
BIBLIOGRAPHY OF IOWA GEOLOGY

BY

CHARLES ROLLIN KEYES.

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Before entering upon any investigation a knowledge of what has already been done in the same line is very essential, in order that labor may not be uselessly expended in duplicating work.

In glancing over the titles herein enumerated, the majority of the people in the State will probably be impressed at once with the large number of references, and with the apparently extensive literature pertaining to the geology of Iowa. More careful perusal, however, will doubtless bring out the striking fact that with few exceptions the publications are purely scientific in character. The reason for this is not far to seek. For a long period of years past scientific work in the State has received little or no public aid or encouragement. Whatever work has been carried on has been done at private expense by scientific men who have received no financial compensation in return for either their time or the money necessary to prosecute their researches. Thus, only the purely scientific results were placed before the world; while all the economic aspects of the various lines of investigation were unable to be directed through those channels most likely to reach the people of the State. This information has therefore been largely forgotten or put away in places now almost entirely inaccessible to the public. Nevertheless, the scientific work

so generously done by persons having no hope of reward or public aid has placed the economical investigation of Iowa's natural resources on a firmer basis than could possibly have been done otherwise, without years of special labor.

The arrangement of the present index to the literature pertaining to the geology of Iowa was intended, primarily, for the convenience of members of the Survey. Portions of it, as a card catalogue of authors, was originally started some years ago. A large number of additions have been made recently, and the whole is brought together now in the form of a bibliography of the subject.

The plan is essentially that of a dictionary catalogue or bibliographical index. It consists of:

(1) An author's list, in which is given the full title, volume, pages, and illustrations of the book or serial in which each article appeared, place and date of publication. This is followed by a very brief synopsis of the contents of each paper.

(2) A title index, in which the name of each article appears under each of its leading words. Then comes the name of the author and an abbreviated reference to its place of appearance.

(3) Subject entries and cross-references. These embrace, under each topic, all references to any particular subject, as to each county, geological formation, zoological group, special subject, etc.; also those writings referring to Iowa in general. The names of authors, and abbreviated references to place and time of publication are given in all cases. Whenever additional information is wanted, reference can be made to the name of the author.

For convenience the whole is arranged alphabetically.

It is believed that the list of papers is fairly complete; though doubtless there are some omissions.

One of the most noticeable considerations connected with the bibliographical index is the fact that the literature is so widely scattered, and now largely inaccessible to the people of the State. The last of the two earlier geological reports was issued nearly a quarter of a century ago. They were rather sparingly distributed, and during the period which has elapsed since their publication most of the copies have been lost, destroyed, or passed beyond the boundaries of the State. In the meantime the population has largely increased, so that if the reports were all at hand the supply would be inadequate. A goodly number of references have appeared in the publications of leading societies and have had a limited distribution, a large share of which has been foreign. Many of the papers referring to the geological phenomena as presented in Iowa are found in the reports of other states; still others are scattered far and wide through various journals and serials, both in English and foreign languages; besides, there are many short articles, and more or less lengthy allusions included in the long list of publications printed by the Federal government. A large majority of these descriptions are unknown to the people of the State, who, consequently, know not where to look for the information desired.

Yet all these have to be gone over, involving so much time and labor that considerable hesitancy arises before the preparation of indices of this kind are entered upon finally.

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General description of the characters. James Hall. (Geol. Iowa, I, 49-51 1858.)

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- Call, R. Ellsworth.** Natural Gas in Iowa. (Iowa Weather and Crop Service, vol. III, pp. 6-7. Des Moines, 1892.) Mention of the several reported occurrences of natural gas in Iowa.
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- Call, Ellsworth R.** Preliminary Paper on Artesian Wells in Iowa. (Monthly Review of Iowa Weather and Crop Service, vol. II, No. iv, pp. 1-6. Des Moines, 1891.) A table of the wells of the State, their location, depth and character of the water.
- Call, R. Ellsworth.** The Loess in Central Iowa. (Am. Naturalist, vol. XV, pp. 782-784. Philadelphia, 1881.) Announcement of its occurrence at Des Moines. Also list of some fossils found in it.
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Description of a section near the terminal moraine
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tion of the different beds belonging to the Devonian,
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City, 1888.) *Spirifera urbana* described as new.

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the Cretaceous fossils found in the drift near Mt. Ver-
non, in Linn county.

Calvin, S. New Species and New Genus of Tubicolar
Annelida. (Am. Geologist, vol. I, pp. 24-28. 1888.)
An account and description of a worm found infesting
the Devonian corals near Iowa City. The following
genus and species described as new:

Streptindytes.

Streptindytes acervularia.

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apolis, 1892.) A short account of the difference between the two species at Independence, Iowa, and elsewhere.

Calvin, S. Notes on a Collection of Fossils from the Lower Magnesian Limestone, from Northeastern Iowa. (*Am. Geologist*, vol. X, pp. 144-148. 1892.) Short notes on various fossils. The following species, without figures, described as new:

Straparollus claytonensis.

Straparollus pristiniiformis.

Raphistoma multivolutum.

Raphistoma paucivolutum.

Cyrtoceras luthei.

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Calvin, S. On some Dark Shale recently Discovered below the Devonian Limestones, at Independence, Iowa; with a Notice of its Fossils and Description of new Species. (*Bulletin United States Geol. and Geog.*

Calvin, S.—Continued.

Sur. Terr., vol. IV, pp. 725-730. 1878.) A short account of the rocks of the locality, with remarks on some of the fossils. The following species are regarded as new:

Strophodonta variabilis.

Strophodonta quadrata.

Orthis infera.

Rhynchonella ambigua.

Gypidula munda.

[**Calvin, S.**] On the Chert of the Upper Coal Measures in Montgomery County, Iowa. (Am. Geologist, vol. I, pp. 116-117. Minneapolis, 1888.) A brief comparison of Iowa cherts with those of Ireland.

Calvin, S. On the Fauna found at Lime Creek, Iowa, and its relation to other Geological Faunas. (Amer. Jour. Sci., (3), vol. XXV, pp. 434-436. 1883.) A criticism on Williams' paper on the same subject, with additional notes and a description of *Spirifera macbridei*, regarded as new.

Calvin, S. Some Geological Problems in Muscatine County, Iowa. (Bul. Lab. Nat. Hist. State Univ. Iowa, vol. I, pp. 7-18. Iowa City, 1888.) A description of certain rocks about Muscatine, showing that they are Devonian instead of lower Carboniferous. Numerous references to fossils given.

Calvin, S. Relation of the Cretaceous Deposits of Iowa to the Subdivisions of the Cretaceous proposed by Meek and Hayden. (Proc. Iowa Acad. Sci., vol. I, pt. iii, pp. 7-12. Des Moines, 1893.) The Cretaceous deposits in the vicinity of Sioux City described in detail.

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tion of the Supposed Kinderhook near the Mouth of Pine Creek. (Am. Geologist, vol. III, pp. 25-36. Minneapolis, 1889.) Special account of certain yellow sandstones in Muscatine county, formerly referred to the Kinderhook, but now shown to be Devonian in age.

