WINTER 1987

Ohio Geology Newsletter

Division of Geological Survey

SURVEY CELEBRATES SESQUICENTENNIAL

by Michael C. Hansen

As geologists, we are commonly unimpressed by the lapse of 150 years—after all, this is but an instant in the hundreds of millions of years of geologic time with which we deal on a daily basis. On the other hand, a century and a half is a relatively impressive figure for the survival and prospering of a traditionally small, technically oriented agency such as the Division of Geological Survey. The Sesquicentennial of the Survey in 1987 provides us with an opportunity to reflect on our origins by focusing on the establishment of the First Geological Survey of Ohio in 1837.

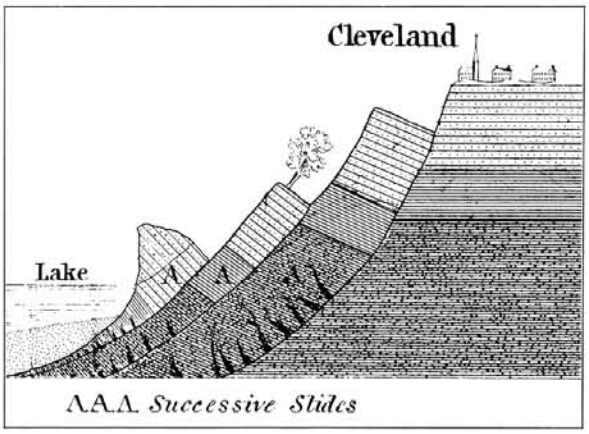
Although the first Survey was short lived—it survived only two years—it drew together a remarkable cadre of geologists, known as the "geological corps," who laid the foundation for understanding the geology of the state and provided the framework for a prosperous mineral industry that still flourishes. And, of importance, the first geological corps established the tradition that the Survey "has always been a producer rather than a consumer," to borrow from the observation of P. W. Stoddard in his 1928 summary of the First Geological Survey of Ohio. This article traces some of the important events and personalities connected with the First Geological Survey of Ohio.

ESTABLISHMENT OF THE FIRST SURVEY

Interest in a survey of Ohio's geological features began some years before 1837, prompted in part by articles on certain aspects of the state's geology by

View of "Putnam's Hill" and the upper Bridge at Zanesville, on the Muskingum River.

This illustration of Putnam Hill at Zanesville is from Samuel P. Hildreth's 1836 article on the geology of the valley of the Ohio, published in the American Journal of Science. *Hildreth's article, along with several others, was instrumental in creating a desire to have a geological survey of the state.*



William W. Mather's (1838) diagram, prepared by Charles Whittlesey, of landslides along the Lake Erie shore was perhaps one of the earliest observations of curved surfaces of failure in such features.

Caleb Atwater (1818) of Circleville and particularly by Samuel P. Hildreth of Marietta. Hildreth was by far the most prolific of these early writers and his series of papers in the *American Journal of Science* (1826, 1827, 1828, 1829, 1833, 1834, 1836a-c, 1837) were instrumental in creating excitement and interest in the mineral potential of Ohio. In no small measure this interest was heightened by Hildreth's delightful prose and by his astute observations of such things as drainage modifications and a prediction of the future use and value of petroleum. There was a consensus among the state's scientific community that such a survey was needed and that it would be of tremendous benefit to the economic development of the state.

The first formal governmental support of the concept of a geological survey came from Governor Robert Lucas in his annual message to the legislature in late 1835. Prompted by the Governor's message, the Ohio General Assembly early in 1836 established a geological committee consisting of Hildreth as chairman, John Locke and John L. Riddell of Cincinnati, and Increase A. Lapham of Columbus to report to the next session of the legislature "the best method of obtaining a complete geological survey of the State, and an estimate of the probable cost of the same."

The committee recommended that the geological survey be funded for four years at a cost of $12,000 per annum and employ one principal geologist, five assistant geologists, one draftsman, and one naturalist. The survey was to include geology, botany,

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ODNR
OHIO DEPARTMENT OF NATURAL RESOURCES

Richard F. Celeste, Governor • Joseph J. Sommer, Director

Chief's corner by Horace R. Collins

One hundred and fifty years ago, on March 27th, 1837, the Ohio legislature created the organization now known as the Division of Geological Survey. From then to the present many dedicated geologists, chemists, cartographers, and technical and clerical staff members have labored to advance the state of knowledge of the geology of Ohio. It is with obvious pride that the present members of the Geological Survey celebrate its Sesquicentennial Year.

