Ohio Geology
A Biannual Publication of the Ohio Department of Natural Resources, Division of Geological Survey 2003, No. 2

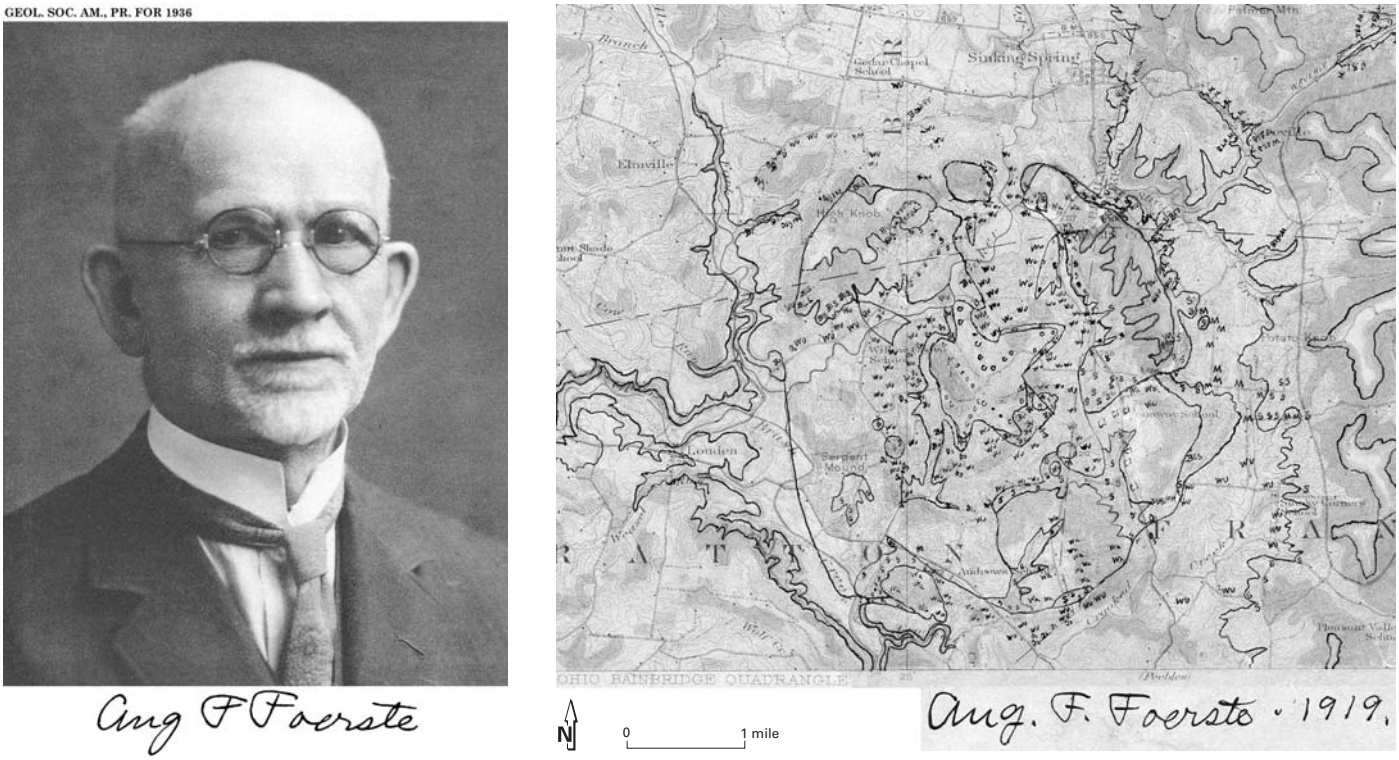
AUGUST F. FOERSTE: THE FIRST GEOLOGIST TO MAP THE SERPENT MOUND DISTURBANCE

By Gregory A. Schumacher

We all have that special song, movie line, or quote that, for whatever reason, sticks with us for a lifetime. One of mine stuck some 25 years ago as I sat in an introductory paleontology lecture about the discovery of new species of fossil organisms. Professor Robert C. Frey stated: "More new species reside in the nation's museum drawers than will be collected by current field expeditions searching for new species of fossils." I was amazed because I had always assumed that new species of fossil organisms were found on great scientific expeditions to remote areas of the world such as the barren deserts of Mongolia or the vast, frozen wilderness of Antarctica. Dr. Frey's point was that paleontologists were overlooking many valuable museum collections and there were many new species just waiting to be discovered in those dusty museum drawers.

