Ohio Geology

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THE SCIOTO SALINE

by Michael C. Hansen

Today, salt is a commodity that is so abundant and inexpensive that most people give little thought to it. Indeed, the Division of Geological Survey estimates that the Silurian rock salt beneath eastern Ohio could supply the entire nation for 32,000 years. But on the Ohio frontier in the late 1700's and early 1800's, salt was a precious commodity that had to be brought by packhorse across the Appalachian Mountains and commanded a price of $4 to $6 dollars per bushel.

It is no wonder that natural salt-water springs, known as licks or salines, were of intense interest and importance to the pioneers. One of these licks, known as the Scioto Saline or Scioto Salt Licks, along Salt Lick Creek (also known as Little Salt Creek) in Jackson County, figured prominently in the development of Ohio. This lick is an area where naturally occurring salt water, known as brine, flows at the surface as a salt-water spring. It has existed at least since the Pleistocene Ice Age because numerous bones of extinct animals were found at the site (see accompanying article). American Indians had obtained salt at the saline for at least 8,000 years, as indicated from archaeological excavations by W. C. Mills at Boone Rocks in 1905. This site had been collected by amateurs for many years and was locally known as the "bone yard" because of the abundant artifacts.

European traders and explorers may have known of the existence of the Scioto Saline as early as 1740 because there was a French trading post at the mouth of the Scioto River at that time. Christopher Gist, surveyor and explorer for the Ohio Company of Virginia, made note of it in his journal compiled during the winter of 1750-51. He noted "The Indians and Traders make salt for their Horses of this Water, by boiling it; it has at first a blueish Colour, and somewhat bitter Taste, but upon being dissolved in fair Water and boiled a second Time, it becomes tolerable pure salt." The Scioto Saline is marked on the well-known Lewis Evans map of the Middle British Colonies issued in 1755.

The Scioto Saline was in Indian territory until defeat of the Indians at the Battle of Fallen Timbers in 1794 and signing of the Greenville Treaty the next year. Joseph Conklin of Mason County, Kentucky, is credited with establishing the first ongoing salt operation by a European settler at the saline. There was no enforced regulation of the salt lands between 1795 and 1803, and "squatter's rights" prevailed.

On April 13, 1803, soon after Ohio became a state, the new legislature passed "An act regulating the public salt works." The provisions of the Enabling Act of 1802, which was passed to create the State of Ohio, forbade the State to sell the salt lands, which consisted of a full 6-mile-square township. The state legislation provided for an agent to lease lots to be used for cultivation as well as to collect fees for manufacturing salt. Each lessee had to have a minimum of 30 salt kettles, but could not exceed 120 kettles, and had to pay 12 cents per gallon capacity in the first year of operation. In 1804 this charge was dropped to 4 cents, in 1805 to 2 cents, and by 1810, to 5 mills.

The earliest method of obtaining salt at the Scioto Saline, employed by Indians and the earliest pioneer operations, was to dig shallow pits into the Sharon sandstone during low water when the rock was exposed in the stream bed. These pits would slowly fill with weak brine, which was dipped out and boiled over fires. The initial attempt to increase salt production was to deepen these rock pits from a foot or two to 6 to 8 feet. The pioneer salt boilers soon discovered that brine would accumulate in deeper pits, up to 30 feet deep, that could be dug into the unconsolidated sediments that filled part of the valley of Salt Lick Creek. These pits or wells were cased at the surface with a hollow black gum log in order to prevent an inflow of surface water.

Depiction of early salt making along Little Salt Creek at the Scioto Saline using methods employed by Native Americans and early pioneers.

Soon after government control and regulation of the licks began, the salt boilers set up crude furnaces to increase efficiency and production. These furnaces consisted of a 4-foot-deep trench over which were set two rows of 12- to 15-gallon kettles. Wood was used as a fuel and heat passed beneath the kettles, bringing them to a boil. These furnaces operated 24 hours a day and required constant attention. Wood had to be cut and fed to the fires and brine had to be replenished in the kettles. Charlotte E. Bothwell, who came to McArthur in 1814, noted in her diary, "Our salt we

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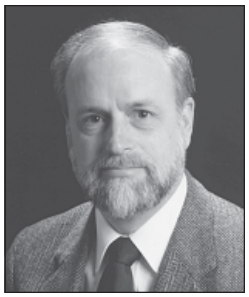

Thomas M. Berg, Division Chief and State Geologist

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From The State Geologist...

Thomas M. Berg

CONTINUING THE HIGH STANDARDS OF EXCELLENCE— A NEW DIRECTOR FOR THE DEPARTMENT OF NATURAL RESOURCES

With heavy hearts we report the resignation of Frances S. Buchholzer, Director of the Ohio Department of Natural Resources from 1991 through 1994. "Fran," as many of us know her, has returned to Akron to care for her father. Director Buchholzer served the people of Ohio very well and she understood the importance of geology in our daily lives. One of her outstanding accomplishments during her tenure as Director was passage of Issue 1—the Parks and Natural Resources bond issue that enables the Department to rebuild, rejuvenate, and expand the state and local park systems within Ohio, along with other aspects of Ohio's natural-resources infrastructure. The Division of Geological Survey will greatly benefit by this program, now called "NatureWorks," by the construction of the Ohio Geological Sample Repository, where all our cores, well samples, and outcrop samples will be processed, stored, and examined by our own staff and other researchers from around the world.