The importance of geology and mineral resources to Ohioans was recognized from the first. Samuel P. Hildreth, chairman of the committee appointed by the legislature to report on the cost and best method for obtaining a geological survey, spoke eloquently on the subject in 1836. Hildreth described visiting "those portions [of Ohio] known to abound in iron ores, coal, and salt; the three main staples in which the future of millions of Ohioans must depend for their manufacturing wealth and greatness." Those who followed—State Geologists and staff alike—have recognized and emphasized the importance of geology to our everyday lives.

The technical reports produced by the Geological Survey throughout the intervening 150 years have consistently reflected the needs of society for geologic information. Although the basic geologic structure of the state has not changed in the past 150 years, society's perceptions of what is important have continuously changed. As societal needs changed so the work of the Geological Survey has changed to meet new conditions and new concerns. New and more sophisticated methods of developing technical information also have continued to evolve.

While mineral resources have always occupied an important position within the Survey's work, other subjects such as environmental geology, geological hazards, and land use and public policy involving geology and mineral resources have assumed more significant roles. Again, these areas are in response to public concern over these problems; as the public organization responsible for developing such information, the Geological Survey has responded with programs to meet these needs.

It is with admiration that we at the Division of Geological Survey look back over the years to the excellent work of our predecessors and to their service to the citizens of Ohio. With the examples of the past and the challenges of the present we must each renew our resolve to continue the work of an enduring and honorable organization and to rededicate ourselves to service in the public interest.

FRIENDS OF PLEISTOCENE TO MEET IN OHIO

As part of the Sesquicentennial activities, the Division of Geological Survey will host the 34th Field Conference of the Midwest Friends of the Pleistocene in Mansfield May 15-17, 1987. The two-day field trip, led by Stanley M. Totten (Hanover College) and John P. Szabo (University of Akron), will focus on stratigraphy of pre-Woodfordian tills in north-central Ohio. Survey contact is Rick Pavey (614-265-6599).

OHIO GEOLOGY

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News items, notices of meetings, etc. should be addressed to the attention of the editor. Change of address and new subscriptions should be addressed to the attention of the secretary.

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zoology, and archeology. After various amendments had been added from both houses of legislature, including one that limited the geological corps to the principal geologist and no more than four assistants, the act establishing the First Geological Survey of Ohio was passed on March 27, 1837. Thus began the tradition that has continued, albeit at times intermittently, for 150 years.

INTO THE FIELD

Thoughts of the continued existence of the Ohio Geological Survey for another century and a half were probably fleeting or nonexistent in 1837 to William W. Mather, Ohio's first State Geologist, but certainly he contemplated the future exploration of the state's mineral resources and the problem of erosion along the Lake Erie shore. Mather speculated that coal would become one of the most productive mineral industries in the state and that a century or two of continued erosion of the shore at Cleveland would remove a considerable extent of the city as it then existed.

Mather and his corps of assistants—Caleb Briggs, Jr., J. W. Foster,[1] Samuel P. Hildreth, Jared P. Kirtland, John Locke, and Charles Whittlesey—embarked on an odyssey, although a brief one, that prodded Ohio into the forefront of the industrial revolution. Their astute observations of the geological framework of the state have endured in modified form to the present.

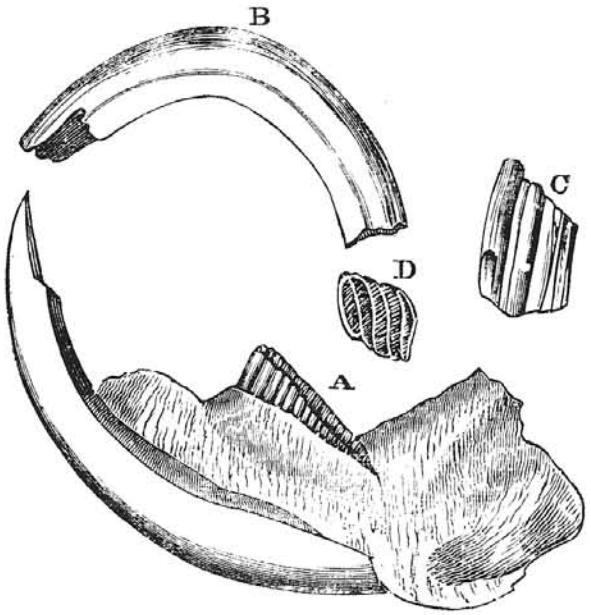
The most significant contributions of the geological corps during the First Survey were fundamental and had profound practical applications. These men entered into territory that had received only cursory, if any, geological exploration and had only a few years before been transformed from a wilderness into a prosperous agricultural entity. Their tasks were made even more difficult by the ignorance of the local populace, which commonly regarded them with distrust and suspicion reserved for speculators and swindlers.