Calvin, S. Some New Species of Paleozoic Fossils. (Bul. Lab. Nat. Hist. State Univ. Iowa, vol. I, pp. 173-181. Iowa City, 1890.) The following species described as new:

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- Schizodus symmetricus.*
- Holopea grandis.*
- Straparollus lativolvis.*
- Straparollus bicarinatus.*
- Straparollus tricarinatus.*

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Cambrian.

Brief general account. W. J. McGee. (Eleventh Ann. Rep. U. S. Geol. Sur., 333-334. 1892.)

Correlation of Potsdam rocks in northeastern Iowa. C. D. Walcott. (Bul. 81, U. S. Geol. Sur., 187-188. 1891.)

Description of the lower sandstone of the Upper Mississippi (Potsdam). D. D. Owen. (Geol. Sur. Wis., Iowa and Minn., 48-58. 1852.) A detailed account of its lithological characters, range and paleontology.

Capellini, J., et O. Heer. Les Phyllites Crétacées du Nebraska. (Mém. Soc. Helvétique des Sci. nat., t.

Capellini, J.—*Continued.*

XXII, pp. 1-24. 1867.) Description of the Cretaceous deposits of the upper Missouri region.

Carboniferous (Lower).

Age of Certain Sandstones near Iowa City. C. R. Keyes. (Proc. Iowa Acad. Sci., 1890-1891, 26. 1892.) Owing to the recent discovery of fossils in the sandstones near Iowa City, the suggestion is made that their age may be Kinderhook (lower Carboniferous) instead of Upper Coal Measures as have been heretofore regarded.

Artesian Wells in Iowa. R. E. Call. (Proc. Iowa Acad. Sci., 1890-1891, 57-63. 1892.) A description of a well in the Carboniferous.

Attachment of *Platyceras* to *Palæocrinoids*. C. R. Keyes. (Am. Philosophical Soc., XXV, 231-243. 1888.) Description of examples recently found showing attachment of gasteropod to crinoids. Four new species described.

Brachiopods from various localities in Iowa. J. Hall. (Nat. Hist. New York, Pal., VIII, 1-367. 1892.)

Brachiopods mentioned from Iowa. R. P. Whitfield. (Bul. Am. Mus. Nat. Hist., I, 39-97. 1882.)

Brecciated Character of the St. Louis Limestone. C. H. Gordon. (Am. Naturalist, XXIV, 303-313. 1890.)

Brief general account. W. J. McGee. (Eleventh Ann. Rep. U. S. Geol. Sur., 312. 1892.)

Brief geological description. C. A. White. (Geol. Iowa, I, 189-230. 1870.) An account of the general characters and leading subdivisions, the last being as follows: Chester, St. Louis, Keokuk, Upper and Lower Burlington, Kinderhook. Each

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- of these then receives special consideration. (See under these titles.) A full description of the unconformability of the coal measures upon the older rocks and of the St. Louis limestone upon the older formations of the subcarboniferous group.
- Carboniferous Echinodermata of the Mississippi Basin. C. R. Keyes. (Am. Jour. Sci., (3), XXXVIII, 186-193. 1889.) Synoptical table and remarks on the distribution of the crinoids and their range in the lower Carboniferous rocks of the Mississippi valley.
- Carboniferous Limestone of the Mississippi Valley. J. Hall. (Proc. Am. As. Ad. Sci., X, 51-69. 1857.)
- Catalogue of the Paleozoic Fossils of North America. B. F. Shumard. (Trans. Acad. Sci., St. Louis, II, 334-407. 1866.)
- Certain Forms of *Straparollus* from Southeastern Iowa. C. R. Keyes. (Am. Geologist, V, 193-197. 1890.)
- Certain sandstones of Muscatine county referred to the Devonian instead of the Lower Carboniferous. S. Calvin. (Am. Geologist, III, 25-36. 1889.)
- Character of the Unconformability of the Iowa Coal Measures upon the Older Rocks. C. A. White. (Am. Jour. Sci., (2), XLV, 331-334. 1868.)
- Classification of Crinoids. C. R. Keyes. (Am. Naturalist, XXIII, 153. 1889.) Remarks on the changes necessitated by the discovery of the ventral structure of *Taxocrinus* (from Marshalltown, Iowa).
- Classification of the Lower Carboniferous Rocks of the Mississippi Valley. C. R. Keyes. (Washington; Judd and Detweiller, printers, 1-24. 1892.) Sections and details of the rocks in southeastern Iowa.
- Correlation of the rocks in Iowa. H. S. Williams.

Carboniferous (Lower).—Continued.

- (Bul. 80, U. S. Geol. Sur., 1-279. 1891.) Numerous references.
- Crinoids from Iowa. A. H. Worthen. (Geol. Sur. Illinois, VII, 264-322. 1883.)
- Description of Burlington fossils. James Hall. (Geol. Iowa, I, 524-605. 1858.)
- Description of fossil fishes. O. H. St. John and A. H. Worthen. (Geol. Sur. Illinois, VII, 53-264. 1883.)
- Description of Keokuk fossils. James Hall. (Geol. Iowa, I, 606-667. 1858.)
- Description of Kinderhook fossils. James Hall. (Geol. Iowa, I, 517-523. 1858.)
- Description of new fossils. A. H. Worthen. (Geol. Surv. Illinois, VIII, 69-154. 1890.)
- Description of new species of Cephalopods. D. D. Owen. (Rep. Geol. Sur. Wis., Iowa and Minn., App., Art. i, 581. 1852.)
- Description of new species of Crinoidea. J. Hall. (Bost. Jour. Nat. Hist., VII, 251-328. 1861.)
- Description of New Species of Crinoids. D. D. Owen and B. F. Shumard. (Rept. Geol. Sur. Wis., Iowa and Minn., App., Art. ii, 587-598. 1852.)
- Description of new species of crinoids. A. H. Worthen. (Illinois State Mus. Nat. Hist., Bul. No. 1, 1-39. 1882.)
- Description of new species of crinoids from Burlington. F. B. Meek and A. H. Worthen. (Proc. Acad. Nat. Sci., Phila., XXI, 67-83. 1869.)
- Description of new species of echinoderms. F. B. Meek and A. H. Worthen. (Proc. Acad. Nat. Sci., Phila., XIX, 251-275. 1868.)
- Description of new species of echinoderms. S. A. Miller and W. F. E. Gurley. (Pamphlet, 59 pp. 1890.)

