

STATE OF OHIO
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Open-File Report 2007-1
(Revised 2018)

A COMPILATION OF PLANNING RESOURCES FOR GEOLOGIC FIELD TRIPS IN OHIO

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Division of Geological Survey
2045 Morse Road, Building C-1
Columbus, Ohio 43229-6693

2007
(Revised 2018)





Ohio Geological Survey

Dear Explorer of Ohio Geology,

The Ohio Department of Natural Resources, Division of Geological Survey appreciates your interest in learning more about Ohio's amazing geology and geologic history. This publication provides information to assist you in planning your exploration of Ohio's geology.

The Ohio Geological Survey Staff regrets that because of staffing and budgetary concerns, we cannot offer staff-guided field trips at this time. Unfortunately, this also applies to public outreach programs. **If you are interested in a guided field trip or civic group or school presentation**, please see your area of interest in this report, or go to the Survey's website links. Most geology clubs and departments offer lectures and field trips at various times throughout the year. In the Cincinnati, Dayton, Oxford (Miami University-Karl E. Limper Museum), Columbus (The Ohio State University-Orton Geology Museum), and Cleveland areas, contact the local natural history museums to learn about available public outreach programs. The Ohio Oil and Gas Energy Education Program also provides public outreach programs.

If you want to go fossil collecting in Ohio, this open-file report lists publications, information and potential field trip locations to help you plan your trip. Ohio's Ordovician-age rocks are highly fossiliferous and worth the time needed to travel to one of the six designated public collecting sites. There is only one public site (each) for collecting Silurian- and Devonian-age fossils in Ohio. Currently there are no public fossil-collecting sites for Ohio's Mississippian-, Pennsylvanian-, or Permian-age rocks; however, you can explore exposed rocks of these ages (please refer to the Mississippian, Pennsylvanian, and Permian sections of this report for information resources).

In addition to exploring Ohio's bedrock geology, you can explore its glacial history by visiting sites such as the Glacial Grooves State Memorial on Kelleys Island and Cedar Bog in Champaign County. Ohio also has several spectacular caverns and even a meteor crater for you to visit and explore.

Whatever aspect of Ohio's geology or geologic history you choose to explore, please be certain to explore in a safe and courteous manner. Always consider the safety of your group and anyone you may meet while on your field trip. Specifically, please be aware that **the Ohio State Highway Patrol and county sheriffs do not permit vehicles to stop along roads unless there is a valid emergency**. There are plenty of publicly accessible sites throughout Ohio where you may explore Ohio's unique geology, please do so responsibly.

Please let us know if we can be of further assistance.

Sincerely,

The Ohio Geological Survey Staff

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INTRODUCTION

This open-file report contains sources for information on Ohio's geologic history, specific geologic time periods, and various aspects of geology. It explains how to obtain publications from the Ohio Geological Survey or from another source. Most of the items listed can be used to plan field excursions anywhere in Ohio. We hope you have safe and enjoyable time exploring and learning about Ohio's geology.

HOW TO ORDER OR PURCHASE PUBLICATIONS

The Ohio Geological Survey's Geologic Records Center (GRC) staff handles all publication and map requests. Please visit the website or contact the GRC staff for the most current pricing information for publications. Publications are available by mail or through the provided link. Please note that website links change over time and may become broken since the posting of this open-file report.

Website links

Ohio Geological Survey home page: <http://geosurvey.ohiodnr.gov>

Publications listing and downloads: <http://geosurvey.ohiodnr.gov/publications>

Ohio Geology Store: CLOSED for redesign (<http://www.ohiogeologystore.com/>)

Geologic Records Center: <http://geosurvey.ohiodnr.gov/contacts-about-us/geologic-records-center>

Hours of operation and ordering methods

The Geologic Records Center is open to walk in customers on:

Tuesdays and Thursdays only, from 8:00–11:30 A.M. and 1:00–4:00 P.M.

The GRC is located at 2045 Morse Road, Building C-1, Columbus, Ohio, 43229-6693.

For directions and a map call (614) 265-6576 .

NOTE: Phone, fax and internet orders are processed daily M–F.

To order by phone: Call the GRC at (614) 265-6576 to order with MasterCard/Visa.

To order by mail: ODNR, Division of Geological Survey, ATTN GRC, 2045 Morse Road C-1, Columbus, Ohio, 43229-6693. Payment must accompany order.

To order by fax: (614) 447-1918. Free publications and/or MasterCard/Visa orders only.

To order by Internet: Visit the OhioGeologyStore.com (<http://www.ohiogeologystore.com>)

Publications listed as *out of print*

Ohio Geological Survey publications listed as *out of print* are available for review and photocopying (there is a copying fee per page) at the GRC. Local public or university libraries may also have copies of *out of print* Survey publications.