I recently experienced the point that Dr. Frey was making as I was going through some of the thousands of maps on file at the Ohio Department of Natural Resources, Division of Geological Survey. My discovery—or more appropriately, rediscovery—was the first maps illustrating the highly complex and chaotic geology of the Serpent Mound disturbance (SMD) drawn by August F. Foerste (See *Ohio Geology*, Winter 1994). The first map of the Bainbridge, Ohio 15-minute quadrangle (scale: 1 inch = about 1 mile) illustrates the SMD as a circular central area of Ordovician rocks ringed by irregularly shaped areas of Silurian, Devonian, and Mississippian rocks. This partial map, signed and dated by August Foerste in 1918, does not define the northern and eastern boundary of the SMD. A second map, drawn in 1919 by August Foerste with assistance from Raymond Lamborn, provides the first complete geologic map of the SMD. The 1919 map depicts a wealth of geologic information and field observations written on the map and map margins by Foerste as he traversed the SMD.

Many geologists erroneously credit Walter Bucher as the first geologist to map the SMD, based on a brief note published in 1921 describing his mapping of the SMD in the summer of 1919. His geologic



August F. Foerste and his hand-drawn 1919 geologic map of the Serpent Mound disturbance (SMD). Note the hand-written field observations throughout the SMD.

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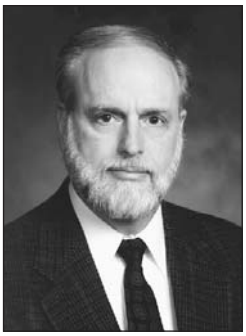

Thomas M. Berg, Division Chief and State Geologist, is recovering from back surgery and will provide an editorial in the next issue of Ohio Geology.

Joseph G. Wells Employee of the Year for 2003

Joseph G. Wells, GIMS Database Administrator for the Petroleum Geology Group, received the Division of Geological Survey's Employee of the Year award for 2003. Division Chief Thomas M. Berg presented Joe with a plaque recognizing his achievement at the Division's annual holiday luncheon and awards ceremony. Joe was chosen as the 2003 recipient by a special committee selected to review nominations submitted by fellow staff members.

Joe has made a positive impact on numerous Survey programs since his arrival in 1997. He designs and maintains numerous databases and database applications that increase productivity of the staff and supply digital information to Survey customers. One of Joe's first tasks at the Survey was to design and implement an electronic activity- and time-tracking database and reporting system. This system, named Activity Reporting and Management System or ARMS, has eliminated the necessity of manually preparing paper time sheets, which in turn has reduced accounting errors and time spent copying and filing records. The database also allows supervisors to quickly and accurately track personnel time spent on Survey grants and projects.

Joe's primary job responsibility is digital conversion and management of the Division's growing spatial-data collections. As the Division continues converting the many thousands of maps and data records in our archives to digital format, Joe's expertise is in great demand. For example, he has been instrumental in developing the POGO (Production of Oil and Gas in Ohio) database, and in re-tooling the Department's shared oil-and-gas data system, RBDMS (Risk-Based Data Management System). Virtually every project and publication that the Survey produces is now created digitally using GIS technology, and Joe is involved behind the scenes with it all. He also is the project manager for the oil-and-gas well-card scanning and data-entry project. This is an enormous project involving the digital conversion of more than 250,000 well records. The Survey has contracted the assistance of inmates through the Ohio Penal Industries to scan and index the original well cards, then enter the data from the cards into a custom database designed by Joe.

State Geologist Thomas M. Berg presenting Joseph G. Wells with the Employee of the Year award.

Joe also has converted the oil-and-gas well-location maps from a Computer-Aided Drafting (CAD) environment into a modern GIS environment. When the well-card project is completed, the Survey will be able to merge the comprehensive relational well database (complete with images of the original paper records) into a graphical GIS well-location system. These examples show the important role Joe plays in the Survey's attainment of current and long-range digital data-management goals, and underscore why he has been chosen as employee of the year for 2003.

Joe is originally from the Erie, Pennsylvania area and attended West Virginia University, where he earned a B.S. degree in geography, specializing in geographic information systems (GIS). Joe, his wife Melony, and two daughters live in Clintonville. Joe's personal interests include playing with his children, Cleveland Browns football, golf, and travel.