Donald C. Anderson

At the same time, and with great pleasure, we enthusiastically announce the appointment of Donald C. Anderson as the new Director of the Ohio Department of Natural Resources. Don served as Director Buchholzer's Assistant Director during her administration, and had prior experience in the Department from 1972 to 1982. From 1982 to 1991, he worked for an international natural-resources consulting firm. He holds a master's degree in public administration from The Ohio State University and served in the U.S. Air Force from 1967 to 1971. Don Anderson brings a wealth of natural-resources, conservation, and administration experience to the position. I know from my own experience working with Don over the past four years that he is a man of the highest integrity, keen perception, and great creativity. He is compassionate and intuitive. Like Director Buchholzer, he understands the importance of geology in natural-resources decision-making. Don Anderson has set the tone for his administration by calling on all ODNR employees to carry out their duties with a commitment to honesty, trust, and respect.

These are challenging times. Our citizens need accurate natural-resources information, especially geological information, more than ever before. Today's great challenge is to attain an acceptable quality of life where environmental security is in proper balance with energy, mineral, water, and land utilization. At the Division of Geological Survey, we believe that Don Anderson is the best possible choice to meet that challenge! We look forward to working with Don and meeting the challenge with him.

1994 Survey Employee of the Year

Sherry L. Weisgarber, geologist and mineral statistician in the Industrial Minerals Group, was selected as the 1994 Survey Employee of the Year. This award recognizes superior efforts and contributions by an employee and has special significance because awardees are selected from nominations submitted by Division staff. The award plaque was presented to Sherry by Division Chief Thomas M. Berg during the Survey's annual Christmas luncheon in December.

Sherry Weisgarber receives Employee of the Year award from Division Chief Thomas M. Berg.

Sherry, who is originally from Massillon, came to the Survey in 1984 after receiving bachelor's and master's degrees in geology from Kent State University. She began her Survey career compiling bedrock-topography and drift-thickness maps, but in 1985 she assumed the responsibility of compiling the annual *Report on Ohio mineral industries*, a publication of vital importance to many segments of the state's business community. Sherry has made many improvements to this report and, through her efforts, the report is issued within nine months of the end of the calendar year. The timely issuance of this report has

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got at Jackson; gave $2 for fifty pounds of mean, wet, dirty salt as could not find a market now at any price."

Dr. Samuel P. Hildreth, Marietta physician, First Assistant Geologist for the Ohio Geological Survey in 1837, and chronicler of pioneer activities in Ohio, summarized the early salt operations at the Scioto Saline in the First Annual Report of the Geological Survey. He noted that the greatest quantity of salt from this site was produced between 1808 and 1810, when 20 furnaces were generating 50 to 70 bushels each per week. Salt sold at this time for $2.50 per bushel or 5 cents per pound. After 1810, salt production at the Scioto Saline declined rapidly owing to the discovery of more concentrated brines along the Kanawha River in what is now West Virginia. Approximately 600 gallons of brine had to be evaporated in order to produce a bushel of salt at the Jackson site. The State of Ohio appropriated funds to drill deeper wells at the Scioto Saline in order to procure more concentrated brine. The last of these wells was drilled to a depth of 450 feet in 1815 under the proviso that 50 pounds of salt must be produced from 250 gallons of brine. Hildreth noted that a stronger brine was discovered but it was in small quantities.

Hildreth reported that the salt works extended for 4 miles along the valley of Salt Lick Creek. The principal activities, however, were concentrated in the valley in the city of Jackson, between what are now Broadway Street and Harding Avenue. During the heyday of the salt operations, a row of salt boilers' cabins in this area was known as "Poplar Row" because they were constructed from poplar trees that grew nearby.

The second site that gained notoriety was Boone Rocks, an outcrop of Sharon sandstone in the northwest part of the city of Jackson, adjacent to the present-day municipal sewage-treatment plant. This 57-foot-high cliff has a small rock-shelter cave at its base that apparently was periodically occupied by Indians when they visited the licks. The bed of Salt Lick Creek ran close to the base of this cliff; however, channelization projects in the 1880's and 1930's straightened the stream and cut off this meander. There is speculation that Indian salt pits in the sandstone are present beneath debris in the former bed of the stream.

Boone Rocks derives its name from an unsubstantiated story about the famous pioneer, Daniel Boone. Supposedly, Boone was brought to the saline in 1778 as a captive of the Shawnee (Shawanese) Indians but escaped by leaping from the cliff to the branches of a tree growing at its base. His Indian captors, not wishing to follow Boone's lead over the edge of the cliff, were unable to catch him.

