Ohio Geology

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Geology in the Public Square: Ohio Statehouses from 1800 to Today

By Mark E. Wolfe

The aspirations and accomplishments of a state are often reflected in the public buildings it conceives and constructs. A state capitol building is not only a place where important government functions are performed, but it is often a focal point of civic pride. Ohio has been fortunate to have beautiful and durable building stones, excellent clays and shales to make brick, and skilled masons to construct statehouses that embody the spirit of Ohio's citizens. In the more than 200-year history of Ohio, four statehouses were erected that represented the vision of the future for the state.

Ohio's first statehouse in Chillicothe

A very early use of Ohio stone for building purposes occurred in 1800 when construction began on the first statehouse in Chillicothe, located approximately 45 miles south of Columbus in Ross County. Chillicothe was chosen as Ohio's first capitol due to its central location on two important early transportation corridors, Zane's Trace and the Scioto River, because it was the largest city in the state at the time and because it was home to influential Ohio politicians. The two-story stone building is believed to be the first public stone structure erected in the Northwest Territories. Major William Rutledge, a veteran of the Revolutionary War, supervised the masonry work on the square, hipped roof and cupola style building. Ohio's first constitution was written there in 1802, and the building served as the state's capitol from 1803 to 1810 and from 1812 to 1816, when the capitol was temporarily relocated from Zanesville. Unfortunately, the historic building was razed after the "Great Chillicothe Fire" in 1852 to make way for the Ross County Courthouse. In 1940, the *Chillicothe Gazette* built a replica of the first statehouse as the headquarters for its newspaper operations.

Ohio's first statehouse was constructed of Devonian-age Berea Sandstone that was quarried by Major Rutledge to the immediate southwest of Chillicothe at Cemetery Hill. Fortescue Cuming, a traveler passing through Chillicothe in 1807, remarks in his diary that "…freestone…got in the neighborhood, is of whitish brown colour, and excellent for building." The Berea Sandstone in this area is usually 25 to 35 feet thick, with individual beds generally 6 to 12 inches thick. The Berea is a fine-grained, light gray sandstone that weathers to light brown. The Berea Sandstone was used to construct many homes and businesses in the Chillicothe area during the early 1800s, including the magnificent mansion constructed in 1807 by Thomas Worthington as part of his estate named

continued on page 3

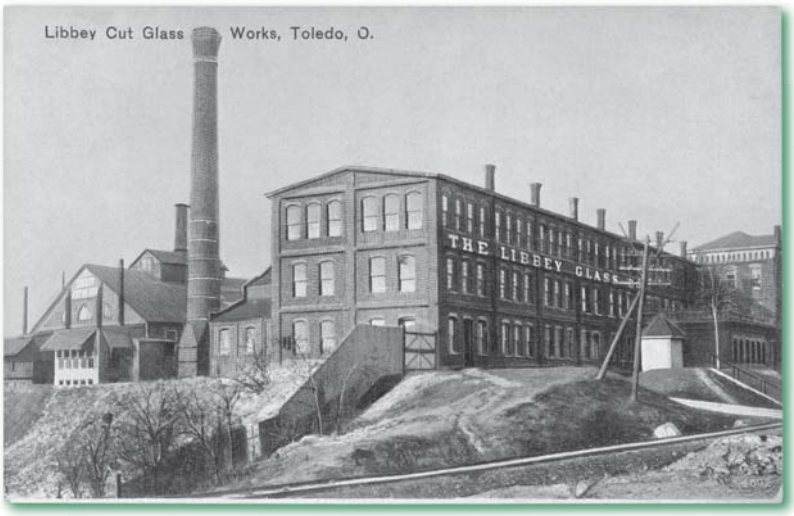
OHIO ROCKS!