COMING FEATURES

In 2004, we plan to unveil two new features in *Ohio Geology—Did you know* and *Test your knowledge*. *Did you know* is a feature that describes little known facts about Ohio's geology or the role geology plays in our daily lives. For example, did you know that Charles Francis Richter, seismologist and developer of the Richter Scale, was born on a farm near Hamilton, Ohio? (Source: Rebecca Goodman, *The Cincinnati Enquirer*)

Test your knowledge is an interactive feature that challenges our readers to identify some aspect of Ohio's geology. We plan to publish photos of scenic features, famous landforms, maps, fossils, minerals, rocks, and other items of interest for our readers to identify.

We will post *Test your knowledge* answers on our website at http://www.ohiodnr.com/geosurvey/ about six to eight weeks after mailing each issue of *Ohio Geology*. Complete answers and information on where to learn more will be provided in the next issue of *Ohio Geology*.

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A biannual publication of the

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Ohio Geology is a free publication. To become a subscriber please contact the Division of Geological Survey at the above address, phone numbers, or e-mail.

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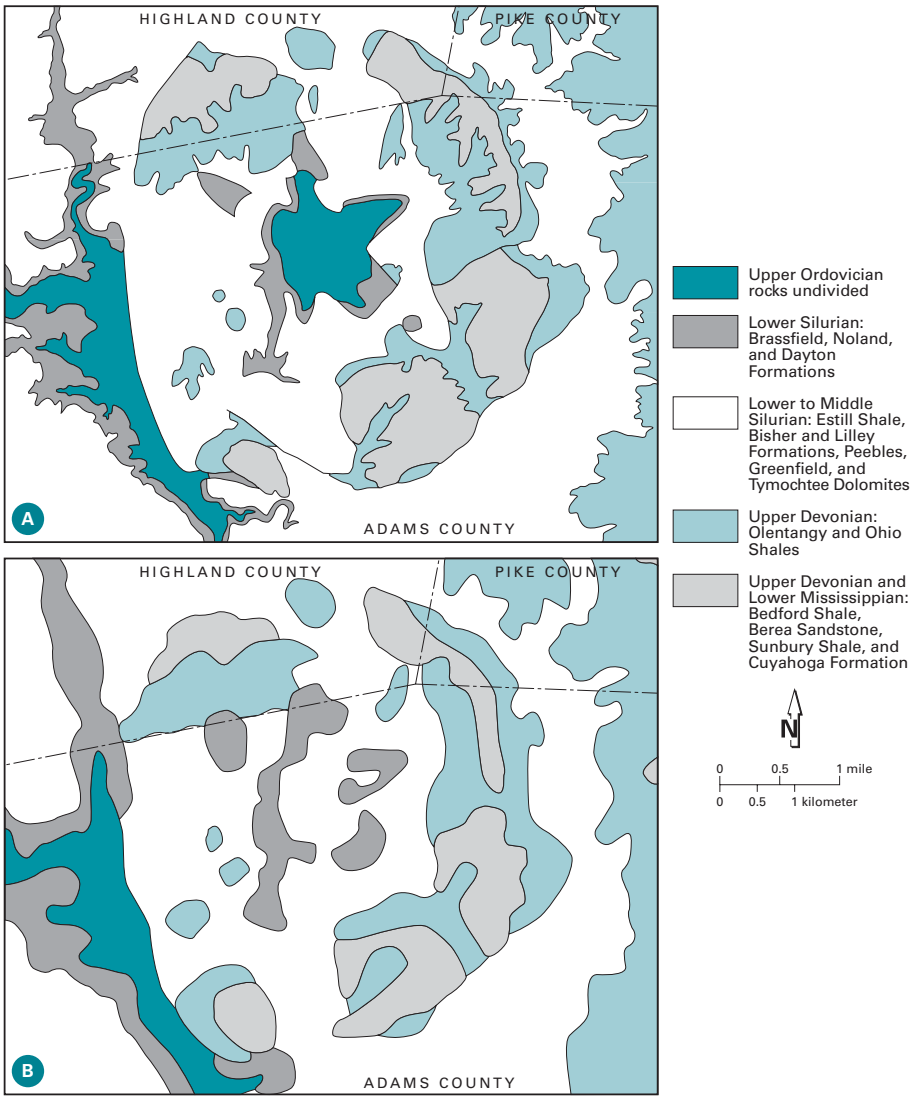
map and description of the SMD were part of a classic paper published in 1936 describing similar structures occurring in the United States. Later, geologists who read this classic paper and were unaware of the "forgotten maps of Foerste" would naturally credit Bucher as the first to map the SMD. However, not only did August Foerste produce the first geologic maps of the SMD, he also should be credited as the first to publish the geology of the SMD because his 1918 and 1919 maps were used by John Bownocker in his compilation of the 1920 Geologic Map of Ohio.