Despite these problems, in only one-and-a-half field seasons the geological corps was able to determine the dip, stratigraphic sequence, and relative ages of the strata and make comparatively good correlations of these rocks with those in Europe. This fundamental framework outlined by the First Geological Survey of Ohio has, of course, undergone considerable modification and refinement and, indeed,

[1]J. W. Foster was added to the geological corps to replace John Locke, who was in Europe for a portion of 1837.

is still undergoing such fine tuning; however, all of the comparatively sophisticated modern interpretations are built upon the foundation laid 150 years ago.

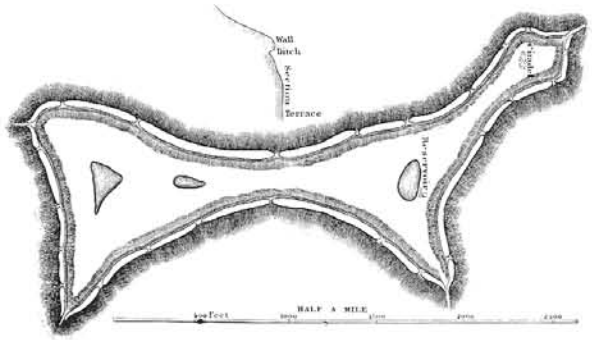
It is perhaps now difficult to imagine the geological ignorance that prevailed among Ohio citizens in 1837, but with no official summary of the state's geology available, wild speculation on the occurrence of mineral resources was rampant. The first geological corps laid to rest such rumors and notions as the presence of coal deposits in western Ohio, the occurrence of gold, tin, silver, and other metals in the sedimentary rocks, and other equally preposterous ideas. They outlined the distribution of the coal-bearing rocks in the state, the distribution of iron ore, marl, clay, brine, burrstone, limestone, sandstone, and other mineral resources.



Lower jaw and teeth of a giant beaver, Castoroides ohioensis, *first described by J. W. Foster in the First Annual Report (1838). This specimen was collected near Nashport, Muskingum County.*

The foray of the first geological corps across the Ohio countryside was, both in spirit and accomplishment, a "survey" of the geology and mineral resources of the state, and it was remarkably comprehensive considering the constraints of time and the lack of previous investigations. Although the legislatively designated task was strongly economic and was well coordinated in this direction by Mather, the geological corps also made a number of important scientific observations. For example, fossils did not escape their notice and were used for biostratigraphy; that is, to determine the relative ages and correlations of strata. John Locke described large specimens of a trilobite, *Isotelus*, now Ohio's state fossil (see *Ohio Geology*, Summer 1985), which he illustrated in the famous "trilobite plate" of the Second Annual Report (1838). J. W. Foster described a specimen of a giant beaver found near Nashport, Muskingum County, and named it *Castoroides ohioensis*. Caleb Briggs described numerous bones of a mammoth near Jackson, Jackson County, and named the creature *Elephas jacksoni*.

Archeological works also were a subject of focus by the geological corps, especially the remarkably observant John Locke and Charles Whittlesey. Fortifications and mounds,



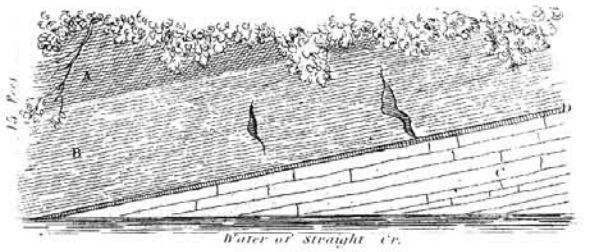
Fort Hill, in Highland County, was among the archeological structures investigated by the geological corps. From Locke (1838, Second Annual Report).

referred to as tumuli, were noted in many areas of the state. Locke prepared a detailed map of Fort Hill in Highland County. Whittlesey mapped numerous mounds and other archeological structures.

The responsibilities of the First Geological Survey also extended to the Recent fauna of Ohio. This task fell to Jared P. Kirtland, who prepared a detailed list of fishes, amphibians, reptiles, birds, mammals, Testacea (clams and snails), and crustaceans. This list, which includes annotations on many animals now extirpated from Ohio, serves as an important record of the occurrence and distribution of the Recent fauna as it was before extensive European settlement.

Soils and their relationship to agriculture, natural springs and their geochemistry, topography, magnetic declination, and the local flora also attracted the attention of the geological corps. This wide spectrum of investigation is testimony to the ability of these broadly trained naturalists. The First Geological Survey of Ohio can truly be said to have been the progenitor of all government-sponsored investigations of natural resources in the state.