GEOLOGY OF THE SALT LICKS

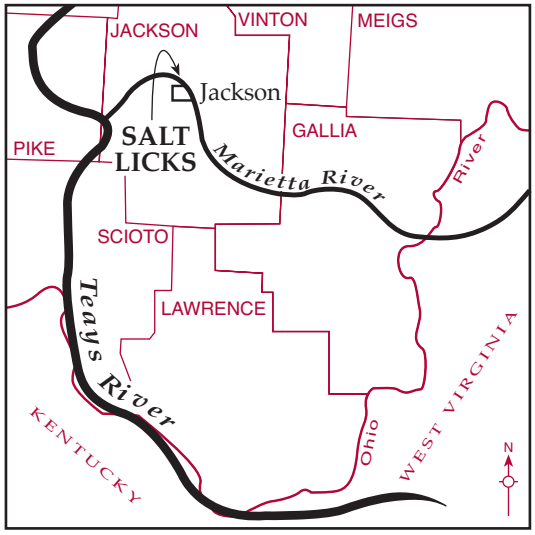
Early Survey geologists Caleb (sometimes listed as Charles) Briggs, Jr., and Samuel P. Hildreth were the first observers and interpreters of the geology of the Scioto Saline. Since their reconnaissance in 1837 there has been very little geological inquiry into the geology of the salt licks, probably because the licks were of little economic interest after their demise about 1815. Later geological focus in the area was on coal, sandstone, iron ore, and other mineral commodities.

It was recognizable to everyone that the brine was flowing from the Sharon sandstone, a nearly pure quartzose sandstone and conglomerate of Early Pennsylvanian age. Briggs noted that many of the productive salt wells at Jackson were in unconsolidated sediments that filled a basinlike depression in the Sharon. He referred to these as "mud wells." The deeper test wells at the saline that encountered more concentrated brines of less quantity were in rocks of Mississippian age. This information suggests that the brine may have been derived from deeper units and flowed from the Sharon. But why does brine flow to the surface in large amounts only at the Scioto Saline and not at the numerous other outcrops of Sharon sandstone in Jackson County?

Cliff of Sharon sandstone, known as Boone Rocks, adjacent to the Jackson municipal sewage-treatment plant. A meander of Little Salt Creek formerly flowed at the base of the cliff but was abandoned when the stream was channelized. Indians, and later pioneers, made salt at this site by digging shallow pits into the sandstone exposed in the creek bed, then boiling the brine that seeped into these pits. The rock-shelter cave visible at the base of the cliff yielded abundant Indian artifacts during the last century.

This question suggests that some unique set of geological conditions is present at the Jackson County salt licks. Hildreth may have been close to the answer when he noted "The seams and vertical cracks in the more compact beds would always afford avenues for the transmission of the brine from the lower to the higher strata." The unique geological factor at the Scioto Saline may be structural in origin.

In areas where faults, folds, and other structural features are not immediately obvious in surface exposures, one of the first procedures is to examine the drainage pattern of the area for clues to cryptic structure. Streams seek the path of least resistance and commonly follow zones of weakness created by fractures. The most obvious drainage feature in the vicinity of Jackson is the long-abandoned valley of the Marietta River, a major tributary of the preglacial Teays River (see *Ohio Geology*, Summer 1987). The Marietta River had its headwaters in eastern Ohio in Monroe County, flowed southwestward across Ohio and West Virginia, then westward across Gallia and Jackson Counties. The Marietta River joined the main Teays River in westernmost Jackson County. This drainage system was destroyed early in the Pleistocene when a glacier dammed the Teays, causing large lakes to form in the valleys in unglaciated Ohio. The lakes eventually spilled over



Jackson County and vicinity in southern Ohio showing the preglacial north-flowing Teays River and a westward-flowing tributary, the Marietta River. Note the arcuate bend in the Marietta River just upstream from its junction with the Teays. The Scioto salt licks are in this arcuate valley, which is even more arcuate than is depicted on this map, which is derived from a map in Stout, Ver Steeg, and Lamb (1943).

The Jackson salt licks were the primary reason that the city developed at this site and were one of Ohio's most important assets when statehood was achieved in 1803.

low divides and created a new drainage system in which the Ohio River was the trunk stream.

The old Marietta River valley is very obvious on topographic maps, where it stands out as a comparatively broad, flat valley, portions of which are occupied by small, underfit streams, such as Salt Lick Creek. The most unusual aspect of the Marietta valley is that it makes a large arc in the western half of Jackson County. The city of Jackson is on the northeast part of this arc. Modern drainage in the area seems to define a domelike structure, as streams appear to flow away from this feature in all directions. This fact did not escape the notice of Charles Whittlesey, topographer for the first Geological Survey of Ohio. He noted in the First Annual Report, "From the southern part of Jackson county, streams descend in every direction. The south fork of Salt creek northwardly, the Little Scioto and Pine creek, to the south and west, and Symmes' creek eastwardly." The old Marietta River valley defines the eastern, northern, and western boundaries of the "dome."