Ohio Geological Survey publication abbreviations used throughout this report

B = Bulletin; EL = Educational Leaflet; GB = Guidebook; GF = GeoFacts; GSA = Geological Society of America; HO = Hands On Earth Science; IC = Informational Circular; RI = Report of Investigation

GENERAL GEOLOGIC INFORMATION

Ohio's official Gemstone and Fossil

Available by mail or PDF from the Ohio Geological Survey

EL 6: Flint, Ohio's official gemstone

GF 6: *Isotelus*: Ohio's State Fossil

Ohio Geological Survey Educational Leaflets (EL)

GENERAL GEOLOGIC INFORMATION (cont.)

Available by mail or PDF from the Ohio Geological Survey

EL 7: The Ice Age in Ohio

EL 11: Guide to the geology along U.S. Route 23 between Columbus and Portsmouth

EL 13: Guide to the geology along Interstate 75 between Toledo and Cincinnati

EL 14: Guide to the geology along Interstate 70 between the Ohio-Indiana boundary and Columbus

EL 15: Guide to the geology along Interstate 77 between Marietta and Cleveland

Ohio Geological Survey Information Circular (IC)

IC 16: Geology along Route 40 in Ohio, by Pauline Smyth. 65 p., 9 figs., 27 pls., including maps, 1955; 2nd printing, 1957. *Out of print.*

Ohio Geological Survey GeoFacts (GF)**Available by mail or PDF from the Ohio Geological Survey**

GF 5: Ohio trilobites

GF 17: Fossil collecting in Ohio

GF 21: Where to see Ohio's geology

GF 23: A brief summary of the geologic history of Ohio

GF 24: Tiny hidden treasures—the microfossils of Ohio

Ohio Geological Survey Hands-on Earth Science (HO)**Available by mail or PDF from the Ohio Geological Survey**

HO 4: Ohio Geology Word Search

HO 5: Ohio Geology Crossword Puzzle

HO 8: Understanding Geologic Time

Ohio Geological Survey Bulletin (B)**Available by mail from the Ohio Geological Survey**

B 65: Ohio—an American Heartland, A.G. Noble, and A.J. Korsok, 230 p., 1975. *Out of print.* An excellent reference on how Ohio developed from its initial settlements to the early 1970s.

B 69: Minerals of Ohio, E.H. Carlson, 155 p., 64 figs., 11 tables, 4 color pls., 1991. An excellent reference that discusses the geologic settings and mineralogy of the 42 minerals known to be present in the rocks exposed throughout Ohio. In addition, *Minerals of Ohio* serves as a good introductory mineralogy text and a reference for how and where to collect minerals. Note many of the localities mentioned in this publication are on private property and cannot be accessed without permission; other sites may have become inaccessible due to land use changes.

B 70: Fossils of Ohio, R.M. Feldmann, and Merrienne Hackathorn, editors. 577 p., 232 figs., 12 tables, 1996. Reprinted with minor revisions, 2005. Paperback. Considered the encyclopedia of Ohio fossils, this bulletin follows the Treatise of Invertebrate Paleontology format of a chapter per phylum.

Overview of Ohio's geology**Available by mail from the Ohio Geological Survey**

Ohio's surface rocks and sediments, by A.H. Coogan, 1996, modified from Chapter 3 of Fossils of Ohio (Ohio Geological Survey Bulletin 70), 21 p. An excellent overview of Ohio's geologic history.

Geological Society of America Guidebooks (GSA)**Available by mail from the Ohio Geological Survey**

GSA 81-1: Stratigraphy, sedimentology: Six field trips in Kentucky, Ohio, Indiana, Virginia, and West Virginia, p. 1-258.

GENERAL GEOLOGIC INFORMATION (cont.)

GSA 81-2: Economic geology, structure: Four field trips in Ohio, Kentucky, Tennessee, Virginia, and North Carolina, plus abstracts for two additional trips, p. 259-408.

GSA 81-3: Geomorphology, hydrogeology, geoarcheology, and engineering geology: Five field trips in Ohio and Kentucky, plus an abstract for one additional trip, p. 409-572.

Generalized correlation chart of bedrock units in Ohio

Available by mail from the Ohio Geological Survey

Color chart, 36 x 44 inches. The chart is sent folded (or rolled in a mailing tube for an additional fee).

8.5 x 11 inch geologic maps

Available by mail or PDF from the Ohio Geological Survey

Fourteen maps, sized 8.5 x 11 inches, showing various geologic interpretations:

Topographic and Bedrock Geology Maps

Available by mail from the Ohio Geological Survey

The Ohio Geological Survey stocks the 788 7.5-minute (1:24,000-scale) series of U.S. Geological Survey topographic maps that cover Ohio. Maps are sent folded (or rolled and sent in mailing tubes for an additional fee). Staff of the GRC can also print bedrock geology, topography, or structure maps of any quadrangle in the state in either black and white or color.