My rediscovery of the forgotten Foerste maps revealed some interesting mysteries. The 1918 and 1919 maps both have Ordovician rocks mapped in the central area of the SMD. However, the 1920 Geologic Map of Ohio shows Silurian rather than Ordovician rocks in the central area. I searched Foerste's many publications for an explanation for this discrepancy without success. Surprisingly, Foerste never wrote a paper describing the chaotic geology of the SMD. He made only passing references to the SMD as he described the fossils collected along the southern flank or described the stratigraphic units along its eastern border.

Pursuing answers to these mysteries, I spoke with many people who knew Walter Bucher or had studied the work of August Foerste. These individuals gladly shared considerable insight and many fascinating details about the lives and work of Walter Bucher and August Foerste. I learned that the Smithsonian Institution Archives in Washington D.C. contained the unpublished manuscripts and field notes of August Foerste, thanks to a tip from Dr. Michael Sandy of the University of Dayton. Could this material hold the answers I was looking for?

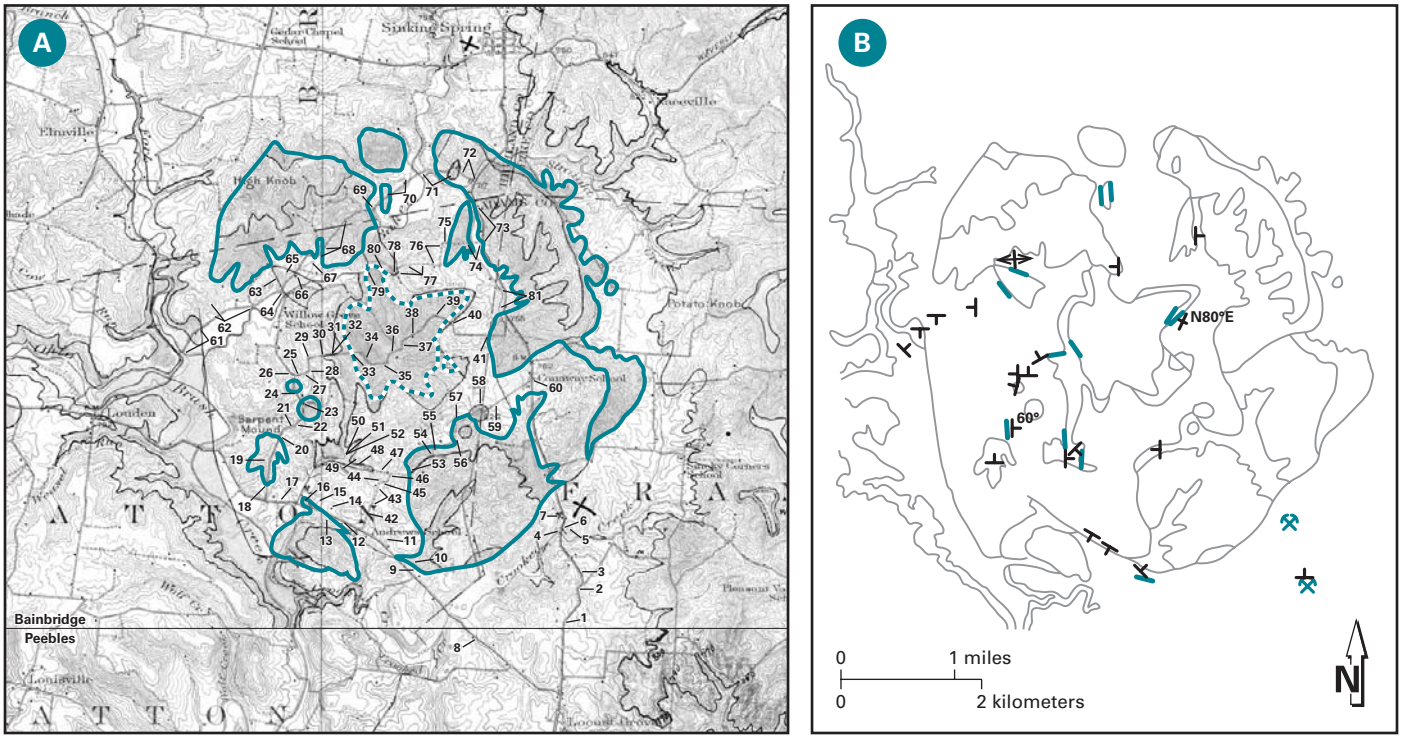
I traveled to the Smithsonian Institution, and upon arrival, I was escorted to a small reading room containing the three boxes of August Foerste's field notes and maps. I dug right in. The pocket-size notebooks were leather or hard-bound, often with beautifully marbled pages, and in nearly pristine condition except for the few which showed signs of water damage. At first, reading Foerste's handwritten notebooks was difficult because