Have fractures extended upward from basement rocks into overlying Paleozoic rocks and acted as conduits for brine to flow to the surface at the Scioto Saline? This question cannot be answered with present information. However, in the last decade we have begun to discover that complexities in Precambrian basement rocks have had subtle, but nonetheless profound, influences on the surface geology in many areas of the state.

RESTORATION OF THE SCIOTO SALINE

At the time of its exploitation, the Scioto Saline was the most important mineral industry in the state. Not only was it the reason for the founding of Jackson at this location, but the availability of salt led to early establishment of a prosperous agricultural and livestock industry in the lower Scioto River drainage area.

This importance has not escaped the attention of many residents of Jackson County. Since 1990, a group of volunteers known as P.A.R.K. (Persons Acquiring Regional Knowledge) has researched the history of the saline with an eventual goal of recreating a portion of the salt-making operation as it was when Ohio became a state. According to Deanna Stroth, Director of the Community Development Office of the city of Jackson, a park is planned in Jackson between Broadway and Water Streets. This park includes the site at which Joseph Conklin first made salt in 1795 and will feature historical elements. The Jackson salt licks were the primary reason that the city developed at this site and were one of Ohio's most important assets when statehood was achieved in 1803. It is no less important that the licks were a mecca for animals of the Pleistocene Ice Age and for many tribes of American Indians for several thousand years. Restoration of some of the lick sites would be a tribute to this long and important history.

ACKNOWLEDGMENTS

Our particular thanks to Emmett A. Conway of McArthur, who has allowed us to freely use information from his unpublished manuscript on the salt licks at Jackson and who has answered our many questions. We also thank Kevin Coleman, Deanna and Mike Stroth, and James L. Murphy for assistance with this article.

FURTHER READING

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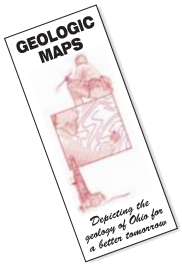


New brochure on geologic maps

The Division of Geological Survey has produced a new brochure titled, *Geologic maps: depicting the geology of Ohio for a better tomorrow*. The brochure describes the various types of geologic maps produced by the Division, including maps showing bedrock geology, Quaternary geology, bedrock topography, structure contours, abandoned underground mines, and subsurface geology. Uses of these maps also are detailed in the brochure, which is available at no charge from the Division of Geological Survey.

DISCOVERY OF 1837 FIELD MAPS

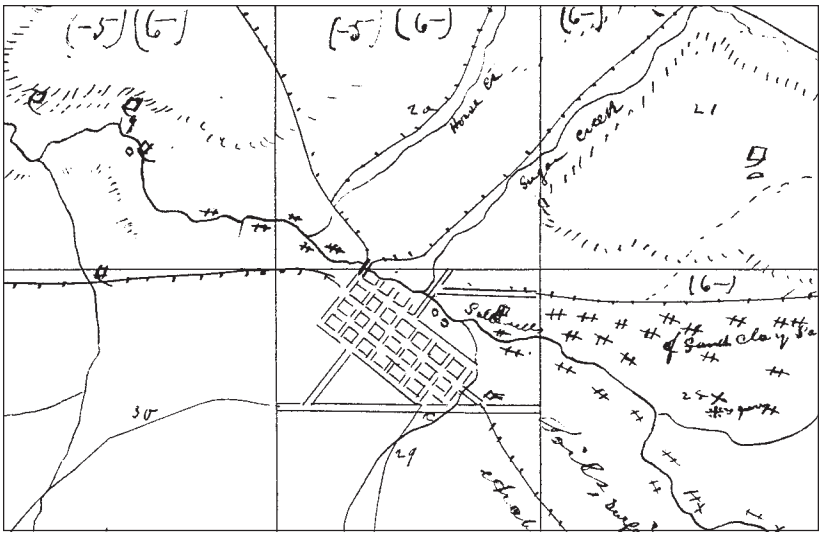
One of the great disappointments in tracing the 158-year history of the Division of Geological Survey is that almost nothing except the First and Second Annual Reports has survived from the first Geological Survey of Ohio under State Geologist William W. Mather. Until 1994, no manuscripts, notes, maps, or correspondence had come to light. Kevin Coleman of Archaeological Services Consultants, Inc., discovered two maps of Jackson County that were prepared in 1837 as part of the first Geological Survey. He had worked for the city of Jackson P.A.R.K. (Persons Acquiring Regional Knowledge) project on the Scioto Saline and was intrigued when he encountered a card referring to the two maps (OHS 0270-2) in the Archives Library of The Ohio Historical Society. One map is at a scale of 1 inch to the mile and the other is at a scale of 2 inches to the mile. The maps are subdivided into townships and sections. The most intriguing aspect of the maps is that they are dotted with symbols that represent the location of rock types, mineral occurrences, and mineral industries, according to the accompanying legend. Streams, roads, and railroads are shown.