EL 16: Ohio Topographic Maps contains an index to the topographic maps.

ORDOVICIAN INFORMATION

Ohio Geological Survey Guidebooks (GB)

Available by mail from the Ohio Geological Survey

GB 9: Cincinnati's geologic environment: A trip for secondary-school teachers, by W.C. Haneberg, M.M. Riestenberg, R.E. Pohana, and S.C. Diekmeyer, 23 p., 24 figs., 1992.

GB 10: The Sangamonian-Wisconsinan transition in southwestern Ohio and southeastern Indiana, by R.D. Hall and others, 38 p., 28 figs., 3 tables, 1992.

GB 12: Excursion to Caesar Creek State Park in Warren County, Ohio: A classic Upper Ordovician fossil-collecting locality, by D.L. Shrake, 18 p., 11 figs., 1 table, 9 pls., 1992.

GB 13: Sampling the layer cake that isn't: The stratigraphy and paleontology of the type-Cincinnatian, R.A. Davis and R.J. Cuffey, editors, 194 p., 107 figs., tables, 2 appendixes, 1998.

Cincinnati Museum of Natural History publication

Available by mail from the Ohio Geological Survey

Cincinnati fossils, an elementary guide to the Ordovician rocks and fossils of the Cincinnati, Ohio, region, R. A. Davis, editor, 61 p., illustrations, 8 pls., 1992.

Kentucky Geological Survey Guidebooks

This guidebook is available by mail from the Ohio Geological Survey or from the Kentucky Geological Survey (KGS ordering information follows):

Exploring the geology of the Cincinnati/northern Kentucky region, by P.E. Potter, Second revised edition: Kentucky Geological Survey Special Publication 8: Series XII, 2007. This 1996 guidebook was updated and re-published as part of the April 2007 centennial celebration by the University of Cincinnati departments of geography and geology. The updated second edition is generously illustrated and is intended for diverse audiences, educators, geologists, enthusiasts, and engineers.

ORDOVICIAN INFORMATION (cont.)

The following guidebooks are available by writing or calling the Kentucky Geological Survey, University of Kentucky, 228 Mining & Mineral Resources Bldg., Lexington, Kentucky 40506-0107; (606) 257-5500 .

Geological aspects of the Maysville-Portsmouth region, southern Ohio and northeastern Kentucky: Roadlog for joint field conference of Ohio Geological Society and Geological Society of Kentucky, by W.L. Calvert and others, 87 p., 1968. This guidebook covers exposures from the Ordovician through the Mississippian Periods.

Stratigraphy, sedimentology, and paleontology (Upper Ordovician), and glacial and engineering geology of northern Kentucky and southern Ohio: Guidebook and roadlog for Geological Society of Kentucky 1987 field conference, by R.C. Kepferle, M.C. Noger, D.L. Meyer, and G.A. Schumacher, 18 p., 1987.

Geology of the Alexandria-Ashland Highway (Kentucky Highway 546), Maysville to Garrison: Guidebook and roadlog for Geological Society of Kentucky 1991 field conference, by P.E. Potter, W.I. Ausich, J. Klee, L.A. Krissek, C.E. Mason, G.A. Schumacher, R.T. Wilson, and E.M. Wright, 64 p., 1991. This guidebook covers exposures from the Ordovician through the Mississippian Periods.

**Unless otherwise posted, while in Kentucky please follow guidelines for collecting in Ohio:
No stopping along roadways or collecting without permission.**

Miami University Guidebooks

Miami University has two guidebooks to facilitate exploration of the tri-state (southwestern Ohio, southeastern Indiana, and northern Kentucky) Ordovician geology. To obtain the guidebooks, write or call the Karl E. Limper Geology Museum, Miami University Department of Geology, 114 Shideler Hall, Oxford, Ohio 45056; (513) 529-3220.

Miami University Geology Field Trip Guide to Localities on Indiana Rt. 101 between Brookville and Liberty (Indiana), by J.K. Pope and W.D. Martin, 25 p., 1998.

A brief description of the Cincinnati Series (Upper Ordovician) of Ohio, Indiana, and Northern Kentucky, by W.D. Martin and K.L. Hauer, color figures, 20 p.; adapted from Miami University Field Trip Guide to Localities on Indiana Rt. 101 between Brookville and Liberty, (1998), by J.K. Pope and W.D. Martin, 2006.

Ohio Geology—Newsletter of the Ohio Geological Survey

Available as PDF from the Ohio Geological Survey

Fall 1997: Geology of Ohio—The Ordovician

Field Trip from Geological Society of America (GSA) Decade of North American Geology, Volume 6 (Southeastern Section, 1986)

Available by mail from the Ohio Geological Survey

GSA Reprint No. 5: Cincinnati region: Ordovician stratigraphy near the southwestern corner of Ohio.