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- Description of new species of fishes. O. H. St. John and A. H. Worthen. (Geol. Sur. Illinois, VI, 245-288. 1875.)
- Description of new species of fossils. F. B. Meek and A. H. Worthen. (Geol. Sur. Illinois, III, 289-565. 1868.)
- Description of new species of fossils. F. B. Meek and A. H. Worthen. (Geol. Sur. Illinois, V, 323-619. 1873.)
- Description of new species of fossils. C. A. White. (Proc. Bost. Soc. Nat. Hist., IX, 8-33. 1865.)
- Description of new species of fossils. C. A. White and O. H. St. John. (Trans. Chicago Acad. Sci., I, 115-127. 1867.)
- Description of new species of fossils from Iowa rocks. F. B. Meek and A. H. Worthen. (Geol. Sur. Illinois, II, 143-411. 1866.)
- Description of new species of fossils from the "Chemung" group, at Burlington, Iowa. C. A. White and R. P. Whitfield. (Proc. Jour. Nat. Hist., VIII, 289-306. 1862.) Brief remarks on the rocks, with descriptions of new fossils.
- Description of the rocks in southeastern Iowa. D. D. Owen. (Rep. Geol. Sur. Wis., Iowa and Minn., 90-105. 1852.)
- Description of St. Louis fossils. James Hall. (Geol. Iowa, I, 667-677. 1858.)
- Discovery of the Ventral Structure of Taxocrinus and Haplocrinus; and Consequent Modifications in the Classification of the Crinoidea. C. Wachsmuth and F. Springer. (Proc. Acad. Nat. Sci., Phila., 1888, 337-363. 1888.) Recent discoveries at Marshalltown noted and described.

Carboniferous (Lower).—Continued.

Evidence of Two Distinct Geological Formations in the Burlington Limestone. W. H. Niles and Charles Wachsmuth. (Am. Jour. Sci., (2), XLII, 95-99. 1866.) A sketch of the Burlington beds and a list of crinoids found in the upper and lower divisions.

Fossils from the yellow sandstone below the Burlington limestone at Burlington, Iowa. A. Winchell. (Proc. Acad. Nat. Sci., Phila., 1863, 2-25. 1864.) Descriptions of new species and genera found in the yellow sandstone at Burlington.

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Gasteropods from Burlington. C. R. Keyes. (Proc. Acad. Nat. Sci., Philadelphia, 1889, 283-298.) Species are from the Kinderhook and Burlington limestone.

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General description of the Burlington limestone. C. A. White. (Geol. Iowa, I, 201-209. 1870.)

Geology and Paleontology of Burlington and Vicinity. C. A. White. (Boston Jour. Nat. Hist., vol. VII, pp. 209-235. 1860.) Detailed remarks on the geological section, with list of species, seven described as new.

In Des Moines county. A. H. Worthen. (Geol. Iowa, I, 201-206. 1858.)

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- In Hamilton county. C. A. White. (Geol. Iowa, II, 256-257. 1870.)
- In Humboldt county. C. A. White. (Geol. Iowa, II, 244. 1870.)
- In Marion county. C. A. White. (Geol. Iowa, II, 263-265. 1870.)
- In Van Buren county. A. H. Worthen. (Geol. Iowa, I, 226-228. 1858.)
- In Wapello county. A. H. Worthen. (Geol. Iowa, I, 254-255. 1858.)
- In Washington county. A. H. Worthen. (Geol. Iowa, I, 242-246. 1858.)
- Keokuk Beds and Their Contained Fossils in the Vicinity of Keokuk, Iowa. C. H. Gordon. (Proc. Iowa Acad. Sci., I, 98-100. 1880.)
- Keokuk group of the Mississippi valley. C. S. Beachler. (Am. Geologist, X, 88-96. 1892.)
- Lamellibranchiata. James Hall. (Nat. Hist. New York, Pal., V, pt. i, second half. 1885.) A number of species of fossils from Iowa noted.
- List of fossils found in the Burlington bluff. J. N. Nicollet. (Sen. Doc., 26 Cong., 2nd Sess., V, pt. ii, No. 237. 1841.)
- Marshall Group: A Memoir on its Geological Position, Characters and Equivalencies in the United States. A. Winchell. (Proc. Am. Phil. Soc., XI, 57-83. 1890.)
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- New erinoids from the Burlington. F. B. Meek and

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- New Species of Blastoidea from the Paleozoic Rocks of the Western States. B. F. Shumard. (Trans. Acad. Sci., St. Louis, I, 238-248. 1858.)
- New species of blastoids from Burlington. F. B. Meek and A. H. Worthen. (Proc. Acad. Nat. Sci., Phila., XXI, 83-91. 1869.)
- New species of Brachiopods from Burlington. A. Winchell. (Proc. Acad. Nat. Sci., Phila., XVII, 109-133. 1865.)
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- New species of sponges from the Keokuk. E. O. Ulrich. (Geol. Surv. Illinois, VIII, 243-251. 1890.)
- Observations upon the Carboniferous Limestones of the Mississippi Valley. J. Hall. (Am. Jour. Sci., (2), XXIII, 187-203. 1857.)
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- Observations on the Keokuk Species of Agaricocrinus. C. H. Gordon. (Proc. Iowa Acad. Sci., 100-101. 1880.)

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- Platyceras and its sedentary habits. C. R. Keyes. (Am. Jour. Sci., XXXVI, 269-272. 1889.) Notes on species found in the lower Carboniferous of Iowa.
- Principal Mississippian Section. C. R. Keyes. (Bul. Geol. Soc. America, III, 283-300. 1892.) The recent investigations along the Mississippi river and the stratigraphical details described, with a proposed new classification of the lower Carboniferous rocks in the Mississippi basin.
- Platyceras Attached to Fossil Crinoids. C. R. Keyes. (Am. Naturalist, XXII, 924-925.) Statement of the association of certain species found in Iowa.
- Remarkable Fauna at the Base of the Burlington Limestone in Northeastern Missouri. C. R. Keyes. (Am. Jour. Sci., (3), XLIV, 247-252. 1892.)
- Remarks on the Age of the Goniatite Limestone at Rockford, Indiana, and its Relations to the Black Slate of the Western States and to some of the Succeeding Rocks of the latter. F. B. Meek and A. H. Worthen. (Am. Jour. Sci., (2), XXXII, 167-177. 1861.)
- Some Geological Problems of Muscatine County. S. Calvin. (Bul. Lab. Nat. Hist. State Univ. Iowa, I, 7-18. 1888.) Certain rocks in the locality shown to be Devonian instead of Kinderhook as was formerly supposed by Hall.
- Synopsis of American Carbonic Calyptraeidae. C. R. Keyes. (Proc. Acad. Nat. Sci., Phila., 150-181. 1890.) Descriptions of all the species known.
- Transition Forms in Crinoids and Description of Five New Species. Charles Wachsmuth and Frank Springer. (Proc. Acad. Nat. Sci., Phila., 224-266.

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Age of Certain Sandstones near Iowa City. C. R. Keyes. (Proc. Iowa Acad. Sci., 1890-1891, 26. 1892.) Owing to the recent discovery of fossils in the sandstones near Iowa City the suggestion is made that their age may be Kinderhook (lower Carboniferous) instead of upper Coal Measures as have been heretofore regarded.

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A brief statement of the clay industries at Des Moines.

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Classification of the Lower Carboniferous Rocks of the Mississippi Valley. C. R. Keyes. (Washington: Judd and Detweiller, printers, 1-24. 1892.) Allusions to the Coal Measures in central Iowa.

