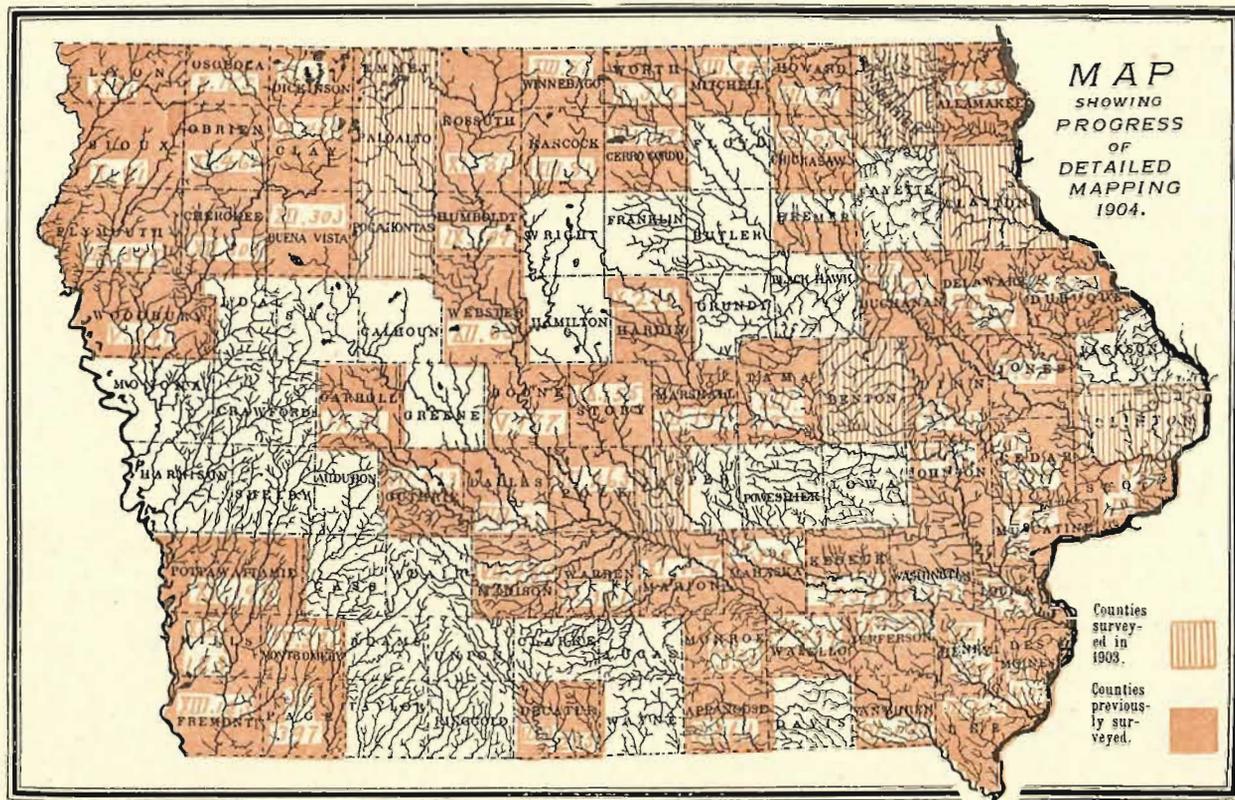

ADMINISTRATIVE REPORT.



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TWELFTH ANNUAL

Report of the State Geologist.

IOWA GEOLOGICAL SURVEY,
DES MOINES, DECEMBER 31, 1903.

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

GENTLEMEN: I have the honor to report that the Iowa Geological Survey, in accordance with the plans approved by you at the beginning of the working season, has continued its investigation of the geology and geological resources of the state during the year 1903. One year ago Doctor Beyer's report on the Clays and Clay Products of Iowa was practically finished as far as it was thought best at that time to carry the work; but before the manuscript was sent to press conditions arose which made it desirable to examine some new fields, to review some of the old ones, and to make a number of additional laboratory tests. This enlargement and revision of the work has occupied Professor Beyer during the year. The manuscript in its revised form is now ready, and I take pleasure in presenting it herewith and recommending its publication as volume XIV of the Iowa Geological reports. The work is one which is timely and will be especially welcome to the public. It is certain to prove of great usefulness to the state in the stimulation and intelligent direction it will give to the great industry of which it treats. At present the clay products of Iowa stand second in value only to the output of coal. Clays, however, are much more generally distributed than coal, and

they are far more abundant. Relatively speaking, the clay industry of Iowa is yet in its infancy. With workable beds that are practically inexhaustible, and almost limitless varieties adapted to every possible use, the industry has an assured future of growth and expansion as the people of the state, increasing in numbers, in wealth and in culture, demand better homes, better public buildings, better streets, better roads, more general and more artistic improvements of numberless kinds into which the products of the kiln may be incorporated.

The work on which this report is based has been in progress for a number of years, and it is but just to call your attention to the great amount of patient and painstaking labor which the preparation of such a monograph involves. I regard it as a duty as well as a privilege here to acknowledge the indebtedness of the Survey to the State College of Agriculture and Mechanic Arts which has so generously and heartily supported Professor Beyer and his associates by placing at their disposal, for purposes of the clay investigation, the resources of its testing and other laboratories. Without the equipment afforded by the laboratories of the college the work covered by the report could not have been accomplished. In addition to work on the monograph on clays, Professor Beyer, in accordance with the custom of past years, has collected and tabulated the statistics relating to the annual mineral production in Iowa.

The collection of data relating to the artesian waters of Iowa, another line of special work in which the Survey has, for some time, been engaged, has been kept up to date by Prof. W. H. Norton of Cornell College. During the past year arrangements have been made whereby the United States Geological Survey will co-operate with the Iowa Survey in the study of the state's artesian waters. Professor Norton will do the work for both organizations, and the expenses will be divided on an equitable basis between them.

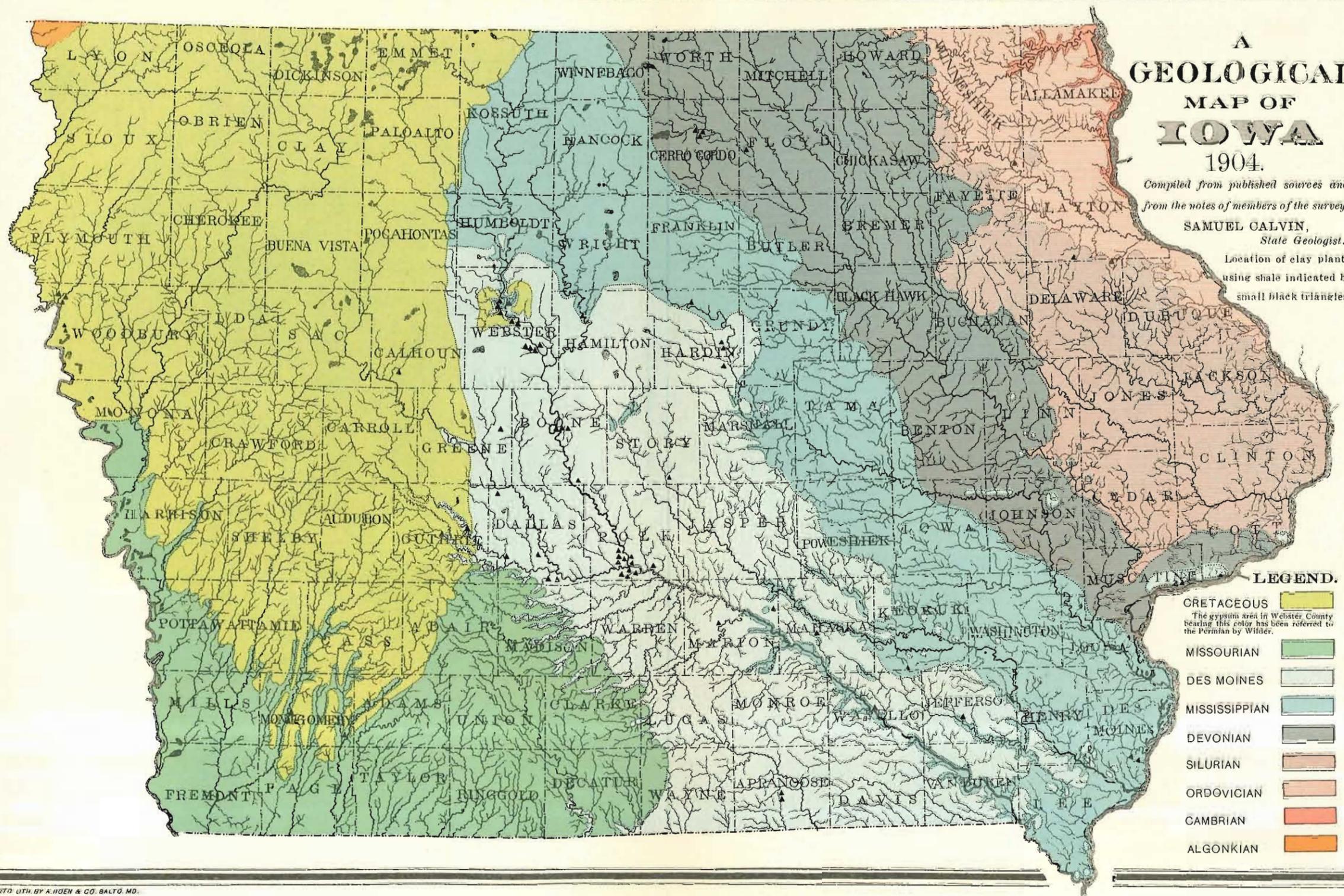
The topographic work of the United States Survey in north-eastern Iowa, which has been in progress for a number of years, was practically completed last summer. It is almost impossible

A GEOLOGICAL MAP OF IOWA 1904.

Compiled from published sources and
from the notes of members of the survey.

SAMUEL CALVIN,
State Geologist.

Location of clay plants
using shale indicated by
small black triangles.



LEGEND.

- CRETACEOUS
The gypsum area in Webster County bearing this color has been referred to the Permian by Wilder.
- MISSOURIAN
- DES MOINES
- MISSISSIPPIAN
- DEVONIAN
- SILURIAN
- ORDOVICIAN
- CAMBRIAN
- ALGONKIAN

PHOTO LITH. BY A. HOEN & CO. BALTO. MD.

to estimate the value of this work to the Iowa Geological Survey. It has covered a portion of the state in which the satisfactory mapping of the geological formations would have been altogether impossible without the aid of topographic base maps. In the report on Dubuque county the Survey made use of the U. S. topographic sheets as the base on which to represent the geology. Through the courtesy of the National Survey, similar sheets will soon be available for the entire driftless and broken area in the northeastern part of our state, and the geological work may be completed more satisfactorily and with far less labor and expense than would otherwise have been possible.

Further co-operation of the United States Survey has been secured in the testing of cement-making materials. For some time the Iowa Survey has been collecting facts relative to the distribution of deposits presumably available for the manufacture of a good grade of Portland cement. It is believed that Iowa has an abundance of such materials. The final decision, however, concerning the value of any given beds can only be reached after thorough and expensive tests, and these the Survey has no means for making. With the aid of the United States Survey these tests can now be made, and accordingly, during the year, the necessary samples have been collected from quite a number of localities and forwarded to Washington for the purpose. We shall soon be in position to make authoritative statements on the possibilities of making Portland cement in Iowa.

As foreshadowed in the report of last year, the Survey is now ready to begin a thorough and comprehensive study of the coals of Iowa. This study will, as a matter of course, include an investigation of the modes of occurrence, and the physical and chemical characteristics of our Iowa coals, their geographical distribution and geological relations, the thickness and persistence of the seams, and the methods of prospecting and mining. In addition to the lines of investigation above enumerated, however, there should be carefully conducted tests on the effects of washing in preparing the coals for market, to what extent the range of utility and the market value of the coal have been improved,

and how far the improvement justifies the added expense. There should also be precise tests on the actual steaming value of the various grades and sizes of coal when burned on a working scale under the boiler; tests on coking and gas-making qualities; and experiments on the briquetting and utilization of wastes. The equipment of a plant for making scientific coal tests on a commercial scale is quite expensive, but it now seems probable that during the coming season arrangements can be made to have the Iowa coal tested with scientific precision at experimental plants specially designed for the purpose, by the United States Geological Survey; and thus we shall be again indebted to the generous co-operation of the national organization.

The other work carried on by the Survey has been almost wholly in the nature of areal investigation and geological mapping. The following counties have received attention during the year: Emmet, Palo Alto and Pocalontas in the area of the Wisconsin drift, which were examined and reported on by T. H. Macbride and R. I. Cratty; Clayton county, which was partly worked by A. G. Leonard in 1902 and finished by him in 1903; Clinton county, which was worked by Prof. J. A. Udden and Jan Andreas Udden; Winneshiek, which was nearly completed by Samuel Calvin and M. F. Arey; and Jasper county, in which work was commenced by Ira A. Williams. Some reconnoissance work, for the purpose of correlating outcrops in Winneshiek and Clayton, was done by Leonard, Calvin and Arey in Fayette county.

Volume XIII of the Survey reports has been printed and distributed during the past year; and the office work, which has greatly increased in the volume of correspondence and in other respects, both at Iowa City and Des Moines, has been kept up to date.

The Assistant State Geologist, Professor A. G. Leonard, was called to North Dakota about the first of September, to fill the position of State Geologist and Professor of Geology in the University of that state, and Professor T. E. Savage was elected to fill the position so made vacant.

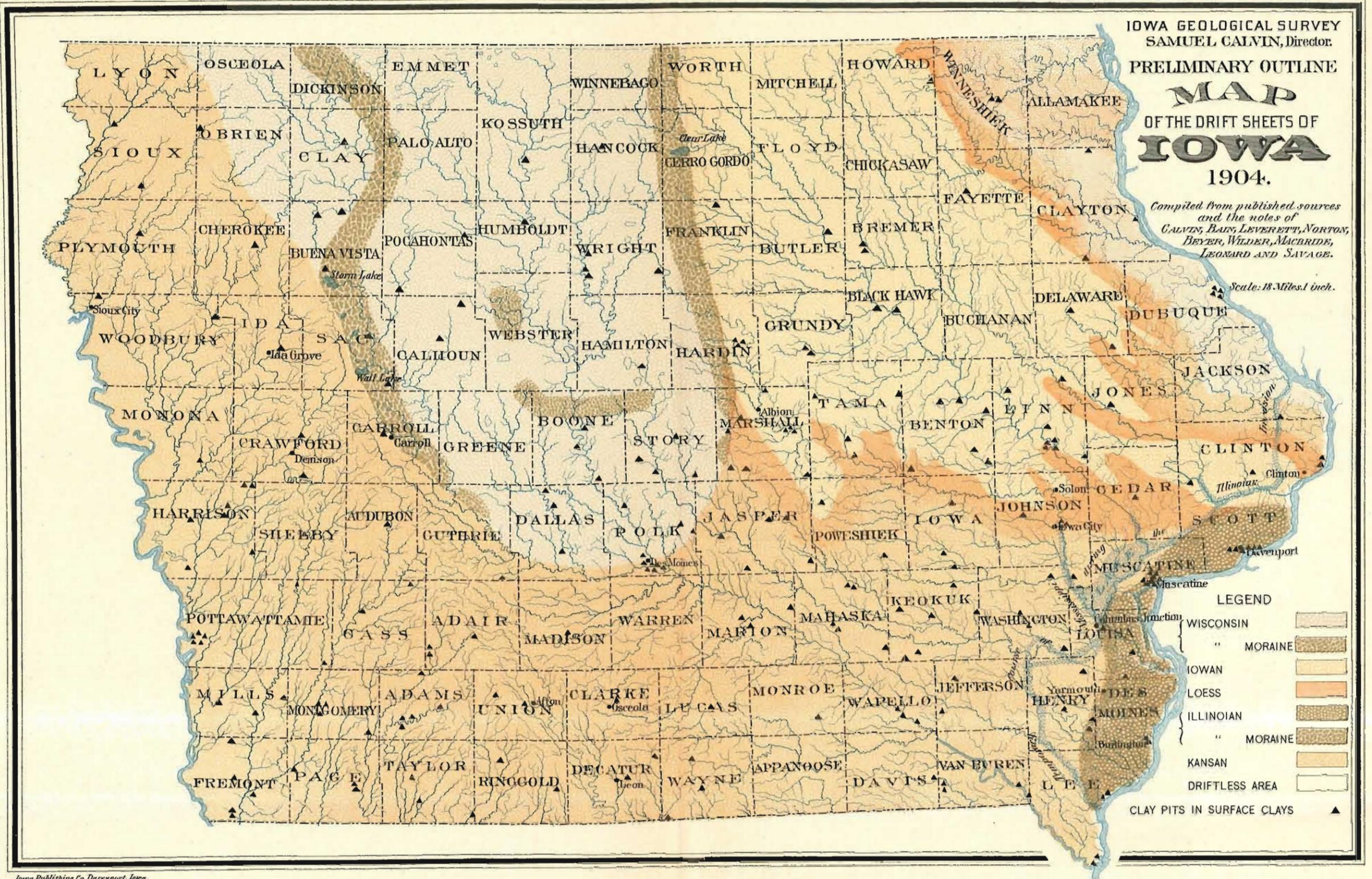
IOWA GEOLOGICAL SURVEY
SAMUEL CALVIN, Director.

PRELIMINARY OUTLINE

MAP OF THE DRIFT SHEETS OF IOWA 1904.

Compiled from published sources
and the notes of
CALVIN, BAUS, LEVERETT, NORTON,
BEYER, WILDER, MACBRIDE,
LEONARD AND SAVAGE.

Scale: 18 Miles to 1 inch.



LEGEND

WISCONSIN	[Pattern]
" MORAINE	[Pattern]
IOWAN	[Pattern]
LOESS	[Pattern]
ILLINOIAN	[Pattern]
" MORAINE	[Pattern]
KANSAN	[Pattern]
DRIFTLESS AREA	[Pattern]
CLAY PITS IN SURFACE CLAYS	▲

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