State Parks

These parks have designated collection areas and rules. Before visiting, please contact the U.S. Army Corps of Engineers at Caesar Creek and East Fork (see below) and park offices at Stonelick and Hueston Woods for collecting information. The parks are listed geologically from the oldest to youngest accessible bedrock formations.

East Fork State Park: (513) 734-4323. Kope and Fairview (main formation exposed in emergency spillway) Formations, and Bellevue Member of the Grant Lake Limestone. For fossil-collecting information, contact U.S. Army Corps of Engineers: (513) 797-6081.

Stonelick State Park: (513) 734-4323. Arnheim formation and Waynesville Formation.

ORDOVICIAN INFORMATION (cont.)

Caesar Creek State Park: (937) 897-3055. For fossil-collecting information, contact U.S. Army Corps of Engineers: (513) 897-1050. Arnheim formation and Waynesville, Liberty (main formation exposed in emergency spillway floor), and Whitewater Formations.

Hueston Woods State Park: (513) 523-6347. Waynesville, Liberty, Whitewater, and Saluda Formations. Hueston Woods fossil-collecting pamphlet: .

City Park

Trammel Fossil Park, Sharonville, Ohio in northeastern Hamilton County. City of Sharonville: (513) 563-2895; Fairview, Miamitown, Bellevue, and Corryville Formations, which places this park stratigraphically between East Fork park and either Stonelick or Caesar Creek parks. For additional information about the park visit: .

Indiana Park

Whitewater Gorge Park, Richmond, Indiana. Park Information: . Whitewater Formation, which places this park stratigraphically above Caesar Creek and Hueston Woods parks. Contact City of Richmond Parks and Recreation before visiting the park: (765) 983-7200, City of Richmond, 50 North Fifth Street, Richmond, Indiana 47374.

Unless otherwise posted, while in Indiana please follow guidelines for collecting in Ohio:

No stopping along roadways or collecting without permission.

SILURIAN INFORMATION

Ohio Geology—Newsletter of the Ohio Geological Survey

Available as PDF from the Ohio Geological Survey

Spring 1998: Geology of Ohio—The Silurian

Field Trips from Geological Society of America (GSA) Decade of North American Geology Volume 3 (North-Central Section, 1987)

Available by mail from the Ohio Geological Survey

GSA Reprint No. 97: John Bryan State Park, Ohio: Silurian stratigraphy.

Available from GSA

Fort Wayne, Indiana: Paleozoic and Quaternary geology, by J.A. Sunderman, Geological Society of America Decade of North American Geology (North-Central Section, 1987) v. 3, nos. 77 and 78, p. 325-332.

Ohio Geological Survey Reprint Series (RS)

Available by mail or PDF from the Ohio Geological Survey

RS 3: The geologic interpretation of scenic features in Ohio, by J.E. Carman. 42 p., 38 figs., 1946. Reprinted (1991) from Ohio Journal of Science, v. 46, p. 241-283. This publication contains a very good discussion on the geologic history of Clifton Gorge. RS 3 is also available as a PDF from the Ohio Academy of Science:

State Park=

No fossil collecting is permitted at the John Bryan State Park. Silurian-age fossils can only be collected at Oakes Quarry Park (see City Park section below).

John Bryan State Park: (937) 767-1274. This state park provides opportunities for up-close examination of bedrock exposures and glacial geology, and public trails of various difficulty levels.

SILURIAN INFORMATION (cont.)

Natural Areas and Preserves

No fossil collecting is permitted at the following preserves. Silurian-age fossils can only be collected at Oakes Quarry Park (see City Park section below). However, these preserves provide opportunities for up-close examination of bedrock exposures and glacial geology. The ODNR, Division of Natural Areas and Preserves requires permits to enter certain locations, please contact them before visiting.

Clifton Gorge Nature Preserve: ODNR, Division of Natural Areas and Preserves: (614) 265-6453, . This preserve provides public trails of various difficulty levels (a permit is not required to use the trails).

Cedar Bog Nature Preserve: ODNR, Division of Natural Areas and Preserves (614) 265-6453. For additional information, contact the Ohio Historical Society at (937) 434-3744; (800) 860-0147 or The Cedar Bog Association .

Greenville Falls: This area is managed by two agencies: ODNR, Division of Natural Areas and Preserves: (614) 265-6453,; and the Miami County Park District: (937) 335-6273,

Charleston Falls: Miami County Park District: (937) 335-6273

Glen Helen Ecology Institute's Outdoor Education Center: (937) 767-7648. The center provides public trails of various difficulty levels.

City Park

Oakes Quarry Park, Fairborn, Ohio: (937) 754-3090. Fossil collecting is permitted at this location. Before visiting the park, please contact the City of Fairborn Parks and Recreation Division at the contact information above for rules and hours of operation.