Comparsion of Foerste's 1919 geologic map of the SMD (A) with the corresponding portion of the 1920 Geologic Map of Ohio (B). Note missing Ordovician rocks in the center of the SMD on the 1920 map.

of the poor quality of his penmanship, but with time I was able to decipher enough of his writing to understand his notations. After looking through a few notebooks, I was amazed how dirty my hands had become. The dirt was a fine clay or silt ranging from light brown to gray in color. I assumed this dirt had accumulated over time. Only later, after reading Raymond Bassler's memorial for August Foerste, a second hypothesis came to mind as to the origin of this dirt. In passing, Bassler mentioned that Foerste had accumulated a large collection of fossils, manuscripts, and field notebooks stored in wooden boxes in the basement of Steele High School in Dayton, Ohio. The Great Flood of 1913 swept much of this material away as the floodwaters of the Great Miami River inundated Dayton. As the floodwaters receded, many of these boxes were found by Foerste's friends living downstream and were returned. Was the dirt on my hands from the muddy waters of the 1913 flood?

My search of the first two boxes revealed interesting notes on the geology of southwestern Ohio and southeastern Indiana, but only a few entries described brecciated rock from some measured sections located in the northeastern section of the SMD. I wondered if my search was for naught as I moved on to the third box. The first file contained two field notebooks. The first notebook described Foerste's travels and measured stratigraphic sections in Warren County, Ohio, and the second notebook described Foerste's extensive travels throughout southwestern Ohio. I was nearing the end of the



EXPLANATION

26 — Map location of August Foerste's field notes

Outline of Ordovician-age rocks of Serpent Mound disturbance

Outline of Devonian and Mississippian-age rocks of Serpent Mound disturbance

EXPLANATION

Quarry

Strike and dip

Fault

Anticline

N80°E Strike of vertical beds

August Foerste's 1919 geologic map of the Serpent Mound disturbance modified to show field observation locations (A), faults, and tilted rock orientations extracted from Foerste's field notebooks (B).

second notebook when on page 124, I noticed the mention of the Bainbridge 15-minute quadrangle. Foerste's notation described the contact between Silurian and Devonian rocks near Locust Grove, Ohio, only a few miles southeast of the SMD. I continued reading notes on the geology northeast, east, and south of Locust Grove, but nothing to the northwest in the direction of the SMD. I continued turning pages until I read the passage: "Peebles-Sinking Springs Pike, Bainbridge sheet."—A road that traverses the eastern part of the SMD! My pulse quickened as I read faster, on page 127, more descriptions of the geology between the SMD and Locust Grove. Then on page 128, Foerste wrote: "On NE side of pike, beyond fault, Monroe exposed with strike parallel to road and dip NE". He was describing his entry into the southern part of the SMD! The following 12 pages described his traverses within the SMD. I now held in my hands the means to walk in the footsteps of Foerste as he first mapped the SMD.

In a few weeks after my return to Columbus, the requested copies of August Foerste's notes arrived. I began to retrace the footsteps of Foerste, adding a wealth of new information to the 1919 geologic map of the SMD. The notes described the geography and geology of 81 locations within and adjacent to the SMD. For example, the complete passage describing his entry into the SMD at location 9 is: "NW of Crooked Creek bridge ½ mile, just beyond lane turning off west. On NE side of pike, beyond fault, Monroe exposed with strike parallel to road and dip NE. Only about 12 ft. of Monroe actually exposed here." This example illustrates the wealth of new information contained within these notes. The detailed description of diagnostic geographical features allowed me to locate each field location on the 1919 geologic map, check the stratigraphic unit exposed and the contacts between stratigraphic units, plot the strike and tilt or dip of the rocks, draw the position of faults and folds, and add the locations of quarries. Foerste also described the fossils and fossil abundance, key marker beds, mineral deposits, and weathering characteristics of exposed bedrock at many locations. This information is available in Ohio Division of Geological Survey Open-file Report 2002-01 entitled: *August F. Foerste's unpublished field notes for the area of the Serpent Mound disturbance*.