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Contribution to the Fauna of the Lower Coal Measures of Central Iowa. C. R. Keyes. (*Proc. Iowa Acad. Sci.*, 1890-1891, 22-23. 1892.) A preliminary note. Three species described from the Lower Coal Measures at Des Moines.

Correlation of the rocks in Iowa. H. S. Williams. (*Bul. 80, U. S. Geol. Sur.*, 1-279. 1891.) Numerous references.

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Chapter I is a description of the Physical Geography of the State. (See J. D. Whitney, 1858.)

Chapter II treats of the General Geology of the State, and the relations of the formations with those of the East.

Hall, James.—*Continued.*

Chapter III describes in detail the different geological formations of the State from observations made during the years 1855-1857.

Chapter IV deals with the geology of Des Moines valley. (See A. H. Worthen, 1858.)

Chapter V is a detailed account of the geology of certain counties in southeastern Iowa. (See A. H. Worthen, 1858.)

Chapter VI is an account of the geology of various counties in the central and northern part of eastern Iowa. (See J. D. Whitney, 1858.)

Chapter VII is a chemical and economical report. (See J. D. Whitney, 1858.)

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Moines; and remarks on the probable eastern limits of the Cretaceous rocks in the State.

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- Keyes, Charles R.** Lower Carbonic Gasteropoda from Burlington, Iowa. (Proc. Acad. Nat. Sci., Phila., 1889, pp. 283-298. 1889.) An annotated list of the species of gasteropods found in the Kinderhook beds and Burlington limestone at Burlington, Iowa; with remarks on the rocks in the vicinity.
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Keyes, Charles R.—*Continued.*

1891.) A statement of the need of the Geological Survey of the state and of the various lines of work which especially require investigation. Comparisons with other states are made; and an outline of how the work should be conducted given. Portions appeared in various newspapers throughout the state.

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species placed under *Soleniscus* and others to the new genus *Sphærodoma*.

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Kinderhook Beds.—*Continued.*

- Attachment of *Platyceras* to Palæocrinoids. C. R. Keyes. (Proc. Am. Philos. Soc., XXV, 231-248. 1888.) Descriptions of examples; and four new species of gasteropods.
- Brachiopods from various localities in Iowa. J. Hall. (Nat. Hist. New York, Pal., VIII, 1-367. 1892.)
- Certain Forms of *Straparollus* from Southeastern Iowa. C. R. Keyes. (Am. Geologist, V, 193-197. 1890.)
- Certain sandstones of Muscatine county referred to the Devonian instead of the Lower Carboniferous. S. Calvin. (Am. Geologist, III, 25-46. 1889.)
- Classification of crinoids. C. R. Keyes. (Am. Naturalist, XXIII, 153. 1889.)
- Classification of the Lower Carboniferous Rocks in the Mississippi Valley. C. R. Keyes. (Washington: Judd and Detweiller, printers, 1-24. 1892.) Sections and details of the rocks in southeastern Iowa.
- Description of new species of crinoids. A. H. Worthen. (Illinois State Mus. Nat. Hist., Bul. No. 1, 1-39. 1882.)
- Description of new species of cephalopods. D. D. Owen. (Rep. Geol. Sur. Wis., Iowa and Minn., App., art. i, 581. 1852.)
- Description of new species of echinoderms. S. A. Miller and W. F. E. Gurley. (Pamphlet, 59 pp. 1890.)
- Description of new species of fossils. F. B. Meek and A. H. Worthen. (Geol. Sur. Illinois, III, 289-565. 1868.)
- Description of new species of fossils from Iowa rocks. F. B. Meek and A. H. Worthen. (Geol. Sur. Illinois, II, 143-411. 1866.)

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In Humboldt county. C. A. White. (Geol. Iowa, II,
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In Lee county. A. H. Worthen. (Geol. Iowa, I, 196.
1858.)

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Principal Mississippian Section. C. R. Keyes. (Bul. Geol. Soc. America, III, 283-300. 1892.) The recent investigations along the Mississippi river and the stratigraphical details described, with a proposed new classification of the lower Carboniferous rocks in the Mississippi basin.

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General remarks. C. A. White. (Geol. Iowa, I, 70-78. 1870.) The principal lakes described briefly; also explanation of the origin of "walled" lakes.

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New species from Burlington. A. Winchell. (Proc. Acad. Nat. Sci., Phila., 225. 1863.)

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- General description. A. H. Worthen. (Geol. Iowa, I, 184-198. 1858.) A rather full account of the different formations occurring in this county.
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- Keokuk Species of *Agaricocrinus*. C. H. Gordon. (Am. Geologist, V, 257-261. 1890.)
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- Observations on the Keokuk Species of *Agaricocrinus*. C. H. Gordon. (Proc. Iowa Acad. Sci., 1887-9, 100-101. 1890.)
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Hydraulic. C. A. White. (Geol. Iowa, II, 318-322. 1870.) Various limestones which possess hydraulic properties discussed.

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Fossil Faunas in Central Iowa. C. R. Keyes. (Proc.

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bibliographic references of the species found in the

lower Coal Measures of the central part of the state.

Fossil Remains of a Caribou. J. Leidy. (Proc. Acad.

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From eastern Nebraska. F. B. Meek. (Final Report

U. S. Geol. Sur. Nebraska, pt. ii, 83-245. 1872.)

New species of fishes from the Iowa Carboniferous.

J. S. Newberry and A. H. Worthen. (Geol. Sur.

Illinois, IV, 246-374. 1870.)

Occurrence of fish remains in the Carboniferous lime-

stone. A. H. Worthen. (Proc. Am. As. Ad. Sci.,

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Of Central Iowa. C. R. Keyes. (Proc. Acad. Nat.

Sci., Phila., 231-247. 1888.)

Volcanic Eruption in Iowa. C. R. Keyes. (Science,

XXI, 132. 1893.)

- Wachsmuth, Charles.** Preliminary Notice of the Sphæroidocrinoidæ. (Proc. Iowa Acad. Sci., 1875-80, p. 22. Iowa City, 1880.) Abstract of a paper read before the Iowa Academy of Science June 24, 1880.
- Wachsmuth, Charles, W. H. Niles, and.** Evidence of the Two Distinct Geological Formations in the Burlington Limestone. (Am. Jour. Sci., (2), XLII, 95-99. 1866.) See W. H. Niles and Charles Wachsmuth. 1866.
- Wachsmuth, Charles, and Frank Springer.** Discovery of the Ventral Structure of Taxocrinus and Haplocrinus; and Consequent Modifications in the Classification of the Crinoidea. (Proc. Acad. Nat. Sci., Phila., 1888, pp. 337-363. 1888.) Remarks upon the classification of the crinoidea necessitated by the recent discovery of the ventral structure of certain crinoids from the Kinderhook [of Marshall County, Iowa.]
- Wachsmuth, Charles, and Frank Springer.** New Species of Crinoids and Blastoids. (Geol. Sur. Illinois, vol. VIII, pp. 157-251. Springfield, 1890.) A short sketch of the geology of LeGrand; with a number of species from Marshall county described as new.
- Wachsmuth, Charles, and Frank Springer.** Revision of the Palæocrinoidæ, Part I. (Proc. Acad. Nat. Sci., Phila., 1879, pp. 226-379. Philadelphia, 1879.) The crinoids of Iowa listed, with localities.
- Wachsmuth, Charles, and Frank Springer.** Revision of the Palæocrinoidæ, Part II. (Proc. Acad. Nat. Sci., Phila., 1881, pp. 177-414. Philadelphia, 1881.) The crinoids of Iowa listed, with localities.
- Wachsmuth, Charles, and Frank Springer.** Revision of the Palæocrinoidæ, Part III, Section 1. (Proc. Acad. Nat. Sci., Phila., 1885, pp. 225-364. Philadelphia, 1885.) The crinoids of Iowa listed, with localities.