Although the two volumes issued by the First Geological Survey of Ohio—a 134-page First Annual Report and a 274-page Second Annual Report—provided a firm outline of the state's geology and spurred development of mineral resources, the organization was doomed soon after it began. The original concept of the Survey was for a four-year venture with an annual appropriation of $12,000. The shortened field season of 1837 consumed only $2,089.57 of the first year's appropriation. The financial panic of 1837 initiated retrenchment by state legislators and, consequently, the Survey appropriation for 1838 was denied. Field work during 1838 was maintained with the unspent balance of funds from 1837 and a total of $9,648.80 was expended in these efforts. General public support of the Survey and campaigning on



Dipping strata along Straight Creek in Highland County just north of the Adams County line as illustrated by John Locke in 1838 (Second Annual Report). This area is on the north side of the Serpent Mound cryptoexplosion structure, which was recognized by Locke and called "Sunken Mountain." These rocks are probably Silurian in age.

the Survey's behalf by a number of legislators failed to generate further appropriations.

In 1841 a sum of $300 was appropriated by the legislature to label and distribute the specimens collected by the geological corps. Mather was in charge of this task, which was completed early in 1842. Efforts were made in 1844, 1851, 1854, 1857, and 1860 to revive the Geological Survey of Ohio, but, despite widespread public support and petitioning and support from various governors, no positive action was taken by the legislature. In 1865, at the conclusion of the Civil War, efforts to revive the Survey began again, and finally, in 1869, after a 30-year dormancy, the Geological Survey of Ohio was again an active entity.

FURTHER READING

Hansen, M. C., and Collins, H. R., 1979, A brief history of the Ohio Geological Survey: Ohio Journal of Science, v. 79, p. 3-14.

Merrill, G. P., 1920, Contributions to a history of American state geological surveys: U.S. National Museum Bulletin 109, 549 p.

Orton, Edward, 1894, Geological surveys of Ohio: Journal of Geology, v. 2, p. 502-516.

Stoddard, P. W., 1928, Story of the First Geological Survey of Ohio, 1835-1842: Ohio Archaeological and Historical Society Publication, v. 37, p. 105-135.

Whittlesey, C. W., 1885, Personnel of the First Geological Survey of Ohio: Magazine of Western History, v. 2, p. 73-87.

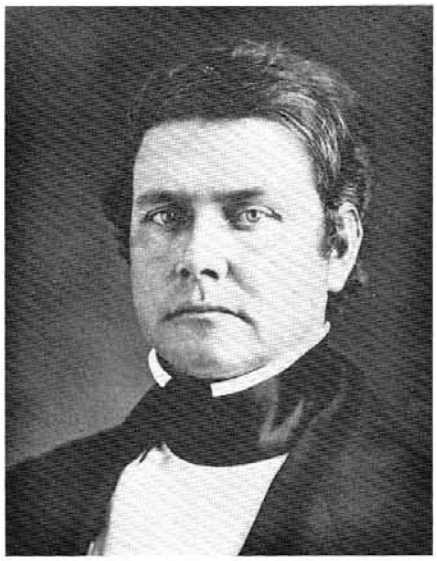
WILLIAM WILLIAMS MATHER

William Williams Mather, Ohio's first State Geologist, was born in Brooklyn, Connecticut, on May 24, 1804, and was a direct descendant of the noted New England Mather family which included Increase and Cotton Mather. As a teenager, young Mather went to Providence, Rhode Island, to study medicine. During this period of study he developed an intense interest in chemistry that would be undiminished throughout his life.

In 1823, Mather entered the United States Military Academy at West Point, from which he graduated five years later. After brief duty as an artillery instructor he was appointed assistant professor of chemistry, geology, and mineralogy at West Point. He held this position for six years and served concurrently as professor of geology at Wesleyan University in Middletown, Connecticut. In 1833 he published a textbook, *Elements of geology*, which was sufficiently popular to go through several revised and enlarged editions. After brief military assignments in Minnesota and Idaho, Mather resigned his army commission in 1836 in order to pursue science as a full-time profession.

Mather served briefly as professor of geology at the University of Louisiana but soon (in 1836) resigned this position to serve as Principal Geologist of the First District of the State of New York. He continued this association with the New York Geological Survey for the next seven years, during which time he prepared five periodic reports and a final report, the latter being a 600-page volume with 46 colored plates.