Larry Wickstrom,
Division Chief and State Geologist

Our lead story in this issue of *Ohio Geology* exemplifies the importance of Ohio's mineral wealth to the development of our great state: Our state capitol has been built in three different areas of the state, and each area had an abundance of good quality building stone nearby to use in the structure. Through the time of the Native Americans, the first European settlements, early statehood, and up to today we have depended heavily on the use of our fuel and non-fuel mineral resources for the development of our cities and our infrastructure.

The use of these resources has benefited non-Ohioans, also. Ohio's mineral resources were key to the industrialization of the nation in the late 1800s and early 1900s; our oil, gas, coal, limestone, and other commodities helped fuel and build equipment for the Civil War, as well as both World Wars. The post-World War II expansion of the U.S. economy, including building the nation's interstate highway system, was heavily dependent on domestic energy and mineral resources.

Many of our cities were founded and/or grew in size and importance because of the mineral wealth located near them. Marietta, Ohio's first major settlement, was aided by the availability of salt from shallow brining operations. Later, local clay and shale were used to grow a brick industry, and locally mined coal and iron ore formed the basis of an iron industry to help build the railroads on top of limestone aggregate ballast. In the late 1860s, oil was discovered and Marietta became one of the first oil centers in the United States.



Early postcard of the Libbey Cut Glass Works, Toledo, Ohio.

Zanesville prospered because of abundant clay, shale, and sandstone for the manufacture of bricks, pottery, and glass. Many more of our municipalities in eastern and southeastern Ohio owe much of their early livelihood to coal mining and related trades, such as Tallmadge in Summit County, Ironton in Lawrence County, and many places in between. Largely because of the local availability of coal, many of our heavy industries of northeastern Ohio prospered in cities such as Youngstown, Canton, and Cleveland. Findlay, and a number of other towns in northwestern Ohio, prospered because of the large oil and gas "boom" of the late 1800s. During that time, Ohio was the leading oil producer in the United States and arguably the world. Many industries, such as Libbey Glass and Republic Steel, originally located here because of abundant and inexpensive fuel and mineral feedstocks. Oil and gas development throughout much of eastern Ohio continued through the 1900s with many "booms," swelling cities and creating local industry in places such as Scio, New Straitsville, East Canton, and Wooster.

Ohio's heritage is closely tied to the mineral industries. Today these industries still provide thousands of jobs and directly produce nearly $3 billion in products every year for the state; the ripple effect through our economy is multiplied by supporting trades and industry. All of these industries are dependent on the geology of Ohio. The Ohio Geological Survey has worked alongside these industries for more than 150 years, providing research and data to assist in their operations and expansion. It is one of our primary duties to map and analyze the economic geology of the state, catalogue the production of these mineral commodities, and know where and how much of these quantities remain in reserve.

Our state was built on our mineral wealth and a large part of our future can be, too. As Ohio and the rest of the nation (and world) now face a struggling economy compounded by soaring energy costs, we need to look to our own domestic resources, fuel and non-fuel, and find new ways to produce more, use less, and do so as responsibly as possible.

continued from page 1

Adena. Worthington was the sixth governor of Ohio and was considered a founding father of the state. The 300-acre estate and meticulously restored mansion are currently owned by the Ohio Historical Society and are open to the public.

Competition to build Ohio's second statehouse in Zanesville

The Stone Academy at Putnam (West Zanesville) was constructed in 1809 to be used as the new statehouse, but after intense political maneuvering a competing brick building across the Muskingum River in Zanesville was chosen by the state legislature, instead. The Stone Academy is currently owned by the Pioneer and Historical Society of Muskingum County and represents the sole remaining public structure in Ohio from the early 1800s. The building stone for the Stone Academy, a Pennsylvanian-age Pottsville Group sandstone informally known as the "Homewood," is light brown, fine- to medium-grained, thick bedded to massive, micaceous, and is approximately 27 feet thick at the former quarry.