- Wachsmuth, Charles, and Frank Springer.** Revision of the Palæocrinoidæ, Part III, Section 2. (Proc. Acad. Nat. Sci., Phila., 1886, pp. 64-226. Philadelphia, 1886.) The crinoids of Iowa listed, with localities.
- Wachsmuth, Charles, and Frank Springer.** The Perisomic Plates of the Crinoids. (Proc. Acad. Nat. Sci., Phila., 1890, pp. 345-292, 2 plates. 1890.) Incidental reference and figures of crinoids from Iowa.
- Wachsmuth, Charles, and Frank Springer.** Transition Forms in Crinoids, and Description of Five New Species. (Proc. Acad. Nat. Sci., Phila., 1878, pp. 224-266. Philadelphia, 1878.) An account of the evolution of certain of the lower Carboniferous crinoids of the Mississippi basin, with special reference to those found in Iowa. Several species described from Iowa as new.
- Walcott, Charles D.** Correlation Papers: Cambrian. (U. S. Geol. Sur., Bul. 81, pp. 1-447. Washington, 1891.) A review of the literature relating to the Potsdam rocks of the state, pp. 187-188. Discussed also in the general summary of the Cambrian rocks of the interior basin.
- Walcott, C. D.** The Utica Slate and Related Formations of the same Geological Horizon. (Trans. Albany Inst., vol. X, Adv. Sheets, pp. 1-17. Albany, 1879.) Galena limestone correlated with the Utica slate.
- Wallace, Samuel J.** Memorandum of a Fossil Wood from the Keokuk Formation, Keokuk, Iowa. (Am. Jour. Sci., (3), vol. XV, p. 396. New Haven, 1878.) Notice of a piece of wood three feet long from the limestone.
- Wapello County.**
Analyses of coal. Rush Emery. (Geol. Iowa, II, 376-385. 1870.)

Wapello County.—*Continued.*

Artesian well at Ottumwa. C. H. Gordon. (Am. Geologist, IV, 237-239. 1889.) Section given.

Brief notes on its geology. C. A. White. (Second Ann. Rep. State Geologist, 108-112. 1868.)

Coal. C. A. White. (Geol. Iowa, II, 268-270. 1870.) Reference to a number of coal mines in the county.

General geological description. A. H. Worthen. (Geol. Iowa, I, 248-258. 1858.) Brief description of the geological features.

Ward, Lester F. Geological Distribution of Fossil Plants. (U. S. Geol. Sur., 8th Ann. Rep., pp. 663-933. Washington, 1889.) Some Iowa localities are given on pages 895-896.)

Warren County.

Analyses of coal. Rush Emery. (Geol. Iowa, II, 385-386. 1870.)

Description of the general geological features. O. H. St. John. (Geol. Iowa, II, 46-77. 1870.) The Geological features of the county briefly described with numerous sections given in detail.

Strata between Ford and Winterset. J. L. Tilton. (Proc. Iowa Acad. Sci., I, pt. iii, pp. 26-27. 1893.)

Warsaw Limestone.

General description of the characters. James Hall. (Geol. Iowa, I, 97-98. 1858.)

In Lee county. A. H. Worthen. (Geol. Iowa, I, 192. 1858.)

Washington County.

Bones of the Mammoth. J. Gass and W. H. Pratt. (Proc. Davenport Acad. Nat. Sci., III, 177-178. 1882.)

Washington County.—*Continued.*

Deep well at Washington. S. Calvin. (Am. Geologist, I, 28-31. 1888.)

General account of the geology. A. H. Worthen. (Geol. Iowa, I, 239-248. 1858.) Brief account of the geological phenomena as shown in the county.

Reference to coal. C. A. White. (Geol. Iowa, II, 273. 1870.)

Waters.

Chemical analyses. G. Hinrichs. (Second Ann. Rep. State Geologist, 233-238. 1868.)

Chemical analyses. Rush Emery. (Geol. Iowa, II, 354-357. 1870.) Artesian well and spring waters.

Its relation to health and disease. W. H. Dickinson. (Iowa State Board of Health, First Biennial Rep., 197-227. 1882.)

Of Iowa. C. A. White. (Geol. Iowa, II, 330-331. 1870.)

Wayne County.

Brief notes on the geology. C. A. White. (First Ann. Rep. State Geologist, 40-42. 1868.)

Webster, Clement L. A Description of the Rockford Shales of Iowa. (Proc. Davenport Acad. Nat. Sci., vol. V, pp. 100-109. Davenport, 1887.) A detailed account of the lithological features of the Rockford Shales and their fossils, with sketch-map.

Webster, Clement L. A General Preliminary Description of the Devonian Rocks of Iowa; which Constitutes a Typical Section of the Devonian Formation of the Interior Continental Area of North America. (Am. Naturalist, vol. XXIII, pp. 229-243. Philadelphia, 1889.) General discussion of the Devonian of Iowa. The name "Hackberry Group" proposed for

Webster, Clement L.—*Continued.*

the Lime Creek beds. The Devonian divided into Corniferous, Hamilton and Hackberry. Lists of characteristic fossils given.

Webster, Clement L. Contribution to the Knowledge of the Genus *Pachyphyllum*. (Am. Naturalist, vol. XXIII, pp. 621-625. Philadelphia, 1889.) Three species, without figures, are described as new from the Devonian of Floyd county.

Webster, Clement L. Description of a New Genus of Corals from the Devonian Rocks of Iowa. (Am. Naturalist, vol. XXIII, pp. 710-712. Philadelphia, 1889.) Three genera and two species, without figures, described as new.

Webster, Clement L. Notes on the Geology of Johnson County. (Am. Naturalist, vol. XXII, pp. 408-419. Philadelphia, 1888.) An account of the surface geology, with several illustrations, in the vicinity of Iowa City.

Webster, Clement L. Notes on the Rockford Shales. (Am. Naturalist, vol. XXII, pp. 444-446. Philadelphia, 1888.) Three species are described as new.

Webster, Clement L. On the Glacial Flow in Iowa. (Am. Naturalist, vol. XXI, pp. 758-761. Philadelphia, 1887.) The announcement of the glacial scratches at Iowa City.

Webster, Clement L. Transitional Drift of a Portion of Northern Iowa. (Am. Naturalist, vol. XXIV, pp. 1182-1185. Philadelphia, 1890.)