In 1837 Mather was appointed Principal Geologist of Ohio, a position he occupied for two years. Two Annual Reports, both of which bear the publication date of 1838, were prepared under Mather's direction for the Geological Survey of Ohio. In the spring of 1838, at the request of the Kentucky legislature, he made a geological reconnaissance of that state and published his findings in a 40-page report. Mather was recruited for this honor because of his success in directing the Ohio Survey. The Kentucky legislature declined to establish a fully staffed Survey at that time. Mather was, however, in effect the first State Geologist of Kentucky as well as of Ohio. During this time he also maintained his affiliation with the New York Geological Survey.



W. W. Mather, Ohio's first State Geologist.

Mather's last service to the Geological Survey of Ohio was in 1841 when he was paid a small sum to finish cataloging the specimens collected by the geological corps. Although he had spent little time in the state prior to becoming State Geologist, Mather lived the remainder of his life as an Ohio citizen. During the first year of the Survey, 1837, he purchased 500 acres of land north of Jackson, Jackson County, where he maintained a residence, which in later years he visited during the summer while living in Columbus. His first wife and two of his sons preceded him in death and were buried in the Mather Cemetery near the family home in Jackson.

After the demise of the First Survey, Mather was engaged in a number of private ventures and public-service activities in Ohio. In 1842 he was appointed professor of natural science at Ohio University in Athens, a position he held until 1845 and again from 1847 to 1850. In 1845 he also served as vice president and acting president of that institution. In 1846 he was appointed acting professor of chemistry and geology at Marietta College but did not retain the position because of commitments to explore mineral deposits for mining companies in New Jersey, Virginia, Massachusetts, and in the Lake Superior area.

Mather, pursuing his nearly life-long interest in the chemistry of rocks, minerals, and soils, served as agricultural chemist for the State of Ohio and as secretary of the State Board of Agriculture from 1850 to 1854. During this period he was editor of the *Western Agriculturist* and prepared many reports on Ohio soils. Mather also served as a consultant for several railroads in regard to the best routes across Ohio and potential mineral resources along these routes. He was active in many civic projects in Jackson County and served as a trustee of Granville College (Denison University) from 1840 to 1855.

William Williams Mather died suddenly in Columbus from an apparent heart attack on February 26, 1859, at the age of 54. He is buried in Greenlawn Cemetery in Columbus.

Mather's contributions to the understanding of the geol-

ogy of Ohio are not voluminous in the aggregate, but under his direction the basic outline of the state's geology was established and a thriving mineral industry was launched. The reports prepared by the First Geological Survey of Ohio in 1838 stood for more than 30 years as the principal source of geologic information for the state. Had the First Geological Survey of Ohio continued for the originally proposed time period with recommended staffing and financing, it is probable that a detailed geologic summary of the state would have been produced in a series of volumes. Mather was a capable geologist and administrator and it is quite obvious that he developed a sincere fondness and devotion for Ohio. He had the honor of being Ohio's first State Geologist, and history has demonstrated that the choice was a good one.

—Michael C. Hansen

FURTHER READING

Hitchcock, C. H., 1897, Sketch of W. W. Mather: American Geologist, v. 19, p. 1-15.

Newvahner, J. H., 1931, William Williams Mather: Ohio Archaeological and Historical Society Publication, v. 40, p. 190-199.

INTERSTATE 70 LANDSLIDE

A large landslide, with a width of about 325 feet, began on September 29, 1986, and within a few days had completely destroyed the westbound lanes of Interstate 70 near New Concord in Muskingum County. The slide necessitated immediate closing of westbound I-70 and rerouting traffic. Ohio Department of Transportation officials indicated that the highway was closed for 30 days while emergency repairs were made. These repairs cost approximately $625,000.

View of the destroyed westbound lanes of Interstate 70 near New Concord.

The slide occurred in locally derived materials that were used to fill the head of a small northeast-trending valley. The fill consists of red mudstone and blocks of nonmarine limestone. Although the exact source of these materials is uncertain, it is likely that they were derived from Conemaugh and Monongahela rocks, of Pennsylvanian age, at about the position of the Pittsburgh coal. These rocks typically consist of red and gray mudstones, comparatively thin nonmarine limestones, and thin beds of sandstone. The red mudstones are particularly prone to failure, especially when they become saturated with water.

The fill material appears to have failed at the junction of the fill and the underlying bedrock—this surface served as a glide plane. Heavy rains during the weeks preceding the slide and, perhaps, a deteriorated drainage system apparently sufficiently saturated the fill material to cause failure. It is also possible that vibrations from traffic on the interstate highway contributed to the triggering of the slide.

Such landslides are not uncommon in eastern Ohio in Pennsylvanian and Permian rocks (see *Ohio Geology*, Spring 1986). However, the disruption of traffic on a major east-west interstate highway serves to make a large segment of the public aware of such problems in Ohio.