The statehouse in Zanesville was completed in 1809. The Zanesville statehouse was an imposing two-story brick structure with a cut-stone foundation and trim that resembled Independence Hall in Philadelphia. James Hampson is generally considered the builder of the statehouse in Zanesville, Jacob Houk supervised the stone and brickwork, and "Mr. Greene" was the mason responsible for cutting the sandstone into caps, window sills, and the 1809 date stone. The second Ohio statehouse, affectionately called "Old 1809" by the locals, was torn down in the 1870s to make way for the new county courthouse. The skillful mason work of the original building is preserved in the oval-cut, one-piece "1809" date stone transferred from the original statehouse and now found above the main entrance to the current Muskingum County courthouse.

The brick used to construct the statehouse in Zanesville was handmade by John Lee at his brickyard near Underwood Street. The brick was produced from the excellent Pennsylvanian-age clays and shales found near Zanesville. The Pennsylvanian-age sandstone used for the foundation and trim most likely came from the Townsend quarries north of Zanesville that supplied a large portion of the building stone used in Zanesville during the early 1800s. The sandstone quarried at Townsend is from the lower portion of the Allegheny Group and informally named the "Clarion." The "Clarion" is a medium- to coarse-grained, light brown sandstone that is micaceous in part and often cross-bedded. The Clarion sandstone is 20 to 30 feet thick at the former Townsend quarries.

The original statehouse in Columbus

After a brief return to Chillicothe (1812–1816), the Ohio state capitol was permanently moved to Columbus in 1817. Though still a small town in the early 1800s, Columbus was more centrally located than either Zanesville or Chillicothe, and most importantly, a large parcel of land had been donated to build a capitol. The new brick building had a foundation constructed of three tiers of hewn stone from Blacklick in eastern Franklin County. The finished building also had a belt of cut sandstone between the first and second stories. The nearby state office building was also built of brick and had a sandstone foundation and trim.

The building stone used to construct the original statehouse in Columbus was sandstone from the Mississippian-age Cuyahoga Formation. The Cuyahoga Formation at Blacklick consists of thin-bedded, gray sandstones and shales. The building-stone quality was variable primarily because of poorly cemented character, but the quarry furnished stone for many early Columbus buildings. The brick was produced on-site using alluvial clay taken from the Native American Mound originally located at the southwest corner of Mound and High Streets. The exterior of the original statehouse in Columbus deteriorated badly over the next 35 years, possibly due to poor building stone selection and brick manufacture, as well as insufficient maintenance, and was destroyed by fire on February 1, 1852, under mysterious circumstances. The dilapidated building had become known as "Rat Rabble" and no one regretted its destruction. Unfortunately, it is possible that some of the first geologic specimens from the Ohio Geological Survey were on display at the Statehouse and became lost prior to or during the fire. The original state office building was demolished in 1857 and the Governor and state legislative offices moved to the nearly finished Ohio Statehouse.

Ohio's current statehouse

The cornerstone of the current Ohio Statehouse was laid in 1839, but it took 22 years of political intrigue, financial panics, industrial development, cholera epidemics, and engineering advancements before the building was completed in 1861. By late 1837, convicts from the

SYSTEM	LITHOLOGY	GEOLOGIC UNIT	APPROX-IMATE THICKNESS (FEET)	DESCRIPTION
PENNSYLVANIAN		**Lower Allegheny Group,** "Clarion" sandstone	25	Sandstone, light brown, medium-to-coarse grained, micaceous. Statehouse at Zanesville.
		Pottsville Group, Clays/shales and "Homewood" sandstone	255	Sandstone, brown, fine-to-medium grained, massive. Stone Academy
MISSISSIPPIAN		**Logan Formation**	160	Interbedded shales, siltstones, and sandstones
		Cuyahoga Formation	47	Sandstone, brown to gray, shaly, thin bedded. Original statehouse at Columbus
		Sunbury Shale	17	Shale, gray to black
DEVONIAN		**Berea Sandstone**	26	Sandstone, light gray, fine grained. First statehouse at Chillicothe
		Bedford Shale	8	Shale, blue-gray to maroon, fossiliferous
		Ohio Shale	146	Shale, dark gray to black, fissile, prominent jointing
		Olentangy Shale	27	Shale, blue-gray, calcareous, sparse fossils
		Delaware Limestone	33	Limestone, gray-brown, cherty and shaly in part
		"BONE BED"		VERY FOSSILIFEROUS ZONE
		Columbus Limestone, Delhi member	60	Limestone, white to light gray, fossiliferous, cherty in part. "State Quarry"
		Bellepoint member	40	Limestone, light brown, dolomitic and shaly in part
SILURIAN		**Salina Group**	>300	Dolomite

Generalized stratigraphic column showing relationships of geologic building materials used to construct historic and present Ohio statehouses. Modified from Orton (1878); Brant and Delong (1960); Hyde (1921); and Stauffer and others (1911).

Ohio Penitentiary were completing stonework at the "Ohio Lunatic Asylum" located in downtown Columbus. Ohio Governor Joseph Vance suggested that using the well-trained prison laborers to build the much-needed new statehouse would be a cost-effective option. In 1838, the Ohio General Assembly authorized building a new statehouse on 10 acres located southeast of the intersection of Broad and High streets, Columbus.

Excavation proceeded briskly to 6 to 10 feet below grade and preparations were made for convicts to cut stone, a vast quantity of which was obtained at the Sullivant's Limestone quarry in late 1838. Foundation walls up to 15 feet thick were made with rough-cut limestone faced with brick. Work progressed rapidly and a grand celebration honoring the laying of the cornerstone was held on July 4, 1839.

Construction on the new statehouse was abruptly halted in 1839 because of the financial panic of 1837, though politics also played a role in the delay. Ohio's debt had increased dramatically in the 1830s due to multiple major projects, including the National Road, canals, Muskingum River locks and dams, and state support of the fledgling railroads. Governor Thomas Bartley complained in the 1844 State of the State address that state offices were in poor condition, state funds were being spent on rental of additional office space, and "an investment of some sixty or seventy thousand dollars in the foundation and materials for the contemplated new State House is lying wholly worthless and unproductive."

An influential event occurred on April 11, 1845, when the State of Ohio purchased the 50-acre quarry belonging to William S. Sullivant. The quarry was located 3 miles west of Columbus on the west bank of the Scioto River and became known as the "State Quarry." The purchase price of $15,000 dollars (approximately $300,000 today) was a wise investment. Devonian-age Columbus Limestone from the quarry was used to construct important structures in Columbus, such as the Ohio Penitentiary, massive piers of the first Broad Street Bridge, and several government buildings, including the Statehouse. Ohio still retains title to the land that contained the historic "State Quarry," though the quarry has been dormant for decades and a portion is now buried beneath interstate highways.

Initially the state penitentiary took charge of the quarry, providing convict stone-cutters and inexpensive stone. These cost-saving conditions encouraged the legislature to provide funds to continue the massive Statehouse building

project. By 1849, Governor Seabury Ford noted in the State of the State address that work on the new Statehouse continues "with commendable energy and success, though considerably retarded by loss of convict labor for nearly half the season." More than 115 convicts had perished that year from the great cholera epidemic.

In 1849, a railroad was constructed to the bottom of the "State Quarry," which was later extended 2,000 feet to obtain additional limestone. Cranes and derricks were erected in the quarry to handle the 12-ton blocks of limestone. The railroad was extended south along Third Street to the Statehouse construction site. Work progressed quickly, and according to the 1849 report of the superintendent of the Statehouse, the basement walls had been completed and the building stood at a height of 14 feet above ground.

The period from 1850 to 1853 was a time of tremendous construction activity on the new Statehouse. Nearly 220 men (including 80 convicts) were employed on-site and an additional 100 men were hard at work at the "State Quarry." By 1854, the entire Statehouse was under a roof and all the stonework had been completed except the cupola, outside steps, curbing, and twin 100-foot-tall ventilation stacks that were finally completed in 1861. Governor William Medill remarked in the 1854 State of the State address that the new statehouse "will be a large and beautiful edifice—comporting well with the magnitude and increasing wealth of the State." The original building commission had decided to use locally derived stone, and the 150-year-old structure demonstrates that the Columbus Limestone is appropriate for the monumental scope of the building. The immense building project used an estimated 55,000 tons of Columbus Limestone during construction—enough stone to fill thousands of rail cars.

In 1859, William Mather, who had previously served as the first State Geologist of Ohio, reported on the drilling of a water well on the statehouse grounds. Mather named the limestone encountered the Columbus Limestone. There are two members of the Columbus Limestone, the Delhi and the Bellepointe Members. The Delhi is the upper member and is generally a light gray to white, fossil-rich limestone approximately 60 feet thick. It was the source of building stone for the Statehouse. The Bellepointe is the lower member and is a light brown, medium to coarse crystalline, dolomitic limestone that is approximately 40 feet thick in the Columbus area. The Bellepointe Member is less desirable as a building stone but is used as aggregate in central Ohio.

Abundant fossils, including corals, gastropods, and mollusks, are evident in the 6-foot-thick, 36-foot-high Doric columns that support the roof. The 24 columns weigh a total of nearly 2,000 tons and were produced from the lower portion of the Delhi member in the "State Quarry." The lower portion of the "State Quarry" also contained cranial plates of a large fish, *Macropetalicthys Sullivanti*. Coiled cephlapods, gastropods, corals, and stromatoporoids, produced from the upper portion of the Delhi member, can be found in the steps. Tiny fossil organisms such as graptolites and bryozoans are abundant, and interesting fossils such as trilobites can be found along the face of the building. The diverse fossils and differential weathering of the Columbus Limestone tend to enhance the aesthetic appeal of the grand building.

Fossils, such as this coral that can be seen in the Ohio Statehouse steps, are common throughout the building and reveal the great variety of marine life that existed in Devonian-age seas in the state.

The beautiful interior floors are made from green and black marble from Vermont, white marble from Italy, and red marble from Portugal. The columns in the legislative chambers are white marble from Pennsylvania and the detailed balustrades on the staircases are alternating dark marble from Tennessee and white marble from Italy.

The Senate Building was completed in 1901 and was constructed from Columbus Limestone obtained from the Taylor and Bell quarries located east of the present Marble Cliff quarry. The Columbus Limestone has a light-colored crystalline texture somewhat resembling marble, thus "Marble Cliff" was a suitable name for the quarry. The Marble Cliff quarry has been an important source of aggregate for the Columbus metropolitan area highway construction and building industry.

Major renovations of the Statehouse and Senate Building from 1992 to 1996 required that special stone-cutting equipment be used to remove Columbus Limestone from an existing aggregate quarry south of Columbus. More than 350 tons of Columbus Limestone, including 100 tons for the massive columns, was used to construct the Atrium connecting the two historic buildings. The extensive and highly successful renovation has returned the Ohio Capitol to its original grandeur. Arnold Berke remarks on the Statehouse renovation in his 1996 review for *Preservation* magazine, "Was it really built piece

by piece or simply carved on site out of a huge block of Columbus limestone?"

Conclusion

Just twelve years after the original settlement in the Northwest Territories at Marietta in 1788, Ohio built its first statehouse of durable, local sandstone to signify a long-term commitment to the soon-to-be formed state. Less than four decades later, workers began building the present Ohio Statehouse, again using a long-lasting, locally derived building stone. The skills of hundreds of stonemasons and prison laborers produced a building of unique splendor that would become a symbol of a nationally influential state. Twenty-first century visitors to Ohio's Capitol Square can observe geologic history in the building stones of the grand Ohio Statehouse; as one gazes upward in its soaring rotunda, it seems as if glimpses of the future are possible.

Further Reading

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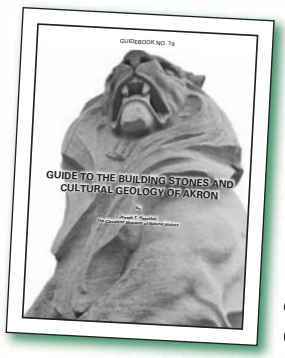
The Ohio State University's Orton Geological Museum Curator, Dale Gnidovec, will be giving a geology-based tour of the Ohio Statehouse on April 17 and October 16, 2009. < http://mps.osu.edu/orton >

Akron's Building Stones



The building stones of Ohio's cities can be as diverse as its citizens. Within 2 miles of the center of Akron, Ohio, building stones from at least 10 U.S. states, the province of Quebec, Canada, and three different regions of Italy can be found in the area's buildings, monuments, canals, and bridges. Joseph T. Hannibal of the Cleveland Museum of Natural History ably describes these structures as part of 28 field trip stops in the *Guide to the Building Stones and Cultural Geology of Akron,* released in 2006 by the Ohio Geological Survey as Guidebook 19.

Building stones quarried in Ohio, such as the well-known Devonian-age Berea Sandstone from Amherst, are used extensively throughout Akron. Hannibal also reveals the use of lesser-known stones quarried in the area, such as the Pennsylvanian-age Sharon sandstone, which can be seen in many structures and natural settings near Akron, with excellent exposures at Gorge Metropolitan and Virginia Kendall Parks.

Long-forgotten quarries from the 19th century are also documented in the guide. Those who explore the cultural geology of Akron with Guidebook 19 will gain a renewed appreciation of the people and geologic materials that helped build the city since this time. On the field trips, keen observers are rewarded by discovering such things as ammonoids and belemnites at the registration desk of the Crowne Plaza Hotel, large yellow-to-pink crystals of oligoclase in the Oliver R. Ocasek office building stones, and beautiful altars and statuary made of Carrara marble from Italy in St. Bernard's church.

Detailed descriptions of 28 easily accessible field trip stops make Guidebook 19 valuable to natural resource professionals, educators, historians, and curious travelers. Stops at the Akron Zoological Park, Cascade Plaza, Quaker Square, and Glendale Cemetery provide readers an opportunity to see a wide variety of geologic features, such as cross-stratification, irregular iron banding, quartz pebble conglomerates, styolites, and fossil assemblages. Guidebook 19, *Guide to the Building Stones and Cultural Geology of Akron,* can be purchased from the Ohio Geological Survey for $11 (plus sales tax and shipping). Please see ordering information on page 8.

All Aboard for a Travel Back in Time at Oakes Quarry Park

Visit the recently opened Oakes Quarry Park in the city of Fairborn, northeast of Dayton, and travel back in time more than 425 million years.

Your journey begins when you head southeast on the park's 2-mile walking path from the parking lot. After a brief 80 to 90 year trip, about half a mile on the path, your first stop is in the Roaring Twenties, when geologists working for Southwestern Portland Cement discovered Brassfield Limestone in the area that is now the park. The high-calcium limestone was easily accessible and an essential ingredient in the manufacturing of Portland cement, which was in great demand in the rapidly developing areas of Dayton and Wright-Patterson Air Force Base. The new quarry operations and a nearby cement plant developed by Southwestern Portland Cement helped support the local economy for decades. (CEMEX USA currently uses the Brassfield Limestone as a raw ingredient in their large modern cement plant approximately three miles southeast of Oakes Quarry Park.)

Grab a coat for your second stop in time, about 20,000 years ago, when Ice Age glaciers made their last major advance and covered Oakes Quarry Park with ice and snow approximately 1,000 feet thick. The massive glaciers carried igneous and metamorphic rocks from Canadian Shield bedrock and sedimentary rocks from northern Ohio that scoured Ohio's bedrock and were deposited as glacial erratics, or rock fragments carried long distances from their native locations. A large hill of stratified sand and gravel carried by glacial meltwater was also deposited around this time and is located to the immediate northeast of the park along Yellow Springs-Fairfield Road.