These are obviously field maps and, although no authorship is noted on them, they must have been prepared by Caleb Briggs, Jr., during his geological reconnaissance of Jackson County in 1837. The base maps were prepared by Charles Whittlesey, Survey topographer, according to his report to W. W. Mather in the First Annual Report. "By your instructions of the 23d of June last, I am directed to proceed to the region, included between the Scioto and Hockhocking rivers, and construct skeleton maps, of the townships and counties within that district, for the use of the geologists in the field . . . . From the best authorities within my knowledge, I have constructed plans of townships, for the counties of Jackson, Lawrence, Gallia and Hocking, and for those parts of Scioto, Pike and Ross, lying east of the Scioto river."

The salt wells at Jackson are noted on the maps, as are occurrences of sandstone, limestone, and coal. Perhaps the most intriguing notation on the maps is the word "bones" beside an "X" along Pigeon Creek, in northern Jackson County. There is little doubt that this is the long-lost locality from which the bones of a mammoth, named *Elephas jacksoni*, were excavated by Briggs and his assistant, John W. Foster, in 1837 (see accompanying article).

The Jackson County maps do not provide great detail on the geological features of the county, but Briggs and Foster could not have spent more than a couple of weeks in the area, considering that they were required to cover each of the southern Ohio counties between the Hocking and Scioto Rivers in a field season that did not extend much beyond two months. Nonetheless, these maps give us a fascinating look at how these brilliant geologists of the First Geological Survey of Ohio went about their work.

—Michael C. Hansen



Portion of the 1837 Geological Survey of Ohio field map showing the city of Jackson and the location of the salt-boiling operations. The symbols ++ represent the extent of unconsolidated sediment in the valley. The base map was prepared by Charles Whittlesey, and the symbols and notations presumably were added by Caleb Briggs, Jr.; both men were geologists with the first Geological Survey of Ohio. The original map is in the Archives Library of The Ohio Historical Society.

EMPLOYEE OF THE YEAR *continued from page 2*

been much appreciated by Ohio's mineral industries.

As an outgrowth of her interest in mineral industries and education, Sherry has directed the annual Ohio's Mineral Industries Teachers Workshop since 1988. This week-long summer workshop is in conjunction with the University of Akron. It provides teachers with the opportunity to visit a variety of mineral industries in the state and to gain an appreciation of the importance of these commodities and a perspective on the geologic, economic, environmental, and social problems faced by these industries. The success of the workshop has not gone unnoticed. Sherry has been a consultant to the Indiana Mineral Aggregates Association and the Indiana Geological Survey in establishing a similar program in their state.

Sherry's interest in and commitment to education has been fulfilled, in part, by the numerous presentations she has given to schoolchildren and other groups of all ages. She has devoted many hours of her own time to these endeavors. In 1994, Sherry began "Hands on Earth Science," an educational activities column in *Ohio Geology*. She also compiled a list of the educational resources available from the Survey and from additional sources. This list has been extremely useful to teachers.

As is obvious from this brief and incomplete compilation of Sherry Weisgarber's activities and accomplishments, she is a person who is most willing to take on challenges and to assist other staff and the public. She volunteered to maintain the mailing list for *Ohio Geology* and is doing a superb job of keeping the list accurate and up to date.

Sherry lives in Columbus with her husband, Douglas L. Crowell, supervisor of the Survey's Coal Geology Group, and their two sons. Sherry L. Weisgarber is most deserving of the Employee of the Year award, and her efforts are appreciated not only by the staff of the Division of Geological Survey but also by the mineral industries, teachers, and the public.

BIG BONES AND THE SEARCH FOR *Elephas jacksoni*

An interesting sidelight to the salt-brining operations at Jackson was the discovery of numerous bones during the excavation of unconsolidated sediments for salt wells in the valley of Salt Lick Creek. In 1838, Caleb Briggs, Jr., in the First Annual Report of the Survey, noted " . . . some of the salt wells in Jackson county were dug in a deposit of clay, sand and gravel, occupying a basin-shaped cavity in the superior part of the conglomerate [Sharon sandstone]. In nearly all these wells were found fossil bones, consisting of jaws, teeth, tusks, vertebrae, ribs, &c, which, from the descriptions given by Mr. Crookham, belong to extinct species of animals. From his descriptions, remains of the megatherium [probably ground sloth, *Megalonyx jeffersonii*], and of the fossil elephant [mammoth], were among the number. A more detailed description of the bones from these wells, will be communicated at another time."

Unfortunately, neither Briggs, nor anyone else, described these specimens, and, as noted below, they were probably lost in a fire. Some speculate that the Scioto Saline may be another Big Bone Lick, the famous site in northern Kentucky that has produced numerous bones of Pleistocene animals. Undoubtedly, the natural saline waters at this site attracted large numbers of animals throughout the Pleistocene and into historic time. There have been few reports of discoveries of additional specimens since the time of the salt operations, and no one has yet undertaken a systematic excavation of these deposits in a search for bones of Pleistocene vertebrates. The question remains as to how much of this material was removed, destroyed, or disturbed during the extensive salt operations.

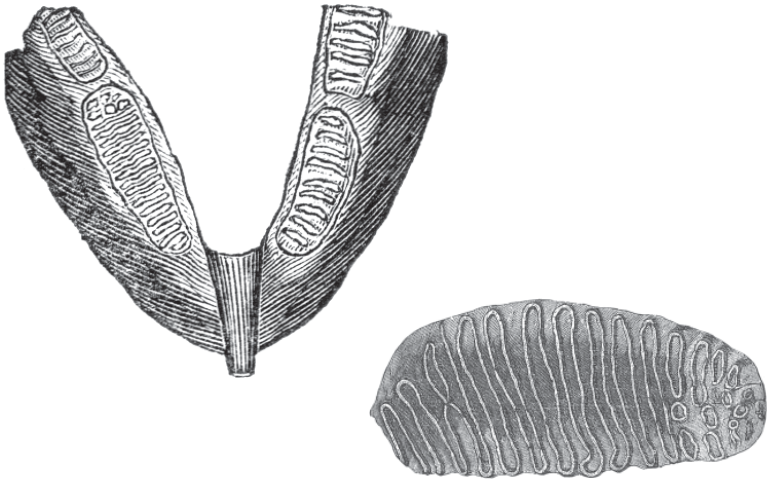


Illustration of the lower jaw and a tooth, showing grinding surfaces, of a mammoth, Elephas jacksoni, *collected in 1837 along Pigeon Creek in northwest Jackson County by Caleb Briggs, Jr., and John W. Foster, geologists with the first Geological Survey of Ohio. The figure of the jaw is from an article in the American Journal of Science in 1838; the figure of the tooth is from an article by Foster in the American Journal of Science in 1839.*

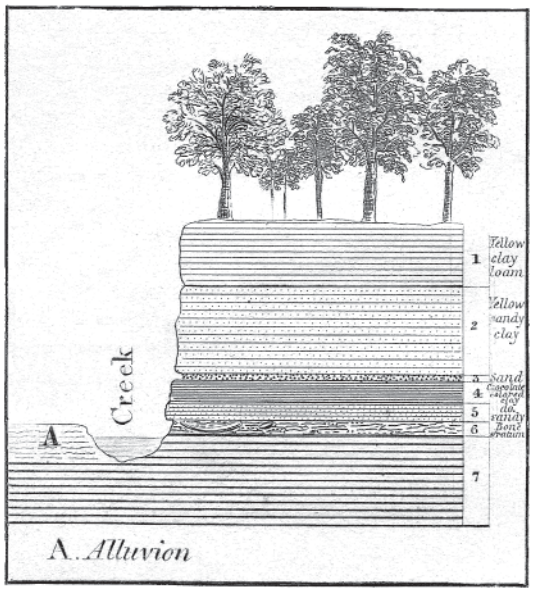
Although Briggs never did describe the bones from the saline, he did report on a remarkable partial skeleton of a fossil elephant from Jackson County in the First Annual Report of the Survey (1838). This specimen has been the subject of confusion and controversy ever since. Briggs noted that the bones were first discovered in 1835 by local individuals "in the bank of one of the branches of Salt creek, in the northwest part of Jackson county" and consisted of a tooth, part of the lower jaw, and some ribs. During the 1837 field season, Briggs visited the site in company with his assistant, John W. Foster, and recovered portions of the skull, two teeth, two patellae, seven or eight ribs, an equal number of vertebrae, and a tusk. The tusk weighed 180 pounds, was 10 feet, 9 inches in length along the outer curve, and had a circumference at the base of 1 foot, 9 inches.

Briggs noted that the specimen was beneath 15 to 18 feet of sediment and recorded the characteristics of six separate beds, the lowermost of which contained the bones. This latter unit was sand and clay, 1 to 1.5 feet thick, and contained "a large proportion of animal and vegetable matter."

The First Annual Report of the Survey was reviewed in the American Journal of Science for 1838 and Briggs' elephant did not escape notice. The review stated, "Among the most interesting details of this report, are those respecting the fossil elephant discovered during the past season." Briggs' account of the specimen from the 1838 First Annual Report was repeated.

The review article is followed by an unsigned letter to the editor, dated March 23, 1838, Columbus, which responds to some of the questions raised by the anonymous reviewer of the First Annual Report. William W. Mather, Ohio's first state geologist, is generally regarded as the author of this letter; however, Oliver P. Hay, in his 1923 monograph on Pleistocene vertebrates east of the Mississippi River, stated that the author of the review of the First Annual Report and the unsigned accompanying letter was John W. Foster. Hay did not give his reasons, but he may have made this conclusion because Foster published an account of the Jackson County elephant in 1839 in the American Journal of Science. The first response in the letter concerns the elephant bones reported by Briggs. These brief comments indicate that the lower jaw and teeth of the Jackson County specimen differ in a number of respects from the then well-known and common fossil mammoth, *Elephas primigenius* (now placed in the genus *Mammuthus*). Included was a drawing of a tooth and the lower jaw, with teeth, of the Jackson County specimen and a comparative drawing of the lower jaw of the "fossil elephant," presumably *M. primigenius*. The Jackson County elephant was named *Elephas jacksoni*, a name which has subsequently been attributed to either Mather or Foster. In modern taxonomy the specimen is placed in the genus *Mammuthus*.