—Michael C. Hansen

FATAL ROCKFALL IN OHIO

Ohio's record of never having experienced a fatal landslide came to a sudden end on Christmas Eve 1986 when James A. Spence, 52, of Ironton was crushed to death by boulders that struck his westbound car on U.S. Route 52 at Hanging Rock, Lawrence County. The tragedy occurred at approximately 6 p.m. after a day of moderate to heavy rainfall, which apparently had increased the weight of an overhanging stratum of sandstone to the point that the failure occurred. There was apparently no warning preceding the sudden downslope movement of numerous large blocks of sandstone along this steep roadcut. Ohio Department of Transportation officials estimated that an area of roadway the size of a football field was covered with debris, which included blocks of sandstone up to 12 feet in diameter. The westbound lanes of this four-lane divided highway were closed for several weeks for removal of the debris. This site had experienced several smaller rockfalls in preceding months and had recently been inspected and scheduled for remedial modifications to the slope.

The rockfall occurred at a steep, 150-foot-high roadcut on the north side of U.S. Route 52, approximately 0.8 mile west of the Lawrence County community of Hanging Rock. At this point, the highway traverses a very narrow terrace between the bluff and the Ohio River.

Hanging Rock, according to Henry Howe's 1907 *Historical collections of Ohio*, received its name from a high, projecting or overhanging cliff of sandstone overlooking the Ohio River. The legend has commonly been repeated that Indians used this vantage point as a lookout for pioneer settlers navigating the river by boat. An iron forge at Hanging Rock was the source of the name Hanging Rock Iron District for

Large blocks of sandstone covering westbound lanes of U.S. Route 52 at Hanging Rock, Lawrence County. Workers are drilling these blocks in preparation for blasting. Photo courtesy of Ironton Tribune.

the iron-producing region of Ohio and Kentucky (see *Ohio Geology*, Winter 1986).

Eastward view of the steep, sandstone-capped bluff on the north side of U.S. Route 52 at Hanging Rock and sandstone and shale rubble from the fatal rockfall blocking westbound lanes of the highway. Note joints in the sandstone and a remaining promontory that could be subject to a future rockfall. Photo courtesy of the Ohio Department of Transportation.

The precise stratigraphic position of the rocks involved in the rockfall at Hanging Rock is uncertain at present because there have been few published geologic investigations in modern times in this area of Lawrence County. The massive sandstone responsible for the main mass of the rockfall is of Pennsylvanian age and ranges up to about 60 feet in thickness. This sandstone is stratigraphically below the Vanport limestone. The rocks involved in the rockfall are therefore assignable to either the Upper Pottsville or the Lower Allegheny Group of Pennsylvanian age. These rocks on the south side of the Ohio River in Greenup County, Kentucky, are assigned to the Lee and Breathitt Formations of Kentucky stratigraphic terminology.

Rockfalls are traditionally the most dangerous types of landslides in Ohio (see *Ohio Geology*, Spring 1986) because they occur suddenly and involve large blocks of rock that move downslope in freefall or a bounding or sliding manner. There is commonly little warning that such a slide is about to occur.

Rockfalls are most common in jointed, massive rocks such as sandstone or limestone that are underlain by weak, incompetent rocks such as shale or clay. Along natural cliffs, or artificial ones created by roadcuts or excavations, the underlying incompetent unit commonly erodes faster than the overlying massive unit, thus leaving an overhang. Vertical sets of joints and cross joints serve to divide the massive bed of rock into blocks that have no lateral attachment to the main mass of rock. Strong vibrations or overloading through saturation by moisture may trigger the rockfall if basal support of the massive unit has been removed sufficiently.

The tragic rockfall at Hanging Rock poignantly illustrates the potential danger inherent in certain geologic situations. Ohio suffers few natural disasters associated with geologic conditions but we are certainly not immune to tragedies such as the Christmas Eve rockfall at Hanging Rock.

ACKNOWLEDGMENTS

We thank Don Mayne, associate editor, *Ironton Tribune*, and Sherrie Lanier, Ohio Department of Transportation, for information and photos used in this article.

—Michael C. Hansen

W. W. MATHER AWARD TO BE PRESENTED TO MYRON T. STURGEON

As part of the Sesquicentennial activities of the Division of Geological Survey an award, known as the W. W. Mather Award, has been established to recognize significant contributions of an individual to the Division of Geological Survey and to the understanding of the geology of Ohio. The award will be presented at intervals deemed appropriate by the Division. Nominations for the award are made by Survey staff and selection of the awardee is by a Mather Award Committee of Survey employees appointed by the Division Chief. Any individual, except current Survey staff and individuals receiving funding from the Division, is eligible for the award.

