alumni, friends, and acquaintances, and the unveiling of the portrait, received an ovation such as rarely comes to a professor.

His death called forth expressions which showed the breadth of his influence. He lies buried under the hemlocks in a wild and picturesque ravine on "Mount Marcy," at Wilbraham, Massachusetts.

Remarks were made by W. H. Dall, W. H. Niles, W. North Rice, and by the President in testimony of the high character and attainments of Doctor Marcy and of his services to science, especially as a teacher.

MEMOIR OF EDWARD ORTON

BY G. K. GILBERT

Edward Orton, ninth president of our Society, was born at Deposit, Delaware county, New York, March 9, 1829. His father, Samuel G. Orton, a minister of the Presbyterian church, was of New England stock, belonging to a family which lived for several generations in Connecticut. His mother's maiden name was Clara Gregory. He was twice married: in 1855 to Mary M. Jennings, of Franklin, New York; in 1875 to Anna D. Torrey, of Millbury, Massachusetts. He died at his home in Columbus, Ohio, October 16, 1899, having rounded out the allotted span of three score years and ten. Charles, Clara, Edward, and Mary, children of his first marriage, his wife, and her two children, Louise and Samuel, survive him. His son Edward succeeds him as State Geologist of Ohio.

As a boy he lived with his parents in a rural community at Ripley, Chautauqua county, New York, becoming intimately acquainted with farm life and work. He was fitted for college mainly by his father, but spent one year in Westfield Academy, and another in Fredonia Academy. He entered Hamilton College as a sophomore, and was graduated at the age of nineteen. After teaching for a year in the academy at Erie, Pennsylvania, he entered the Lane Theological Seminary (1849), but he was prevented from completing the course by the temporary disability of his eyes. After a year or more of rest and out-of-door life, he resumed teaching in the Delaware Institute at Franklin, New York, where he was assigned the department of the natural sciences. In 1852 he returned to student life, spending six months in the Lawrence Scientific School, and afterward resuming theological studies at Andover Seminary. He was then ordained to the Presbyterian ministry and became for one year the pastor of a church in Downsville, New York. In 1836 he was called to the chair of natural science in the New York State Normal School at Albany, and from 1859 to 1865 was principal of the Chester Academy in Orange county. He was then called to Antioch College
Very truly yours,
Edward Orton.
at Yellow Springs, Ohio, becoming at first principal of the preparatory
department, then professor of natural history, and finally, in 1872, presi­
dent of the institution. The following year he resigned to accept the
chair of geology in the Ohio Agricultural and Mechanical College, then in
process of organization under the provisions of the act of Congress of
1862. Before the institution was opened he was tendered and had ac­
cepted the presidency, and he filled both positions for eight years. This
was the formative period of the institution and he had much to do with
the shaping of its policy. It grew rapidly and, with enlarging scope,
became the present Ohio State University. But while his administrative
work gave satisfaction to his associates, it was less to his taste than
either teaching or scientific research, and he gladly relinquished it as
soon as he could do so without seeming to betray a trust. He resigned
the presidency in 1881, but retained the chair of geology during the
remainder of his life. His work as an investigator in geology was
carried on during his residence in Ohio, and could command only such
share of his time as was not consumed by executive and professorial
duties.

For thirty years he served the state of Ohio, first as assistant geologist,
and later as state geologist. He was vice-president of the American Asso­
ciation in 1885, president of the Geological Society in 1897, and president
of the American Association at the time of his death.

This brief outline of Orton's life, dry and statistical though it is, reveals
the important fact that his dominant activity, beginning in the field of
religious instruction, was successively transferred to secular education
and geologic research, so that there are three points of view from which
his career might appropriately be considered. Our interest as geologists
naturally centers in his labors and influence as a man of science, but it
is well to recognize that these were affected in important ways by his
earlier and associated activities.

In a sketch of his life which, though anonymous, is clearly autobi­
ographic, Orton says of himself: "Finding that his theological creed was
giving way under his later studies [at the Lawrence school], he sought
to avert the change by more thorough investigation in this department,
and entered Andover Seminary to attend for a year Professor Park's lec­
tures on theology. The experiment was successful to the extent of arrest­
ing the change in his views, but after a few years the process was resumed
and ended in the replacement of the Calvinistic creed, in which he had
been brought up, by the shorter statements of Unitarianism."*

* Historical Collections of Ohio; Centennial edition, 1889, vol. 2, p. 59. In the compilation of my
account of Orton's early life I have drawn freely on this biography.— G. K. G.
This change of belief cost him not only loss of status as a Presbyterian minister, but the alienation of friends, and there followed a period of such unhappy remembrance that he afterward shrank from the mention of it, even to the members of his family. It is to the credit of advancing civilization that here at the end of the nineteenth century our community finds difficulty in realizing how hard was the temporal way of the apostate even at the century's middle.

On leaving the Presbyterian ministry Orton accepted secular teaching as an occupation, but adhered to religious teaching as a duty. Living in communities where there were few Unitarians, he was not connected with a church organization, but he often addressed audiences on religious and ethical topics, and during his connection with the State University he frequently gave a Sunday lecture for the benefit of such students as were not connected with the Columbus churches. This practice and the spirit which actuated it doubtless helped to keep him in touch with the community and contributed to the high esteem and confidence with which he was regarded. It is proper to add that, while his belief in the fundamental doctrines of Christianity survived the perils sometimes attributed to scientific training, his science suffered nothing from theologic bias. His writings ascribe the phenomena of nature to natural causes, and his hypotheses seek verification by appeal to visible and tangible facts.