Webster County.

Analyses of coal. Rush Emery. (Geol. Iowa, II, 375-376. 1870.)

Webster County.—*Continued.*

Coal at Ft. Dodge. C. A. White. (Second Ann. Rep. State Geologist, 140-141. 1868.)

Deposits of Gypsum described in detail. C. R. Keyes. (Mon. Rev. Iowa Weather and Crop Service, IV, No. 3, 2-4. 1893.)

Gypsum at Ft. Dodge. C. A. White. (Second Ann. Rep. State Geologist, 135-140. 1868.)

Gypsum deposits. C. A. White. (Geol. Iowa, II, 293. 1870.)

General geological features. C. A. White. (Geol. Iowa, II, 254-256. 1870.)

Reference to the coal and gypsum. C. A. White. (First Ann. Rep. State Geologist, 26-27. 1868.)

Wells.

Deep Well at Emmetsburg, Iowa. N. H. Winchell. (Bul. Minnesota Acad. Sci., I, 387-390. 1880.)

Deep Well at Washington, Iowa. S. Calvin. (Am. Geologist, I, 28-31. 1888.)

White, Charles A. A sketch of the Geology of Southwestern Iowa. (Am. Jour. Sci., (2), vol. XLIV, pp. 23-31. New Haven, 1867.) It is shown that the limestones of the region discussed belong to the upper and not to the lower Carboniferous series, as has been supposed by some previous authors.

White, Charles A. Announcement of the Existence of Cretaceous Rocks in Guthrie County, Iowa. (Proc. Am. As. Adv. Sci., vol. XVII, pp. 326-327. Cambridge, 1869.)

White, Charles A. Character of the Unconformability of the Iowa Coal Measure upon Older Rocks. (Am. Jour. Sci., (2), vol. XLV, pp. 331-334. New Haven, 1868.) A brief announcement of the unconformity of the coal Measures on the Lower Carboniferous rocks.

- White, Charles A.** Contributions to Invertebrate Paleontology, No. 8: Fossils from the Carboniferous Rocks in the Interior States. (U. S. Geol. and Geog. Sur. Terr., Twelfth Ann. Rep. 1878, pp. 155-171, pls. xxxiv-xlii. Washington, 1883.) Descriptions of new species of fossils from Iowa included.
- White, Charles A.** Description of New Species of Fossils from the Devonian and Carboniferous Rocks of the Mississippi Valley. (Proc. Boston Soc. Nat. Hist., vol. IX, pp. 8-33. Boston, 1865.) A number of new species of fossils described as new.
- White, Charles A.** Description of New Species of Fossils from the Paleozoic Rocks of Iowa. (Proc. Acad. Nat. Sci., Phila., vol. XXVIII, pp. 27-34. Philadelphia, 1877.) Numerous species described as new.
- White, Charles A.** Drift Phenomena of Southwestern Iowa. (Am. Jour. Sci., (2), vol. XLIV, p. 119. New Haven, 1867.) An additional note to an article of the same title.
- White, Charles A.** Exogenous Leaves in the Cretaceous Rocks of Iowa. (Am. Jour. Sci., (2), vol. XLIV, p. 119, New Haven, 1867.) A note announcing the discovery of exogenous leaves, and showing that the "Nishnabotna sandstone" is identical with the Dakota group.
- White, Charles A.** First Annual Report of Progress of the State Geologist. (Pamphlet, pp. 1-4. Des Moines, 1867.) A statement of the work done during the year previous.
- White, Charles A.** First Annual Report of the State Geologist. (First and Second Annual Report by the State Geologist, on the Geological Survey of the State of Iowa, pp. 5-8. Des Moines, 1868.) A short report

White, Charles A.—*Continued.*

of the work carried on during the preceding two years, with reprint of popular letters appearing in the various newspapers of the state.

White, Charles A. Geological Map Model of Iowa. (Geol. Iowa, vol. I, p. 32. Des Moines, 1870.)

White, Charles A. Geological Map of the State of Iowa. (Geol. Iowa, vol. II. Des Moines, 1870.)

White, Charles A. The Iowa Drift. (Am. Naturalist, vol. II, pp. 615-616. Salem, 1869.) Calls attention to the original sites of the granite boulders found in Iowa.

White, Charles A. Lakes of Iowa; Past and Present. (Am. Naturalist, vol. II, pp. 143-155. Salem, 1868.) The drift lakes, including the so-called "walled" lakes are described and the origin of the "walls" explained. Also the bluff deposit of the Missouri river valley is shown to be the deposit of an ancient lake.

White, Charles A. Lakes of Iowa; Past and Present. (Second Ann. Rep. State Geologist, pp. 151-163. Des Moines, 1868.) A popular description of some of the lakes in Iowa.

White, Charles A. Note on "Cone-in-cone." (Am. Jour., Sci. (2), vol. XLV, pp. 400-401. New Haven, 1868.) The mineral mentioned is from the lower Coal Measures of Iowa.

White, Charles A. Observations on the Red Quartzite Boulders of Western Iowa; and their Original Ledges of Red Quartzite in Iowa, Dakota and Minnesota. (Proc. Am. As. Adv. Sci., vol. XVII, pp. 340-342. Cambridge, 1869.)

White, Charles A. Observations on the Summit Structure of Pentremites, the Structure and Arrangement of Certain Parts of Crinoids, and Description of New

White, Charles A.—*Continued.*

- Species from the Carboniferous Rocks of Burlington, Iowa. (Boston Jour. Nat. Hist., vol. VII, pp. 481-506. Boston, 1863.) Notes on the summit structure of various Pentremites. Several species described as new.
- White, Charles A.** Observations upon Geology and Paleontology of Burlington, Iowa, and its Vicinity. (Boston Jour. Nat. Hist., vol. VII, pp. 209-235. Boston, 1860.) A detailed description of the rock-section at Burlington, Iowa, with table showing vertical range of the more important fossils. All below the oölite refer to the Chemung (Devonian). Several species are described as new.
- White, Charles A.** Observations upon the Drift Phenomena of Southwestern Iowa. (Second Ann. Rep. State Geologist, pp. 143-148. Des Moines, 1868.) A short account of the glacial scratches and drift materials.
- White, Charles A.** Observations upon the Drift Phenomena of Southwestern Iowa. (Am. Jour. Sci., (2), vol. XLIII, pp. 301-305. New Haven, 1867.) Special attention is directed to the glacial striae upon rocks *in situ*.
- White, Charles A.** On Spontaneous Fission? in Zaphrentis. (Am. Jour. Sci., (3), vol. V, p. 72. New Haven, 1873.) Special reference to specimens from the St. Louis Limestone of Marion county.
- White, Charles A.** On the Eastern Limit of Cretaceous Deposits in Iowa. (Proc. Am. As. Adv. Sci., vol. XXI, pp. 187-192. Cambridge, 1873.) Cretaceous fossils reported from the drift of Howard, Black Hawk and Johnson counties.