Private Nature Sanctuary

Highlands Sanctuary Organization, (937) 365-1935 or use the following link for information and the online permit system for self-guided tours: . The Sanctuary also offers guided hikes and programs featuring the geology of south-central Ohio.

DEVONIAN INFORMATION

Ohio Geology—Newsletter of the Ohio Geological Survey

Available as PDF from the Ohio Geological Survey

1999 No. 1: Geology of Ohio—The Devonian

Ohio Geological Survey GeoFacts (GF)

Available by mail or PDF from the Ohio Geological Survey

GeoFacts 4: Ohio Shale Concretions

Field trip guide from the Ohio Academy of Science

Available as PDF from the Ohio Academy of Science

Middle Devonian (Givetian) Silica Formation of Northwest Ohio—Description and Road Log (1991), by M. J. Camp and C.B. Hatfield, Ohio Journal of Science, v. 91, n.1, pp. 27-34. PDF: . Some stops in this guide will be inaccessible due to lack of permission to enter.

Ohio Geological Survey Information Circular (IC)

Available by mail from the Ohio Geological Survey

IC 27: Devonian-Mississippian shale sequence in Ohio, by K.V. Hoover, 154 p., 11 figs., 3 tables, 3 pls., 1960. Reprinted 1965, 1978.

SILURIAN INFORMATION (cont.)

Ohio Journal of Science PDF

Middle Devonian carbonate rocks and shales of north-central Ohio (1988), by C.B. Hatfield, Ohio Journal of Science, v. 88, n. 1, pp. 18-22. PDF:

Field Trip from Geological Society of America (GSA) Decade of North American Geology Volume 3 (North-Central Section, 1987)

Available by mail from the Ohio Geological Survey

GSA Reprint No. 93: The Cuyahoga Valley National Recreation Area, Ohio: Devonian and Carboniferous clastic rocks.

GSA Reprint No. 99: Copperas Mountain: Black shale facies of the Upper Devonian Ohio Shale in south-central Ohio.

Local Park

Devonian-age fossils can only be collected at Sylvania Fossil Park.

Sylvania Fossil Park: Olander Park System (419) 882-8313. Before visiting, please contact the Sylvania Park District at the contact information above for collecting information and hours of operation.

MISSISSIPPIAN INFORMATION

Ohio Geology—Newsletter of the Ohio Geological Survey

Available as PDF from the Ohio Geological Survey

2001 No. 2: The Geology of Ohio—The Mississippian

Ohio Geological Survey Report of Investigation (RI)

Available by mail from the Ohio Geological Survey

RI 63: Bedrock geology of the South Bloomingville quadrangle, Hocking and Vinton Counties, Ohio, by R.M. DeLong, color map (1 inch equals 2,000 feet), one sheet with text, 1968. Map is sent folded (or rolled and sent in mailing tubes for an additional fee). Map and text detail the geology of the Hocking Hills region and includes photographs of several of the parks.

Ohio Geological Survey Guidebook (GB)

Available by mail from the Ohio Geological Survey

GB 4: Geology of the Hocking Hills State Park region, by M.C. Hansen, 23 p., 28 figs., 1975.

Ohio Geological Survey Information Circular (IC)

Available by mail from the Ohio Geological Survey

IC 27: Devonian-Mississippian shale sequence in Ohio, by K.V. Hoover, 154 p., 11 figs., 3 tables, 3 pls., 1960, Reprinted 1965, 1978.

Ohio Journal of Science PDF

Geology and Habitats of the Cuyahoga Valley National Recreation Area, Ohio (1988), R.G. Corbett and B.M. Manner, Ohio Journal of Science, v. 88, n. 1, pp. 40-47. PDF:

Geological Society of America (GSA) Guidebook

Available from GSA

Late Devonian and Early Mississippian strata at Stebbins Gulch, Geauga County, and Quarry Rock, Cuyahoga County, Ohio, by A. H. Coogan, L.E. Babcock, J.T. Hannibal, D.W. Martin, K.S. Taylor, and D.C. When, 1986. Guidebook for Field Trip Number One of the Geological Society of America North-Central Section Meeting held in Kent, Ohio, April 1986. 16 p. Availability of this guidebook is limited.

PENNSYLVANIAN INFORMATION

Ohio Geological Survey Report of Investigation (RI)

Available by mail from the Ohio Geological Survey

RI 84: Bedrock geology of the Flint Ridge area, Licking and Muskingum Counties, Ohio, by R.M. DeLong, color map (1:24,000-scale, or 1 inch equals 2,000 feet), one sheet with text, 1972, Reprinted 1978.

RI 142: Pennsylvanian trilobites of Ohio, by D.K. Brezinski, M.T. Sturgeon, and R.D. Hoare, 18 p., 4 figs., 4 tables, 2 pls., 1989, Reprinted 1998.