Dr. Myron T. Sturgeon, an Ohio native and Professor Emeritus of Geology at Ohio University, Athens, has been selected as the first recipient of the W. W. Mather Award. His publication of more than 60 papers and monographs on Ohio geology and paleontology and his association with the Division of Geological Survey since 1935 document a long career of service to Ohio geology. Dr. Sturgeon will accept the first W. W. Mather Award at the Sesquicentennial Banquet on March 27, 1987. All friends, former students, and supporters of Dr. Sturgeon are encouraged to attend.

NATIONAL GEODETIC SURVEY MARKER PRESERVATION

During the past century and a half, agencies of the U.S. government have been determining with great precision the latitude, longitude, gravity, and height of thousands of locations throughout the United States and its possessions. Collectively, this network of precisely measured points is called the National Geodetic Reference System (NGRS). NOAA's National Geodetic Survey (NGS) has established approximately one million permanent survey markers at these precisely measured points. Other surveying organizations have also established such permanent markers.

The permanent markers are bronze disks, about 3½ inches in diameter. Different types are used for position, height, gravity, and azimuth (direction) measurements. The markers are used by surveyors, engineers, and planning officials as the basis for maps, construction and property surveys, natural resource protection and development, and a variety of engineering projects.

When a survey marker is removed or displaced, its value as a survey point is lost. Replacing a disturbed or destroyed survey marker is time consuming and expensive, requiring precise measurements from other nearby markers. Repeat surveys reveal the destruction of an alarming number of survey markers: typically, half are missing within 30 years. Most have been destroyed by ordinary construction activities. As a result, warning signs, which are called Witness Posts, are set near some types of markers to aid in their preservation and recovery.

To help protect this valuable national resource, the public is asked to cooperate in preserving these survey markers. A survey marker should never be removed or disturbed without permission from NGS, which has a team of regional coordinators and state advisors who arrange the necessary marker-preservation procedures. Anyone with information on NGRS survey markers that are either in need of repair or in danger of being disturbed, call the NGS Rockville, Maryland, office at (301) 443-8319 (collect calls are accepted).

—National Geodetic Survey Information Branch, NOAA

Suzan Jervey

NEW HEAD OF PUBLICATIONS CENTER

Suzan Jervey joined the Survey in October 1986 as Head of the Publication Sales Section and manager of the Publications Center. She replaces Madge Fitak, who served in this capacity for a number of years.

Suzan has a diverse background in natural resources. She holds a B.S. degree in natural resources from the Ohio State University and an M.S. degree in agricultural education, also from OSU. After completing her degrees, Suzan taught natural resources for seven years in vocational schools in Cincinnati and Piqua and then served for a year and a half as coordinator of educational programs for the Miami Soil and Water Conservation District.

Suzan enjoys working with the public and looks forward to maintaining a high level of efficiency in operations of the Publications Center. She is orginally from Columbus and enjoys photography and music as hobbies.

The Publications Center, located on the first floor of the Survey building at Fountain Square, annually distributes approximately 150,000 Survey documents including 26,000 topographic maps and 41,000 publications. In addition, each year the Center distributes an additional 150,000 publications of other divisions of the Department of Natural Resources.

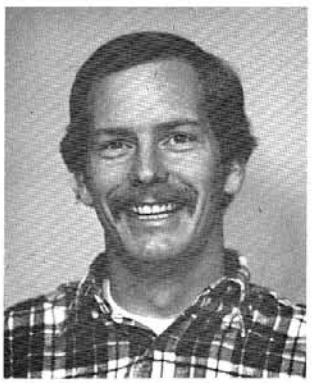
NEW SPECTROMETER FOR GEOCHEMICAL STUDIES

The Division of Geological Survey recently installed an Applied Research Laboratories Model 3510 PC spectrometer in the Geochemistry Section. The 3510 PC is a computer-controlled, inductively coupled plasma (ICP), sequential-emission spectrometer. The spectrometer is operated by an IBM microcomputer and is able to function in a multielement mode. Purchase of the 3510 PC was partially funded by a grant from the Division of Oil and Gas for support of trace-metal investigations of brines.

Initially, the instrument will be used in the Geochemistry Section's current study of Ohio oil-field brines. This equipment will provide determinations of a number of trace metals in brine including aluminum, barium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, vanadium, and zinc. At the conclusion of the brine project the model 3510 PC spectrometer will become the Survey's main method of instrumental chemical analysis for most minor and trace elements in many geological materials, including carbonate rocks, coal ash, silicate rocks, and brine.