White, Charles A. On the Occurrence of Later Cretaceous Deposits in Iowa. (Am. Geologist, vol. I, pp. 221-227. Minneapolis, 1888.) Remarks on certain fossils found in the drift in Hardin county.

White, Charles A. Report of the Geological Survey of the State of Iowa. (Vol. I, pp. i-viii and 1-391. Des Moines, 1870.)

Introduction: Historical statement, popular explanations, and general classification of the Iowa rocks.

PART FIRST (PHYSICAL GEOGRAPHY AND SURFACE GEOLOGY):

Chapter I is a general account of the surface features of the state: Boundaries, general topography, drainage, springs, etc.

Chapter II forms a general description of the surface deposits of the state, with rather detailed accounts of the composition, distribution and origin of the drift, altered drift, alluvium and bluff deposits (loess).

Chapter III treats of the soils of the drift, loess (bluff) and alluvium; and of the adaptability of the Iowa soils for the growth of the forest trees. Also an explanation of origin of prairies.

Chapter IV is on the climate of Iowa. (See T. S. Parvin, 1870.)

PART SECOND (GENERAL GEOLOGY):

Chapter I describes the area, general characters, economic value and the fossils of the Archæan, Lower Silurian and Upper Silurian and their general subdivisions.

Chapter II gives an account of the Subcarboniferous; the general characters, economic value and fossils of the Kinderhook, Burlington, Keokuk and St. Louis limestones, together with sections and their minor

White, Charles A.—*Continued.*

subdivisions. Remarks also on the unconformability of the Coal Measures upon older rocks and of the St. Louis limestone upon older formations of the Subcarboniferous group.

Chapter III. The lower, middle and upper Coal Measures recognized in their general characters; and their economic value and fossil features described. Also general observations on the Carboniferous rocks of Iowa, with some practical conclusions.

Chapter IV treats of the middle Coal Measures. (See O. H. St. John, 1870).

Chapter V. Earlier Cretaceous, Nishnabotna sandstone, Woodbury shales and Inoceramus beds described; and their areas, lithological character, economic value and fossils noted.

PART THIRD (COUNTY GEOLOGY.)

Chapter I is a general account of the geology of southwestern Iowa, with special descriptions of the geology of the following counties:

Madison.
 Clarke.
 Decatur.
 Ringgold.
 Union.
 Adair.
 Adams.
 Taylor.
 Page.
 Fremont.
 Montgomery.
 Mills.
 Cass.
 Pottawattamie.

White, Charles A. Report of the Geological Survey of Iowa. (Vol. II, pp. i-viii and 1-435. Des Moines, 1870.)

PART FIRST (COUNTY GEOLOGY.)

Chapter I deals of the geology of the middle region of western Iowa. (See O. H. St. John, 1870.) The physical features and general geology described, with special reference to the Post-tertiary, Cretaceous and Coal Measures. The general features of the following counties are briefly described, with numerous sections :

Woodbury county.

Monona county.

Harrison county.

Shelby county.

Crawford county.

Audubon county.

Sac county.

Ida county.

Calhoun county.

Carroll county.

Greene county.

Guthrie county.

Dallas county.

Polk county.

Boone county.

Webster county.

Chapter II treats chiefly of Northwestern Iowa. A general description of the geology and material resources ; and the geological features of the following counties briefly described :

Pocahontas county.

Palo Alto county.

Emmet county.

White, Charles A.—Continued.

Dickerson county.

Clay county.

Buena Vista county.

Cherokee county.

O'Brien county.

Osceola county.

Lyon county.

Sioux county.

Plymouth county.

Chapter III describes the middle region of northern Iowa, including the geology of the following counties:

Franklin county.

Wright county.

Cerro Gordo county.

Hancock county.

Worth county.

Winnebago county.

Kossuth county.

Humboldt county.

Chapter IV deals with the geology of the Coal Measures. A few preliminary remarks and a rather full account of the geological features of the following counties are given:

Webster county.

Hamilton county.

Hardin county.

Boone county.

Story county.

Marshall county.

Polk county.

Jasper county.

Warren county.

White, Charles A.—*Continued.*

Marion county.

Mahaska county.

Keokuk county.

Monroe county.

Wapello county.

Appanoose county.

Davis county.

Van Buren county.

Jefferson county.

PART SECOND (ECONOMIC GEOLOGY.)

Chapter I describes at length the Peat formation of the state; also brief reference to the petroleum.

Chapter II describes in detail the Gypsum deposits and related materials.

Chapter III gives an account of the Building Materials, especially the clays found in the eastern part of the state; also more or less brief mention of the limestone, fire-clay, road-materials, etc., with brief allusion to the artesian wells and mineral springs.

Chapter IV is chiefly a report of chemical work done by the Survey. (See Rush Emery. 1870). This includes minerals, rocks, lead, clays, coals, waters, and peats.

Appendix A is a list of railroad elevations by chief engineers of the different railways.

Appendix B is a catalogue of Iowa Birds. (By J. A. Allen.)

Appendix C is an explanation of land surveys. (By C. W. Irish.)

White, Charles A. Report upon the Invertebrate Fossils Collected in Portions of Nevada, Utah, Colorado, New Mexico and Arizona by Parties of the Expedi-

White, Charles A.—*Continued.*

- tions of 1871, 1872, 1873 and 1874. (Rep. Geol. and Geog. Expl. and Sur. W. 100 Mer., vol. IV, pp. 1-219, pls. i-xxi. Washington, 1875.) A number of species from Iowa described as new.
- White, Charles A.** Second Annual Report of the State Geologist on the Geological Survey of the State of Iowa. (Pamphlet, pp. 81-284. Des Moines, 1868.) A short sketch of the work done, with reprint of popular letters appearing in the various newspapers of the state.
- White, Charles A.** Sketch-Map of the State of Iowa. (Geol. Magazine, (1), vol. VIII, p. 222. London, 1871.)
- White, Charles A.** The Iowa Drift. (Am. Naturalist, vol. II, pp. 615-616. Salem, 1869.) The derivation of the drift material from the underlying rocks, by their disintegration and comminution, is shown.
- White, Charles A.** The Soils of Iowa and Their Origin. (Rep. Sec. Iowa State Agric. Soc., 1865, pp. 245-267. 1865.) A popular lecture delivered before the society, September 29, 1865.
- White, Charles A., and O. H. St. John.** Descriptions of New Subcarboniferous and Coal Measure Fossils, collected upon the Geological Survey of Iowa, together with notice of new Generic Characters observed in two Species of Brachiopods. (Trans. Chicago Acad. Sci., vol. I, pp. 115-127, figs. 1-12. Chicago, 1867.) Fourteen species of fossils described as new from Iowa rocks.
- White, Charles A., and O. H. St. John.** Preliminary Notice of New Genera and Species of Fossils, by C. A. White and O. H. St. John. (Pamphlet, pp. 1-3. Iowa City, 1867.)

White, Charles A., and R. P. Whitfield. Observations upon the Rocks of the Mississippi Valley which have been Referred to the Chemung Group of New York, together with Descriptions of new Species of Fossils from the same Horizon at Burlington, Iowa. (Proc. Boston Soc. Nat. Hist., vol. VIII, pp. 289-316. Boston, 1862.) Several species are described as new from Iowa.