Ohio Geological Survey Guidebooks (GB)

Available by mail from the Ohio Geological Survey

GB 2: Selected field trips in northeastern Ohio, edited by R.A. Heimlich and R.M. Feldmann, Field trip 1, General geology of the International Salt Company Cleveland mine, Cleveland, Ohio, by R.A. Heimlich, R.W. Manus, and C.H. Jacoby; Field trip 2, Sedimentary environments of the Lower Pennsylvanian Sharon Conglomerate near Akron, Ohio, by A.H. Coogan, R.M. Feldmann, E.J. Szmuc, and J.V. Mrakovich; Field trip 3, Engineering and Pleistocene geology of the lower Cuyahoga River valley, by George Gardner, Arthur Wittine, M.R. McComas, B.B. Miller, and R. W. Manus, 59 p., 45 figs., 4 tables, 1974, Reprinted 1987.

GB 3: Pennsylvanian conodont localities in northeastern Ohio, by G.K. Merrill, 25 p., 5 figs., 2 tables, 2 pls., 1974.

GB 15: Sedimentology and provenance of Carboniferous and Permian rocks of Athens County, southeastern Ohio, by G.C. Nadon, E.H. Gierlowski-Kordesch, and J.P. Smith, 23 p., 22 figs., 1998.

GB 18: Pennsylvanian Sharon Formation, Past and Present: Sedimentology, Hydrogeology, and Historical and Environmental Significance A.M. Foos, editor, 93 p., 58 figs., 15 tables, 13 pls., 2004. A field guide to Gorge Metro Park, Virginia Kendall ledges in the Cuyahoga Valley National Recreation Area, and other sites in Northeastern Ohio.

OF 92-558: Regional aspects of Pottsville and Allegheny stratigraphy and depositional environments, Ohio and Kentucky, by C.L. Rice, R.L. Martino, and E.R. Slucher, U.S. Geological Survey Open-File Report 92-558, 67 p., 33 figs., 1 chart. Guidebook prepared for the 1992 national meeting of the Geological Society of America in Cincinnati, Ohio.

Ohio Geological Survey Educational Leaflet (EL)

Available by mail or PDF from the Ohio Geological Survey

EL 8: Coal

Ohio Geological Survey GeoFacts (GF)

Available by mail or PDF from the Ohio Geological Survey

GF 14: History of Coal Mining in Ohio

GF 15: Coal Mining and Reclamation

GF 16: Coal and Electricity

Ohio Geological Survey Bulletin (B)

Available by mail from the Ohio Geological Survey

B 71: Pennsylvanian cephalopods of Ohio, Part 1, Nautiloid and bactritoid cephalopods, by M.T. Sturgeon, D.L. Windle, R.H. Mapes, and R.D. Hoare; Part 2, Ammonoid cephalopods, by R.H. Mapes, D.L. Windle, M.T.

PENNSYLVANIAN INFORMATION (cont.)

Sturgeon, and R.D. Hoare. 260 p., 45 figs., 34 tables, 54 pls., 1997. Note: Most of the collecting localities listed in B 71 have yielded a diverse assemblage of marine invertebrates and some fishes. Although many of the localities may no longer be accessible, some of them have produced excellent fossils for decades. **Most of these localities are on private property and permission of the landowner must be obtained.** Fossil cephalopods are not common; they are among the specimens most highly prized by collectors.

Field Trip from Geological Society of America (GSA) Decade of North American Geology, Volume 3 (North-Central Section, 1987)

Available by mail from the Ohio Geological Survey

GSA Reprint No. 94: Wellsville Hill: exposures in the Pennsylvanian Allegheny and Conemaugh Groups of eastern Ohio.

GSA Reprint No. 95: Black Hand Gorge State Nature Preserve: Lower Mississippian deltaic deposits in east-central Ohio.

GSA Reprint No. 96: Flint Ridge, Ohio: Flint facies of the Pennsylvanian Vanport Limestone.

Field Trip from Geological Society of America (GSA) Decade of North American Geology, Volume 6 (Southeastern Section, 1986)

Available from GSA

Burning Springs Anticline, West Virginia, Filer, J.K.: Geological Society of America Decade of North American Geology (Southeastern Section, 1986) v. 6, n. 12, p. 55-58. Trip site is located on U.S. Route 50 east of Parkersburg, West Virginia.

Ohio Journal of Science PDFs

An Overview of the Upper Carboniferous Fossil Deposit at Linton, Ohio (1988), R.W. Hook and Donald Baird, Ohio Journal Science, v. 88, n. 1, p. 55-60. PDF:

Physiographic Features of Southeastern Ohio (1938), Wilber Stout and G.F. Lamb, Ohio Journal of Science, v. 38, n. 2, pp. 49-83. PDF:

Alluvial Architecture of the Early Pennsylvanian Sharon Formation in Northeastern Ohio (2002), D.J. Ninke and J.E. Evans, Ohio Journal of Science, v. 102, n. 4, p. 70-81. PDF:

State Park

No fossil collecting is permitted at Nelson-Kennedy Ledges State Park. However, the park provides opportunities for an up-close examination of bedrock exposures and glacial geology.