SURVEY STAFF NOTES

Nate Fuller



Mike Mitchell

Jonathan (Nate) Fuller is a geologist with the Lake Erie Section in Sandusky. Nate, a Columbus native, came to the Survey in 1978. He has a bachelor's degree from Hope College, Holland, Michigan, and a master's degree from Western Michigan University in Kalamazoo. Between degrees Nate worked as a geology lab technician at the West Indies Laboratory of Fairleigh Dickinson University.

Nate's primary research interest is the sedimentology of modern depositional systems, a specialty which he has applied to his studies of lake-bottom sediments, particularly sand and gravel, in Lake Erie. He especially enjoys open-ended research and being on the lake aboard the Survey research vessel, the *GS-1*.

Nate also enjoys contact with the public and has found himself to be very busy in this regard because of the record-high water levels of Lake Erie in recent months. He resides in Huron and enjoys participating in community theater and gardening.

Michael Mitchell is the Survey's most experienced driller and is now in charge of the new Longyear Hydro 44 deep-core rig. Since Mike came to the Survey in 1981 he has drilled 66 core holes with a total footage of more than 40,000 feet. He had previous drilling experience in the limestone industry and has a certificate in automotive and diesel truck technology from Lincoln Technical Institute, Indianapolis, Indiana.

Mike was coauthor of an article in *Drill Bits*, the newsletter of the National Drilling Federation, and recently received a 5-year safety award from the Department of Natural Resources. He was also nominated for the Governor's Trim Award for exhibiting project creativity and inventiveness. Mike enjoys the challenge of completing deep core holes and meeting numerous people as he travels across the state with the Survey's core rigs.

Mike is married, has three boys, and lives in Washington Court House. He participates in drag racing and likes to rebuild "big motor" cars of 1960's vintage.

CARTOGRAPHER FEATURED

Robert L. Stewart, a cartographer in the Technical Publications Section, is featured in a profile of a cartographer as part of a section titled "Focus on People and Careers" in an eighth-grade earth-science textbook, *Focus on Earth Science*, published by Merrill Publishing Company. Stewart has been with the Survey since 1978 and has been involved with production of a number of Survey maps and publications, including cartographic work on *Ohio Geology* illustrations.

SESQUICENTENNIAL BANQUET PLANNED

To celebrate the 150th anniversary of the creation of the Geological Survey of Ohio, the Division is sponsoring a banquet on the evening of Friday, March 27, 1987. March 27th is the actual anniversary of the passing of the legislation that inaugurated the first Geological Survey of Ohio in 1837. The festivities will be at the Holiday Inn Columbus/Worthington Conference Center (I-270 and U.S. Route 23). Dinner ($16 per person) will begin at 7:30 p.m., preceded by a cash bar at 6:30 p.m. The evening will be highlighted by an after-dinner speech by Dallas L. Peck, Director of the U.S. Geological Survey, and by presentation of the first W. W. Mather Award to Dr. Myron T. Sturgeon, Professor Emeritus of Geology at Ohio University in Athens (see article elsewhere in this issue).

We welcome all friends of the Survey and of Ohio geology to join us in this premier event of our Sesquicentennial celebration. For information on banquet reservations contact Clark Scheerens at the Survey (telephone 614-265-6592).

As a precursor to the banquet on the evening of March 27th, the Survey will hold an open house from 1:00 to 5:00 p.m. that afternoon at its Fountain Square offices. The staff of Survey will be available to discuss current projects.

QUARTERLY MINERAL SALES, JULY—AUGUST—SEPTEMBER 1986

Compiled by Sherry L. Weisgarber

Commodity	Tonnage sold this quarter[1]	Number of mines reporting sales[1]	Value of tonnage sold[1] (dollars)
Coal	8,058,296	214	258,064,708
Limestone/dolomite[2]	13,212,075	100[3]	48,930,199
Sand and gravel[2]	12,723,793	207[3]	40,303,555
Salt[2]	733,793	4[4]	6,745,466
Sandstone/conglomerate[2]	442,103	22[3]	7,205,184
Clay[2]	326,217	27[3]	2,166,372
Shale[2]	273,733	17[3]	555,370
Gypsum[2]	59,225	1	562,638
Peat[2]	9,205	3	40,083

[1]These figures are preliminary and subject to change.
[2]*Tonnage sold* and *Value of tonnage sold* include material used for captive purposes. *Number of mines reporting sales* includes mines producing material for captive use only.
[3]Includes some mines which are producing multiple commodities.
[4]Includes solution mining.

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Division of Geological Survey
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