Ironically, August Foerste's field notes did not answer my questions of why the Ordovician rocks of the central uplift are designated Silurian-age on the 1920 Geologic Map of Ohio or why Foerste never published a paper describing the complex geology of the SMD. These questions remain unanswered, but my initial questions led to the discovery of long forgotten geologic information about the SMD. The rediscovery of August Foerste's geologic maps and field notes have corrected the mistaken assumption that Walter Bucher was the first geologist to map the SMD and provided the opportunity to walk in Foerste's footsteps

and appreciate the detailed data utilized to produce the first geologic maps of the Serpent Mound disturbance.

FURTHER READING

Baranoski, M. T., Schumacher, G. A., Watts, D. R., Carlton, R.W., and El-Saiti, B. M. B., 2003, Subsurface geology of the Serpent Mound disturbance, Adams, Highland, and Pike Counties Ohio: Ohio Division of Geological Survey Report of Investigations 146, 60 p.

Bassler, R. S., 1937, Memorial of August F. Foerste: Proceedings of the Geological Society of America for 1936, p. 143-158.

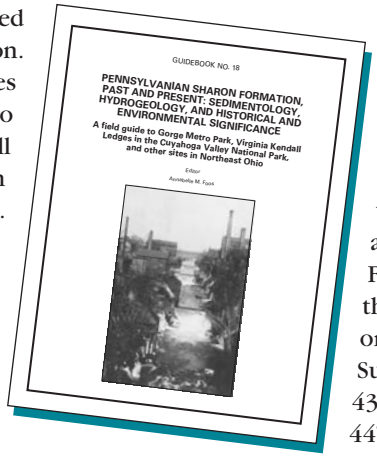
Bucher, W. H., 1921, Cryptovolcanic structure in Ohio of the type of the Steinheim Basin: Geological Society of America Bulletin, v. 32, p. 74-75.

Bucher, W. H., 1936, Cryptovolcanic structures in the United States: International Geologic Congress, Report of the 16th Session, v. 2, p. 1055-1084.

Hansen, M. C., 1994, Return to Sunken Mountain: the Serpent Mound cryptoexplosion structure: Ohio Geology, Winter issue, p. 1, 3-7.

New Guidebook

The Ohio Division of Geological Survey recently released Guidebook 18, *Pennsylvanian Sharon Formation, Past and Present: Sedimentology, Hydrogeology, and Historical and Environmental Significance,* edited by Annabelle M. Foos of the University of Akron. The guidebook focuses on the classic exposures of the Sharon Formation located at Gorge Metro Park in Cuyahoga Falls, Ohio and Virginia Kendall Ledges in Cuyahoga Valley National Recreation Area. In the guidebook, authors, Annabelle M. Foos, Neil A. Wells and David A. Waugh of Kent State University, James E. Evans of Bowling Green State University, and Joseph T. Hannibal of Cleveland Museum of Natural History provide a comprehensive overview of previous studies and update our knowledge of the Sharon stratigraphic and depositional framework by reporting the results of their studies using sequence-stratigraphy and basin-analysis methods. This new information, in conjunction with petrographic studies, advances our knowledge of groundwater flow through the sandstones of the Sharon. Later chapters provide an historical overview of the importance of the Sharon in the economic development of northeast Ohio and discuss the environmental issues associated with historic dams built to harness the power of water flowing over rapids and waterfalls created by resistant sandstone beds of the Sharon. In the last chapter, field-trip stops and visited outcrops are described. A detailed road log is provided and the geologic and cultural features of the Sharon are well illustrated by 58 figures and 13 plates. Fifteen tables summarize the data used to support the authors' new findings. This guidebook may be ordered from the Geologic Records Center of the Survey, 4383 Fountain Square Dr., Columbus, OH 43224-1362; telephone: 614-265-6576; fax: 614-447-1918; e-mail: geo.survey@dnr.state.oh.us. The price is $10.00 plus $2.50 postage and handling and sales tax of 6.75% for all non-tax exempt Ohio orders. Visa and MasterCard are accepted.