Nelson-Kennedy Ledges State Park: Contact: c/o Punderson State Park, P.O. Box 338, Newbury, Ohio 44065, (440) 564-2279. Article on Nelson-Kennedy Ledges:

PERMIAN INFORMATION

Ohio Geological Survey Guidebook (GB)

Available by mail from the Ohio Geological Survey

GB 15: Sedimentology and provenance of Carboniferous and Permian rocks of Athens County, southeastern Ohio, by G.C. Nadon, E.H. Gierlowski-Kordesch, and J.P. Smith, 23 p., 22 figs., 1998.

Ohio Geological Survey Bulletin (B)

Available by mail from the Ohio Geological Survey

B 73: Geology of the Dunkard Group (Upper Pennsylvanian-Lower Permian) in Ohio, West Virginia, and Pennsylvania, by W.D. Martin, 49 p., 30 figs., 2 tables, 1998.

PENNSYLVANIAN INFORMATION (cont.)

GLACIAL GEOLOGY OF OHIO**Ohio Geology—Newsletter of the Ohio Geological Survey**

Available as PDF from the Ohio Geological Survey

Winter 1992: Bestiary of Pleistocene vertebrates in Ohio

Spring 1992: Indian Trail Caverns—a window on Ohio's Pleistocene bestiary

Ohio Geological Survey Guidebooks (GB)

Available by mail from the Ohio Geological Survey

GB 10: The Sangamonian-Wisconsinan transition in southwestern Ohio and southeastern Indiana, by R.D. Hall and others, 38 p., 28 figs., 3 tables, 1992.

GB 16: Quaternary geology along the eastern margin of the Scioto Lobe in central Ohio, by T.A. Frolking and J.P. Szabo, 40 p., 26 figs., 7 tables, 1998.

GB 20: Quaternary geology of the interlobate area between the Cuyahoga and Grand River lobes, north-eastern Ohio, by J.P. Szabo, 2006.

Ohio Journal of Science PDF

A Field Guide: The Kelleys Island Glacial Grooves, Subglacial Erosion Features on the Marblehead Peninsula, Carbonate Petrology, and Associated Paleontology (1991), R.S. Snow, T.V. Lowell, and R.F. Rupp, Ohio Journal of Science, v. 91, n. 1, p. 16-26. PDF: . Note: Possession of guide does not give nor grant permission/access to collect fossils. Fossil collecting is not permitted on the public lands of the Ohio Lake Erie islands.

Field Trip from Geological Society of America Decade of North American Geology, Volume 3 (North-Central Section, 1987)

Available by mail from the Ohio Geological Survey

GSA Reprint No. 98: Hueston Woods State Park: Wisconsinan glacial stratigraphy in southwestern Ohio.

General Glacial Information

Available by mail or PDF from the Ohio Geological Survey

EL 7: Ice Ages in Ohio

Natural Areas and Preserves

Cedar Bog Nature Preserve: ODNR, Division of Natural Areas and Preserves, (614) 265-6453. For additional information, call the Ohio Historical Society at (937) 434-3744, (800) 860-0147; or contact The Cedar Bog Association (non-state agency) .

Siegenthaler-Kaestner Esker State Nature Preserve: ODNR, Division of Natural Areas and Preserves, (614) 265-6453. Preserve contains glacial landforms including eskers, kames, an outwash valley, and kettle ponds.

SERPENT MOUND IMPACT FEATURE**Ohio Geological Survey Report of Investigation (RI)**

Available by mail from the Ohio Geological Survey

RI 146: Subsurface geology of the Serpent Mound disturbance, Adams, Highland, and Pike counties, Ohio, by M. T. Baranoski, G. A. Schumacher, D. R. Watts, R. W. Carlton, and B. M. El-Saiti, 60 p., 26 figs., 5 tables, 3 pls., 2003.

GLACIAL GEOLOGY OF OHIO (cont.)

Field Trip from Geological Society of America (GSA) Decade of North American Geology, Volume 3 (North-Central Section, 1987)

Available by mail from the Ohio Geological Survey

GSA Reprint No. 100: The Serpent Mound disturbance, south-central Ohio.

ROCK SHELTER CAVES IN OHIO

Southeastern Ohio is home to spectacular geomorphic features known as recess or rock shelter caves, such as Ash Cave. The online article, *Sculptures in Stone*, describes how these caves form and provides the locations for some of the more prominent caves in Ohio: . Contact: ODNR, Division of Parks and Recreation, 2045 Morse Road, Bldg. C, Columbus, Ohio 43229-6693, (614) 265-6300, for information about the availability of this article in printed form.

