritius—Societe' d'Histoire Naturelle de l'Isle Maurice.

ASIA.

Batavia—Bataviasche Genootschap von Konsten en Welens-  
chappen.

Bombay—Royal Asiatic Society.

Calcutta—Asiatic Society.

## AUSTRALIA.

Hobarton—Royal Society of Van Dieman's Land.

## AMERICA.

Havana, (Cuba)—Real Sociedad Econonuca.

Lima—University Library.

Mexico—El Museo Nacional.

Rio Janeiro—Royal Geological Society.

Santiago—University Library.

Twenty-five copies were sent for distribution by the Smithsonian Institution.

The Supplement to my Report on the Palæontology of the State, which you directed me last year to furnish, as being the material partially prepared for the first Report, is now nearly completed. This preliminary step will secure to the Survey of Iowa the priority in the descriptions of numerous species of crinordea and other fossils, which abound in the rocks of Burlington and Keokuk; and which will form most appropriately a part of the Geological Report of the State.

In this department I have not suffered my work to cease; and knowing from experience the great labor attending the preparation of any valuable work on Palæontology, I have been gradually arranging and studying all the materials that I have been able to procure. Moreover, as the time and means usually allowed for a Geological Survey do not admit of a complete collection of fossils being made in many localities, we are often obliged to rely upon persons living upon the ground.

In this respect I have been so fortunate as to secure for the use of the future Reports the very valuable collections of Mr. C. A. White, of Burlington, whose specimens of crinordea exceed any other known to me. The Rev. Mr. Barris of the same place has also most generously offered me any part of his collection that I may find desirable. The Hon. T. S. Parvin of Muscatine, whose labors in Natural Science have been continued through many years, has also offered the use of any part of his valuable collection, that may serve to enrich this department of the Survey.

To Mr. Kellogg, of Keokuk, I am likewise indebted for the use of some interesting specimens of crinordea; and I feel confident that the Palæontology of the Survey may appear in the next Report as full and interesting as in the preceding one.

In reference to the future of the Survey, I must leave the matter to you, and to an intelligent Legislature, who, appreciating at its true value what has already been done, will act according to their convictions of what may be required for the permanent advantage of the State.

Thus far, we believe that the Survey has been carried on in a most economical manner, and that the amount of work done, and the results as shown in the Report, will compare favorably with similar work in any other State.

The western half of the State, being less accessible by rivers and other avenues, and more sparsely populated than the eastern part, will require a greater outlay to carry on the work than in that part already explored. From my experience in the eastern part of the State, I would recommend that not less than three years be allotted to the completion of the field work in Western Iowa, in order to give to the examination that degree of attention which will enable us to do justice to the State and to ourselves.

To carry on this Survey in a manner that will accomplish the work most thoroughly and most economically, we shall require an appropriation of—

With the practical knowledge that we already have of the geological structure of the eastern half of the State, we feel that we can go on with working out the Geology of the western half of the State under many advantages; and as that portion of the State is now inviting emigration, we believe that a thorough investigation and exploration of the character of the soil and mineral resources, would serve more than anything else to bring into notice this valuable region of country.

At the same time, should the circumstances preclude the plan proposed, I would earnestly recommend that the Survey be not allowed to terminate at this time. The experience of other States has shown that when once suspended, and a renewal has followed, much work once accomplished has to be done over again before

the parties become prepared to carry on the plan of the Survey, and the result has in the end been far more expensive than it would have been to have carried on the work continuously.

If it shall be thought unwise to continue the Survey as proposed, with a view to its completion in three years, I would suggest that a small sum of one or two thousand dollars annually be appropriated to enable me to keep an Assistant in the field, who can gather information of the economical resources, and make collections of fossils. This latter will greatly facilitate future working, in determining by their study the age of the strata; and will also afford me time the more satisfactorily to prepare these materials gradually for the future Report; and to give that part of the work the completeness so desirable in the results of a Geological Survey, which is to be regarded as a standard work for the people of the State.

With such a sum, I will pledge myself to show, at the end of two or three years, some satisfactory results; nevertheless, this work would be mainly preliminary to the labor of following out and mapping the extent and distribution of the geological formations.

I make this suggestion in reference to the Survey, since I have heard from various sources that it might be difficult, at the present time, to get the appropriation necessary for carrying on the Survey; and feeling that an entire cessation of the work would be a misfortune to all parties.

Personally, I cannot but feel a deep interest in the completion of the work. The labor in the field of Iowa Geology has opened new views in regard to many important questions. The generosity and confidence with which I have been treated, have inspired in me an affection for the State and her people. The cordial expression of satisfaction with which the work already published has been received by the scientific world, is grateful to me, as I trust it may be to the people of the State; but this expression only stimulates me to show that there is yet more to be done, of equal interest and importance; and having entered the field, I have a natural, and, I believe, a laudable ambition to present a Geologi-

cal Report on Western Iowa which shall in no wise prove inferior to that of Eastern Iowa.

Submitting myself to your direction, and to the disposition of an enlightened Legislature, I remain, with great respect,

Your obedient servant,

JAMES HALL.

ALBANY, Dec., 1859.