ROCK AND MINERAL SETS A HUGE SUCCESS

The Division of Geological Survey has distributed over 25,000 Ohio Rock and Mineral Sets since this promotional and educational effort began in early 1998. The sets contain ten rocks and minerals found or mined in Ohio, and include clay, coal, dolomite, flint, gypsum, limestone, salt, sand and gravel, sandstone, and shale. Samples for the sets are donated to the Survey by industrial-mineral producers and coal companies or are collected by Survey staff members at quarries or field sites across the state. Limestone and dolomite, abundant in central Ohio, are easy to acquire, however, flint and gypsum samples can be more difficult to obtain. Flint is common but typically not concentrated enough to easily collect in large quantities. When Ohio's only operating gypsum mine closed in August 2001, several hundred pounds of gypsum were hurriedly collected to meet rock and mineral set demand for the next several years. Fortunately, that mine was reopened under new ownership a short while later, so a reliable source of Ohio gypsum is once again available.

Assembly of the rock and mineral sets is an interesting process. Corrugated cardboard boxes are cut and stamped by the Ohio Penal Industries, Lima Correctional Institution. The unassembled boxes, bags of bulk rock and mineral samples, labels, maps and explanation, and other necessary supplies are delivered to the Ohio Department of Rehabilitation and Correction's Medical Center on the south side of Columbus. Here, inmates assemble and label each box, break down the bulk samples to the proper size, and place the samples in the boxes together with a bedrock geology map and an explanation of uses for each rock or mineral in the set. The assembled sets are collected from the Corrections Medical Center and checked for completeness and correct sample identification prior to distribution. Over the

years, the Ohio Rock and Mineral Sets have been one of the Survey's most popular educational outreach efforts, serving as a great teaching resource for hands-on instruction on Ohio's mineral industries and the geology of Ohio.

Ohio Rock and Mineral Sets are available free of charge in limited quantities and can be picked up at the Survey's central office located at 4383 Fountain Square Drive, B-2 Columbus, Ohio 43224. Although the sets are free, postage and handling charges are applicable on all shipped orders. Please call (614-265-6576) or e-mail (geo.survey@dnr.state.oh.us) the Geologic Records Center for ordering information. Due to high demand for these popular educational resources, the sets are available to Ohio residents only.

These rock and mineral sets are made possible through the generosity of Ohio's coal and mineral producers, Mr. Roy Miller, and the Ohio Department of Rehabilitation and Correction.

Shaded bedrock-topography map wins award

The *Shaded bedrock-topography map of Ohio* (see *Ohio Geology* 2003, issue 1) received the first place award for best map in the digital-cartographic map gallery at the September 2003 Ohio GIS Conference. GIS Specialist Donovan Powers, who created the GIS adaptation of the map, accepted the award for the Division of Geological Survey. Donovan's *Shaded elevation map of Ohio* won first place at the 2002 Ohio GIS Conference. Congratulations to Donovan for his remarkable back-to-back, awarding-winning achievements.

The *Shaded bedrock-topography map of Ohio* depicts the topographic relief on Ohio's bedrock surface as if all the glacially derived sediments were removed. County boundaries are overlain on the map for spatial reference and a short explanatory text provides an overview of Ohio's complex history of terrain development. This map, based on data collected during the remapping of Ohio's bedrock geology, was produced using ArcGIS software products.

Full-color, 1:500,000-scale (1 inch = about 8 miles) plots of this attractive and informative wall-sized map are popular with Survey customers and are available ($15.00 plus sales tax and handling) from the Geologic Records Center (614-265-6576). An electronic GIS version (CD-ROM, ArcGIS format) of the map, with more than 162,000 data points, also is available ($25.00 plus sales tax and handling) from the Geologic Records Center. This is an excellent digital dataset for geologists, students and teachers equipped to work with GIS coverages in ArcGIS format.

Earth Science Week 2003

Senior staff Geologist Greg Schumacher discusses fossils with young rock hounds and their parents at the 6th Annual Earth Science Week Expo held Sunday, October 12, 2003 at Highbanks Metro Park, north of Columbus in Delaware County. Greg, Tom Berg, Scott Brockman, Stephanie Konfal, and Mac Swinford, along with Pete MacKenzie of the Ohio Geological Society distributed hundreds of maps and publications, gave away nearly 200 Ohio rock and mineral sets, and answered numerous geology questions from park visitors.

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