WATERFALLS IN OHIO

National Park

Brandywine Falls, Buttermilk Falls, and Blue Hen Falls: Located in Cuyahoga Valley National Park, Cuyahoga Valley National Park, 15610 Vaughn Road, Brecksville, Ohio 44141, (216) 524-1497, (800) 445-9667, fax (440) 546-5989.

State Parks

With the exception of its northwest corner, Ohio has numerous parks with waterfalls to visit. The online article, "Waterfalls in Ohio's Parks," describes several of these waterfalls: . Contact the ODNR, Division of Parks and Recreation, 2045 Morse Rd; Bldg. C, Columbus, Ohio 43229-6693, (614) 265-6300 for information about availability of this article in printed form.

Natural Areas and Preserves

Contact the ODNR, Division of Natural Areas and Preserves, (614) 265-6453, or the appropriate agency for information on the following waterfalls:

Rockbridge Falls:

Halls Creek Nature Preserve:

Greenville Falls:

Greenville Falls is also managed by the Miami County Park District: (937) 335-6273.

City Parks

Hayden Run Falls, a City of Columbus park

For information, contact Columbus Parks and Recreation, 420 W. Whittier Street, Columbus, Ohio 43215, (614) 645-3300,. Hayden Run Falls is located between Riverside Drive and Dublin Road in Columbus, for additional information.

Chagrin Falls Triangle Park

For information, contact the City of Chagrin Falls, 21 W. Washington Street, Chagrin Falls, Ohio 44022, (440) 247-5050, or their Information Line: (440) 247-3379, fax (440) 247-1510.

Cuyahoga Falls

For information, contact the City of Cuyahoga Falls Parks and Recreation Office at (330) 971-8225.

Cascade Park, home of East and West Falls of Black River

For information, contact the City of Elyria at (440) 365-7101, fax (440) 366-1739. Cascade Park is located at Cascade Park Drive and Washington Avenue.

Mill Creek Falls, located in the Garfield Park Reservation

For information, contact Cleveland Metroparks, 4101 Fulton Parkway, Cleveland, Ohio 44144, (216) 635-3200, fax (216) 635-3286, TTY: (216) 351-0808

The Cascades Waterfall, West Milton, Ohio: Located behind what used to be the West Milton Inn (now a furniture store) at the corner of State Route 571 and State Route 48.

Overlook Park Falls, West Milton, Ohio

NATURAL ARCHES AND BRIDGES IN OHIO

Ohio has twelve known natural arches and bridges: Spring Creek Arch, Miller Sanctuary Arch, and Miller Sanctuary Natural Bridge in Highland County; Rockbridge and Rockhouse in Hocking County; Greenville Falls Arch in Miami County; Needle's Eye in Ottawa County; Raven Rock Arch in Scioto County; and Ladd Natural Bridge and Irish Run Natural Bridge in Washington County.

The ODNR, Division of Natural Areas and Preserves manages all of the sites. For information, contact them at 2045 Morse Road, Bldg. F-1, Columbus, Ohio 43229-6693, (614) 265-6453.

KARST FEATURES IN OHIO

Ohio's Karst Map**Sinkholes and Karst Geohazards*****Ohio Geology*—Newsletter of the Ohio Geological Survey**

Available as PDF from the Ohio Geological Survey

1999 No. 2: Mapping Ohio's karst terrain

Ohio Journal of Science PDF

The limestone caves and caverns of Ohio (1926), G.W. White: Ohio Journal of Science, v. 26, n. 2, pp. 73-116. PDF:

Cave and Cavern Tours in Ohio

Ohio has no state-operated karst cave or cavern tours. The following links are websites of various commercially operated tourist caves and caverns located in Ohio. The Ohio Geological Survey does not endorse any of the following cave and/or cavern tour operators and only provides seasonal operation information (not information for year-round tours). For more information, please contact the operators at the individual cave tour locations listed.

Seneca Caverns: (419) 483-6711. Caverns are open every day from Memorial Day through Labor Day. Open Saturdays and Sundays only from the beginning of May to Memorial Day and after Labor Day to mid-October. Geology of Seneca Caverns, Seneca County, Ohio (1990), L.C. Ruedisili, G.E. Kihn, and R.C. Bell: Ohio Journal of Science, v. 90, n. 4, pp. 106-111. PDF:

Perry's Cave: (419) 285-2405

Ohio Journal of Science PDFs

Caves in the Lake Erie's Islands (1953), J.L. Verber and D.H. Stansbery: Ohio Journal of Science, v. 53, n. 6, pp. 358-362. PDF:

The origin of the caves at Put-in-Bay, Ohio (1919), K. Cottingham: Ohio Journal Science, v. 20, n. 2, pp. 38-42. PDF:

Indian Trail Caverns: (419) 387-7773. The caverns are open from 1:00 to 5:00 p.m. on weekends from Memorial Day through Labor Day. