

**ANNUAL REPORT OF
PROGRESS AND RESULTS OF
THE WISCONSIN GEOLOGICAL
SURVEY FOR THE YEAR 1876**

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Annual Report of progress and results of the wisconsin geological survey for the year 1876 by T. C. Chamberlin

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T. C. CHAMBERLIN

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OF
PROGRESS AND RESULTS
OF THE
WISCONSIN
GEOLOGICAL SURVEY
FOR THE YEAR 1876.

BY
T. C. CHAMBERLIN,
CHIEF GEOLOGIST.

MADISON, WIS.:
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1877.

ANNUAL REPORT.

To His Excellency, HARRISON LUDINGTON,

Governor of Wisconsin :

SIR :—In accordance with the requirements of chapter 292 of the General Laws of 1873, I herewith present a report of the progress and results of the geological survey for the year 1876. As previous legislatures have deemed it injudicious to publish voluminous annual reports, but have wisely made provision for the publication of a final report which shall include all the results of the survey in their most compact and convenient form, it is not thought advisable to extend this report beyond a brief statement of the work of the year, and of the condition of the survey at its close. The labor saved by this brevity has been expended in hastening the preparation and publication of the final report.

Most respectfully,

Your obedient servant,

T. C. CHAMBERLIN,
Chief Geologist.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial reporting and compliance with regulatory requirements. The text notes that without reliable records, organizations may face significant challenges in identifying discrepancies, resolving disputes, and demonstrating adherence to applicable laws and standards.

2. Furthermore, the document highlights the role of technology in streamlining record-keeping processes. Modern accounting software and digital storage solutions can significantly reduce the risk of human error and data loss while improving the efficiency and accuracy of data collection and analysis. It suggests that organizations should invest in robust IT infrastructure to support their record-keeping needs and ensure that all data is securely stored and easily accessible for review and audit.

3. In addition, the text addresses the importance of regular audits and reviews to verify the integrity and accuracy of the recorded information. It states that periodic audits help to detect and correct errors or irregularities early on, preventing them from escalating into more serious issues. The document also notes that audits provide valuable insights into organizational performance and can identify areas for improvement in internal controls and operational procedures.

4. Finally, the document concludes by reiterating the overall significance of diligent record-keeping for long-term organizational success and sustainability. It encourages organizations to adopt a proactive approach to record management, ensuring that all relevant information is captured, maintained, and protected in accordance with best practices and industry standards. By doing so, organizations can build trust with stakeholders and ensure the reliability of their financial and operational data.

THE GEOLOGICAL SURVEY.

The direction of the survey was placed in the charge of the writer on the 16th of last February. At that time there remained an area of upwards of 28,000 square miles that had not been examined in detail. The greater part of this area lay in the unsettled forest region of the north, where the most serious obstacles to examination are presented. Not only does the density of the forests make their penetration to long distances from the settlements laborious, but it conceals the outcroppings of the formations, and greatly enhances the labor necessary to make complete investigations. To these difficulties, the little known character of the region, both geographically and geologically, adds many others. Geological reconnoissances had been made along some of the rivers and in the more accessible portions, but even the general structure of large areas was, as the sequel has shown, quite unknown. As this region involved the unascertained limits and relations of both the iron and copper-bearing series, its exploration became the more important. Besides the survey of this large, unexamined tract, it was deemed essential that further examinations should be made in some important regions, which had been previously examined in part, especially the iron districts of Oconto and Ashland counties. There remained of the time for which appropriation had been made, little more than a year, and of the funds, an available amount somewhat less than the allotment for one year.

From these facts it becomes evident to every one, most especially so to those familiar with geological work, or with exploration of any kind in the northern part of the state, that a more than Herculean task was imposed upon the corps. To this was added a little later, by enactment of the legislature, the laborious but grateful duty of preparing and publishing the final report.

The plan of operations for the season was matured with reference to these conditions.

Two purposes predominated: the first being to seize upon the most important points and lines of investigation, and, from these to extend the work so far as possible; and the second, to so distribute the work as that, if not complete, it should be as nearly as possible just to the several sections. In respect to the latter point, it is to be remarked that nothing short of the complete and thorough investigation contemplated by the act authorizing the survey can be entirely just, since the greater portion of the state has been thus examined.

In pursuance of this plan and the modifications subsequently found advisable, work has been in progress on the Oconto Iron series, reaching out thence westward and southward; upon the Penokee Iron series, with the double purpose of more thorough examination of the known portion, and, of determining the nature of its westward extension; upon the Copper Bearing series in Ashland county; upon the Copper Bearing series in Polk county and its heretofore unrecognized extension through Burnett, Ashland and Bayfield counties to its junction or rather continuation in the Lake Superior series; upon the Paleozoic formations of the St. Croix and upper Mississippi regions, and upon a portion of the Archaean district on the head waters of the Wisconsin river. A little additional work has also been done in the lead region and in the central and southern parts of the state. These several portions of the work will be considered more in detail presently. They are here grouped together as indicating the salient plans and purposes of the year's administration, and because they determined, in large measure, the organization of the working force.

ORGANIZATION OF THE CORPS.

The commissioned members of the corps, R. D. Irving, A. M., E. M., Moses Strong, A. M. E. M., Assistant Geologists, and W. J. L. Nicodemus, A. M., C. E., Topographical Assistant, have retained their connection with the survey as heretofore. Mr. Strong continued his work of previous seasons in the Mississippi regions until July, after which he explored the Copper-bearing series from St. Croix Falls to Lake Superior. Prof. Irving, besides some work in central Wisconsin, continued his examination of the Iron and Cop-

per-bearing series of Ashland county, begun in 1873. Prof. Nicodemus has been actively engaged in compiling the geographical data for the maps, and in drawing them upon a uniform and accurate scale. Each township has been carefully built up from the notes and plats of the original government linear surveys, and the natural features have been compiled from a large collection of state, sectional, county, township and special maps. It is impossible in the present condition of our linear surveys, and of the local maps, to construct absolutely accurate maps, but it is believed that those of the survey will be an important contribution in that direction. This digression from the subject of organization is rendered pardonable by the fact that I shall not again have occasion to refer to the work of Prof. Nicodemus.

Arrangements were made with Prof. W. W. Daniells, of the State University, who had been chemist to the survey during the first two years, and with Mr. Gustavus Bode, of Milwaukee, who had sustained that relation during the last year, to do such chemical work as might be needed, at specified rates, per determination.

Chas. E. Wright, M. E., an experienced iron expert, was engaged to examine the Penokee Iron range from the gap of the Bad river westward, and to trace out its extension as far as the time and means that could be allotted him would permit.

In 1874, work was commenced in the Menomonee Iron region of Oconto county, under Major T. B. Brooks, C. E., an iron expert and geologist of large experience in the Lake Superior region, but the funds that were apportioned to that part of the work, on the basis of an estimate of its cost, proved insufficient, and the survey was left incomplete. During the following year, the work was not resumed. It was deemed highly important that the investigation of that region should be continued. Circumstances rendered it impossible to secure the personal services of Major Brooks, and the work was therefore placed in the hands of his associate, Mr. Wright, who had assisted in the work that had been previously done, and was thoroughly familiar with the region so far as then explored.

Mr. L. C. Wooster, who had been connected with the survey during the three preceding years, was employed to examine a belt extending from St. Croix and Pierce counties eastward, and lying contiguous to the area surveyed by Mr. Strong.

The commissioners for the survey of a military road from Wausau

to the north line of the state, a distance of about one hundred miles, generously offered to furnish supplies and camp facilities for an observer to accompany their party; and Dr. A. C. Clark, of Wausau, was commissioned to this work.

The act authorizing the survey very wisely requires observations on animal life in its relations to agricultural interests; and, in pursuance of this provision, arrangements were made with Dr. P. R. Hoy, of Racine (known throughout the country as an able observer in this department), to report upon the fishes, reptiles and insects of the state, whereby, not only the observations of the year, but the fruits of a life time of earnest study are secured to the state.

Mr. F. H. King, who, as my assistant in previous years, had been engaged in practical observations in this department of the survey, and had accumulated many valuable facts, as heretofore reported, has continued his observations in relation to the food and habits of birds.

In the progress of the survey, a collection of twenty thousand or more fossils had been gathered; many of them new species which required identification and description preparatory to publication, and, to the specimens being placed in the several institutions entitled to them. For this work, the services of Prof. R. P. Whitfield, of Albany, N. Y., an able and experienced paleontologist, who, through former investigations, was thoroughly familiar with the organic remains that had previously been collected in the state, and was thus peculiarly fitted for this work, were procured.

The working force as thus organized stands as follows:

COEFS.

- T. C. CHAMBERLIN, Chief Geologist.
- R. D. Irving and M. Strong, Assistant Geologists.
- W. J. L. Nicodemus, Topographical Assistant.

LOCAL AND SPECIAL ASSISTANTS.

- W. W. Daniells, Chemist.
- Gustavus Bode, Chemist.
- Chas. E. Wright, Iron Expert.
- hi t field, Paleontologist.
- P. R. Hoy, Ichthyologist and Entomologist.
- F. H. King, Ornithologist.
- L. C. Wooster, Local Assistant.
- A. C. Clark, Local Assistant.