There was never a mention in the First Survey reports of the disposition of the specimen nor the precise locality from which it was collected. In the intervening years there have been periodic inquiries to the Survey and to The Ohio State University concerning the whereabouts of the type specimen of *Elephas jacksoni*. Hay, in his 1923 report, noted that they were not in the collections of The Ohio State University. In 1929, Dr. Henry Fairfield Osborn, paleontologist and director of the American Museum of Natural History, wrote a letter to Dr. R. C. Osburn of Ohio State in an attempt to locate the specimen for inclusion in his forthcoming monograph on fossil elephants. The letter was forwarded to Dr. J. Ernest Carman, Chairman of the OSU Department of Geology, who responded to Osborn that the bones were not in the collections of Orton Geological Museum nor were they in the collections of the Ohio Archaeological Museum.



Eighteen-foot-thick section of unconsolidated sediments measured by Caleb Briggs, Jr., and John W. Foster along Pigeon Creek, Jackson County. The lowest layer, just above water level, yielded the remains of Elephas jacksoni. *The age of these sediments is uncertain--they could be as old as early Pleistocene, formed when the Teays River was dammed by the Nebraskan glacier, or, more likely, they may be Late Pleistocene (Late Wisconsinan). Illustration from frontis plate of Ohio Division of Geological Survey First Annual Report.*

Why so much interest in the bones of a mammoth, a fairly common Pleistocene animal? The answer to this question is because the Jackson County mammoth was described and named at such an early date. The rules of nomenclature for naming living or once-living things is that the earliest scientific name applied to a plant or animal has precedence over any other names later applied to the same species. Unfortunately, as is the case with the Jackson County mammoth, many of the early named species commonly were accompanied by very brief descriptions and crude illustrations. In such cases it is imperative for researchers to examine the original (type) specimen in order to compare it with later described species. There has long been some suspicion that the Jackson County mammoth is identical to *Mammuthus columbi*, a species described in 1857. If such is the case, the Jackson County species would be the senior synonym and this mammoth would then be known as *Mammuthus jacksoni*. But we will probably never have the answer to this question because there is a great likelihood that the type specimen of *Elephas jacksoni* has long been lost.

In Ohio in 1838 there were few repositories for natural history specimens, except for private collections, then commonly referred to as cabinets. Museums, as we know them today, were nonexistent and the few small universities and colleges apparently did not have provisions for the preservation and upkeep of scientific specimens. One small museum in existence at this time was the Zanesville Athenaeum; however, specimens such as the type specimen of the giant beaver, *Castoroides ohioensis*, that were in this museum have been lost. Neither Briggs nor Foster made mention of the repository of *Elephas jacksoni*.

One possibility is that the mammoth specimen was placed in the collections of Indian artifacts and natural history specimens maintained by George L. Crookham, who came to Jackson in 1799 and became engaged in the manufacture of salt. He provided information about this industry to Briggs and to Samuel P. Hildreth during the first Geological Survey and was a friend of Mather, who maintained a summer residence in Jackson. Crookham was also a teacher and farmer and is credited with providing inspiration for study of geology and archaeology to John Wesley Powell, who spent his youth in Jackson. Powell later gained fame for his exploration of the Colorado River and his service as director of the U.S. Geological Survey and the Bureau of Ethnology. Crookham's school, which housed his collections, was burned by anti-abolitionists in 1844. It may never be known if the type specimen of *Elephas jacksoni* was in the Crookham school, but it seems a likely possibility.

The recent discovery of two maps of Jackson County in the archives of the Ohio Historical Society (see accompanying article) provided long-lost and valuable information on the Jackson County mammoth. These maps presumably were prepared by Caleb Briggs, Jr., during his investigations of the geology of the area in 1837. On one map, at a scale of 1 inch to the mile, forester and local Jackson County historian Emmett A. Conway noted an "X" and the word "bones." The other map, at a scale of 2 inches to the mile, has "Black Swamp" marked at the same location. This site is on the south side of Pigeon Creek just upstream from its junction with Long Branch, southeast of the village of Ray, just south of the Jackson-Vinton County line in section 2, Jackson Township.

There can be little doubt that this is the site (known as the type locality) at which the bones of *Elephas jacksoni* were discovered. Briggs, as noted earlier, indicated the specimen came from a tributary of Salt Creek in northwest Jackson County (Pigeon Creek is unnamed on Briggs' map of 1837). Hay, in his 1923 monograph, interpreted Little Salt Creek, rather than Pigeon Creek, to be the stream referred to by Briggs. This rediscovered field map solves part of the puzzle. Although we may never know for sure where *Elephas jacksoni* belongs in the taxonomic web, we may be able to relocate the outcrop from which it came and study the sediments in which it was entombed. Perhaps these sediments will yield additional bones or organic matter, such as a Pleistocene log, that can be subjected to radiocarbon dating and tell us not only the age of the mammoth, but shed light on the deposition of lake silts in this unglaciated part of Ohio. Our colleagues of the first Geological Survey in the 1830's opened the lid of a treasure chest, but the contents of the strongbox have yet to be completely inventoried.