The final part of your journey will cover an additional 425 million years…at the beach! Warm shallow seas teeming with marine organisms covered the park during the Silurian age, and the remains of these organisms eventually formed limestone. Filter-feeding animals called crinoids were especially abundant. They were part of a group of spiny-skinned animals known as echinoderms; modern-day examples of echinoderms include starfish, sea urchins, and sand dollars. More than 29 species of crinoid fossils have been documented at Oakes Quarry Park, making it one of the largest and most diverse Silurian-age fauna sites in the world.

In addition to crinoids, a profusion of reef-building organisms, such as corals and stromatoporoids, are preserved in the Brassfield Limestone

Interpretive sign about the geology of the Oakes Quarry.

of the park. The reef provided excellent habitat for brachiopods, bryozoans, mollusks, cephlopods, and trilobites, which include Ohio's state fossil *Isotelus*. Look for their irregularly shaped burrows fossilized on the surface of park rocks.

The park and its amazing collection of marine organism fossils are now protected for public enjoyment and academic research by a generous land donation from the Oakes family. Many individuals, including employees of CEMEX, volunteered their time and equipment for landscaping improvements and biodiversity management of the park. Regional academic institutions, particularly the students and faculty of Wright State University, provided expertise to enhance the park experience for both the casual visitor and school science classes. More than $370,000 secured from the State of Ohio's Clean Ohio Fund will be used for additional plantings and environmental remediation.

On your way back to modern times, be sure to visit the 25-acre prairie planted in the northwest corner of the park. The park manager, Pete Bales, says the prairie "is likely the way the site would have looked prior to any mining activity just one hundred years ago."

Oakes Quarry Park covers 190 acres and is located immediately east of the intersection of I-675 and SR 235. Please note that quarry walls are dangerous and should be avoided and fossil collecting is only permitted in designated areas. More information about Oakes Quarry Park can be obtained from Pete Bales, Park Manager, at (937) 754-3090 or parks@ci.fairborn.oh.us.

—Mark E. Wolfe

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- Katy H. Pan—Publications Editor, Publications and Geologic Records Center
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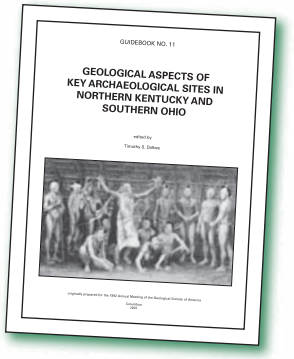
Ordering information

To order any of the Survey's publications or maps, contact the Geologic Records Center, 2045 Morse Road, Bldg. C-1, Columbus, Ohio 43229-6693; telephone: (614) 265-6576; fax: (614) 447-1918; email: geo.survey@dnr.state.oh.us. Please include 6.75 percent sales tax on orders delivered to an Ohio address. Handling charges apply to all mailed orders (please call for rates). Visa and MasterCard are accepted.

Guidebook to Fourteen Archaeological Sites in Ohio

Geological Aspects of Key Archaeological Sites in Northern Kentucky and Southern Ohio, the Ohio Geological Survey's Guidebook 11 by Timothy S. Dalbey, connects Native American social, ceremonial, and religious practices with Ohio's unique geologic settings and leads the reader-explorer on a roadtrip to sites that date from 1,000 to 14,000 years ago. Ohio's cultural and geologic histories are intertwined at sites like SunWatch Indian Village and museum near Dayton, which has highly productive and well-drained soils that allowed Native Americans to establish a relatively permanent settlement.

A total of eight authors describe the 14 stops listed in the guidebook. Descriptions range from detailed maps to summaries of how the first artifacts were discovered. Guidebook 11, *Geological Aspects of Key Archaeological Sites in Northern Kentucky and Southern Ohio,* is available from the Ohio Geological Survey for $12 (plus sales tax and shipping). Please see ordering information at left.



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