Of his work as an educator it is not necessary that I attempt to speak, because it has already been treated by the abler pen of Doctor Mendenhall,* who was for years his associate. It contributed to his success as a geologist chiefly by making him master of the art of presentation alike from the platform or through the printed page.

Orton's interest in geology was not developed until early manhood. His first work appears to have consisted of observation and collection carried on as an aid to teaching, and it was not until his forty-first year that he made contribution to the literature of the science. In the year 1869 the Second Geological Survey of Ohio was organized, with John S. Newberry as State Geologist and Edward Orton and E. B. Andrews as Assistant Geologists. Orton was at that time professor of natural sciences in Antioch College and did not relinquish his college work. The southwest quarter of the state, called the third district, was assigned him as his field of survey, and an assistant was given him. After a few seasons of active field-work, in which the areal geology was completed

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*Edward Orton, educator. By T. C. Mendenhall. Address read at Columbus, Ohio, November 26, and printed by the Ohio State University in a memorial volume. Printed also in Science, vol. 11, 1900, pp. 6-11. A biographic memoir by I. C. White is published in the American Geologist (vol. xxv, 1900, pp. 197-210), and one by J. J. Stevenson in the Journal of Geology (vol. viii, 1900, pp. 205-213).
and reported on by counties, the attention of the principal assistants was given to various special topics. Newberry, who had been divided in residence between Ohio and New York, removed altogether from Ohio, and about the same time Orton's field of college work was removed from Yellow Springs to Columbus. Votes of state money, except for publication, had practically ceased, and it remained only to prepare and print the topical volumes of the series of projected reports. The editorial work gradually devolved on Orton. He also continued to devote much time to field-work, and he came to constitute the survey in fact some years before Newberry relinquished nominal control. Meanwhile the development of various mineral resources, especially the fuels, coal, gas, and oil, created a popular demand for more geologic work, and a third geological survey was finally established under Orton's directorship. In 1882 he was charged by the legislature with the completion of delayed reports of the second survey, and a year later was appointed State Geologist by Governor Foster. The new organization, restricting attention to the geology and industries of useful materials, assumed the character of a continuous economic survey and has been maintained to the present time.

Orton's personal contributions to the geology of Ohio began with the details of areal, stratigraphic, and structural geology in the third district. These were described and published in thirteen county reports and two reports on the classification and distribution of strata. His data on various economic materials, accumulated during the areal survey, were supplemented by visits to other parts of the state and were generalized in a series of special papers. Iron ores, building stones, lime, gypsum, clays, rock waters, and coal were thus treated, the discussion of coal being elaborated by horizons and districts. From about the year 1884 attention was largely concentrated on natural gas and oil, and as to these Orton soon became a recognized expert. In addition to his voluminous writings on this subject for the Ohio reports, he made a number of contributions to scientific and technical journals, and his researches were carried to other states. Chiefly for the purpose of verifying a general theory of the relations of gas, oil, and brine in subterranean reservoirs, he extended the investigation of the natural gas fields in northwestern Ohio so as to include the cognate fields in eastern central Indiana; and he was called by the officers of geological surveys in Kentucky and New York to examine and report on gas and oil fields.

The earlier part of his geologic work consisted of observation and primary generalization, the determination and record of local phenomena and their arrangement under categories already established. His later work was largely economic, the application of geologic principles and
local geologic knowledge to industrial questions. His contributions to
type came late, were few in number, and were broadly founded on
the facts of his own observation. He never entered the field of specu-
lation. He epitomized in a single career the fundamental method of
science—first, observation, then theory, then verification through re-
newed observation, and finally the application of theory to particular
cases for the promotion of human welfare—and by thus exhibiting pure
and applied science in close and logical association he gave to his com-
community an object lesson of great value.

Beginning life as a preacher and never ceasing to be a religious in-
structor, continuing life as a teacher and remaining a teacher to the
end, and bearing in middle life an important administrative trust, he
reserved scant time for research; yet despite these limitations he be-
came, in fact as well as by official designation, the first geologist of his
state, and he attained the foremost rank in an important department of
theoretic and applied geology. Quiet in manner and retiring in dispo-
sition, challenging attention by no brilliant and striking theories, refrain-
ing from the discussions of the more general problems of his science,
and adhering modestly to those of his state and his specialty, he was
yet so appreciated by his fellows that he received the highest honor in
the gift of American geologists and the presidency of the greatest body
of American scientists.

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The memoir of Sir William Dawson was read by H. S. Williams.

**MEMOIR OF SIR J. WILLIAM DAWSON**

**BY FRANK D. ADAMS**

It is with deep regret that we record the death of Sir William Dawson, which took place at Montreal on the morning of November 19, in the eightieth year of his age. In him Canada loses a distinguished geologist and naturalist, as well as one who was intimately identified with educational work of all kinds, but more especially with higher education in the province of Quebec.

Sir John William Dawson, having been born at Pictou on October 13, 1820, was a native of Nova Scotia, a province which has produced more than its share of the Canadians who have risen to eminence in the various walks of life. His father, James Dawson, was from near Aberdeen, Scotland, and came to Nova Scotia to fill a position in a leading business house in Pictou, and on the termination of his engagement began business on his own account, becoming in the course of time one of the chief ship-builders in that part of Nova Scotia. James Dawson had but two children, of whom Sir William was the elder. The younger died at an early age, leaving Sir William thus the sole survivor of the family.