—Michael C. Hansen

The tusk weighed 180 pounds, was 10 feet, 9 inches in length along the outer curve, and had a circumference at the base of 1 foot, 9 inches.

FURTHER READING

Anonymous, 1838, Remarks in addition to and explanation of the Review of the Report of the Geological Survey of Ohio: unsigned letter to the editor, American Journal of Science, v. 34, p. 362-363.

Briggs, Caleb, Jr., 1838, Fossil bones: Ohio Division of Geological Survey First Annual Report, p. 96-97.

Foster, J. W., 1839, Head of the *Mastodon giganteum*: American Journal of Science, v. 36, p. 189-191.

Hay, O. P., 1923, The Pleistocene of North America and its vertebrated animals from the states east of the Mississippi River and from the Canadian provinces east of longitude 95°: Carnegie Institution of Washington Publication No. 322, 499 p.

HANDS-ON EARTH SCIENCE No. 4

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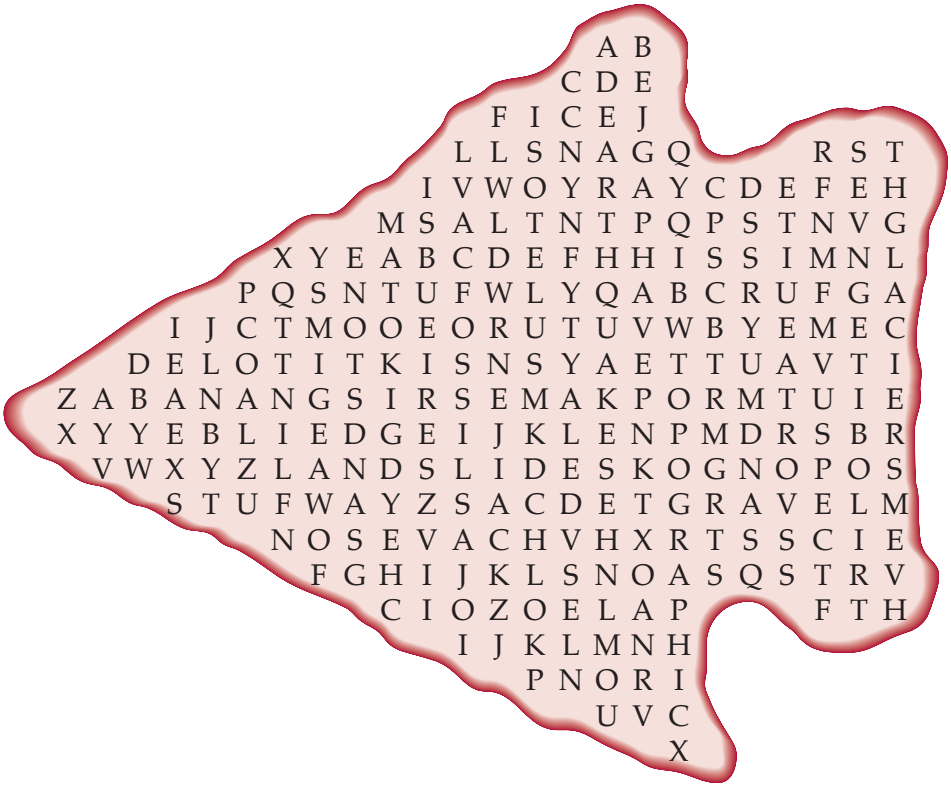
OHIO GEOLOGY WORD SEARCH

Look for these words, all related to Ohio geology, within the arrowhead diagram. The words may read forward or backward, and across, down, or diagonally. Further information on these words and their relation to Ohio geology is included in the *Ohio Geology Crossword Puzzle*. Call (614)265-6588 for a free copy.

brine	*Isotelus*
caves	kames
clay	landslides
coal	limestone
earthquakes	mammoths
Erie	Paleozoic
flint	rivers
fossils	salt
gas	sand
glaciers	sandstone
gravel	shale
gypsum	Teays
ice	topographic
iron	trilobite



1995 Teachers workshops

The Ohio's Mineral Industries Teachers Workshop has changed its name to Ohio's Mineral Industries and the Environment—South. This workshop will be conducted June 26-30 and will be based in Columbus. A new workshop also will be offered this year, Ohio's Mineral Industries and the Environment—North. The new workshop will be conducted July 10-14 and will be based in Akron. For more information contact Sherry Weisgarber, ODNR, Division of Geological Survey, 4383 Fountain Square Dr., Columbus, OH 43224-1362 (telephone: 614-265-6588), or Dr. Roger Bain, Department of Geology, University of Akron, Akron, OH 44325-4101 (telephone: 216-972-7659).

Ohio **Geology**

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