Whitfield, R. P. Description of a New Species of Crinoid from the Burlington Limestone, at Burlington, Iowa. (Bul. Am. Mus. Nat. Hist., vol. I, pp. 7-9. New York, 1881.) *Poteriocrinus jesupi* described and figured as new.

Whitfield, R. P. On the Fauna of the Lower Carboniferous Limestones of Spergen Hill, Ind., with a Revision of the Descriptions of its Fossils hitherto Published; and Illustrations of the Species from the Original Type Series. (Bul. Am. Mus. Nat. Hist., vol. I, pp. 39-97, with plates. New York, 1882.) A number of the species reported from Iowa localities.

Whitfield, R. P. Paleontology of Wisconsin. (Geol. Sur. Wisconsin, vol. IV, pp. 163-349, with plates. Madison, 1882.) A number of species of fossils from Iowa localities noted.

Whitfield, R. P., and J. Hall. Description of New Species of Fossils from the Devonian Rocks of Iowa. (New York State Cab. Nat. Hist., 23d Ann. Rep., pp. 223-239. Albany, 1873.)

Whitney, J. D. Chemistry and Economical Geology. (Geol. Iowa, I, 324-472. Albany, 1858.) A mention of the chemical composition and lithological characters of the various geological formations with chemical analyses, also remarks on the mode of occurrence of lead ore in northeastern Iowa.

- Whitney, J. D.** County Geology. (Geol. Iowa, I, 259-323. Albany, 1858.) Detailed notice of the geology of the central and northern counties in the eastern part of Iowa.
- Whitney, J. D.** Geological Map of the Lead Region in the States of Wisconsin, Illinois and Iowa. (Geol. Sur. Wisconsin, vol. I. Albany, 1862.)
- Whitney, J. D.** Geology of the Lead Region. (Geol. Sur. Illinois, vol. I, pp. 153-207. Springfield, 1866.) Numerous references to the occurrence of lead in northeastern Iowa.
- Whitney, J. D.** Physical Geography of Iowa. (Geol. Iowa, vol. I, pp. 1-34. 1858.) A descriptive account of the surface features, soil and climate of Iowa.
- Williams, Albert, Jr.** Mineral Resources of the United States. (U. S. Geol. Sur., Statistical Papers for 1882, 813 pp. Washington, 1883.) Numerous references to Iowa mineral products.
- Williams, Albert, Jr.** Mineral Resources of the United States. (U. S. Geol. Sur., Statistical Papers for 1883-84, 1016 pp. Washington, 1885.) Numerous references to Iowa mineral products.
- Williams, H. S.** A Remarkable Fauna at the Base of the Chemung in New York. (Am. Jour. Sci., (3), vol. XXV, pp. 97-104. New Haven, 1883.) A number of comparisons of fossils of the Lime creek beds of Iowa with those of New York.
- Williams, H. S.** Correlation Papers: Devonian and Carboniferous. (U. S. Geol. Sur., Bul. 80, pp. 1-279. Washington, 1891.) The rocks of Iowa discussed in a general way, and their correlation with other formations in the Mississippi valley noted. Numerous references.

- Williams, H. S.** Equivalency of Lime Creek Beds. (Am. Jour. Sci., (3), vol. XXV, p. 311. New Haven, 1883.) A short note on the correction of statements made in a former publication.
- Williams, H. S.** On a Remarkable Fauna at the Base of the Chemung Group in New York. (Am. Jour. Sci., (3), vol. XXV, pp. 97-104. New Haven, 1883.) The Devonian fauna of Lime creek discussed and compared.
- Williams, H. S.** On the Relation of the Devonian Faunas of Iowa. (Am. Geologist, vol. III, pp. 230-233. Minneapolis, 1888.) Remarks on the Devonian of Iowa.
- Wilson, Park C.** Biennial Report of the State Mine Inspector to the Governor of the State of Iowa, for the years 1880-1881. (Pamphlet, 1-165. Des Moines, 1882.) Brief accounts of the different mines in the state and incidentally reference to the geology.
- Wilson, Park C.** First Biennial Report of the State Mine Inspector for the years 1882-1883. (Pamphlet, 1-94. Des Moines, 1883.) Short accounts of coal mines throughout the state. There is also a number of records of borings made in various parts of Iowa.
- Wilson, Park C.** Second Biennial Report of the State Mine Inspector for the years 1884-1885. (Pamphlet, 1-116. Des Moines, 1885.) Short accounts of some of the mines of the state with list of all the mines and their location; also the records of several borings.
- Winchell, Alexander.** Description of Fossils from Yellow Sandstone lying below the Burlington Limestone at Burlington, Iowa. (Proc. Acad. Nat. Sci., Phila., XV, pp. 2-25. Philadelphia, 1863.) A number of species and genera described as new.

Winchell, Alexander. Description of New Species of Fossils from the Marshall Group of Michigan and its Supposed Equivalent in Other States: with Notes on Some Fossils of the Same Age Previously Described. (Proc. Acad. Nat. Sci., Phila., vol. XVII, pp. 109-133. Philadelphia, 1865.) Several species of fossils noted from Burlington.

Winchell, Alexander. The Marshall Group: A Memoir on its Geological Position, Characters and Equivalencies in the United States. (Proc. Am. Philosophical Soc., vol. XI, pp. 57-83. Philadelphia, 1869.) References to the correlation of the Kinderhook rocks of Iowa are given.

Winchell, N. H. Description of a Deep Well at Emmetsburg, Iowa. (Bul. Minnesota Acad. Sci., vol. I, pp. 387-390. Minneapolis, 1880.)

Winchell, N. H. Geology of Minnesota. (Geol. and Nat. Hist. Sur. Minnesota, Final Rep., vol. I, 697 pp. Minneapolis, 1884.) A number of incidental references given concerning the geology of Iowa.

Winnebago County.

Analysis of a Meteorite. J. Torrey and E. H. Barbour. (Am. Geologist, VIII, 67-72. 1891.)

Analyses of peat. Rush Emery. (Geol. Iowa, II, 398. 1870.)

General description. C. A. White. (Geol. Iowa, II, 247-249. 1870.) Brief general description of the surface characters.

Meteorites. Joseph Torrey, Jr., and E. H. Barbour. (Science, vol. XV, 347. 1890.) Reference to a fragment supposed to be a piece of meteorite. The authors claim it was not and base their claims on the grounds of: Too low specific gravity, absence of

- Winnnebago County.**—*Continued.*
metals and external crust, and chemical analysis.
Winnnebago Meteorite. E. N. Eaton. (Am. Geologist,
VIII, 385-387. 1891.)
- Winneshiek County.**
Notice of the geology. J. D. Whitney. (Geol. Iowa,
I, 312-317. 1858.)
- Witter, F. M.** Gas Wells near Letts, Iowa. (Am. Geologist,
vol. IX, pp. 319-321. Minneapolis, 1892.)
Notes on natural gas wells recently opened in Louisa
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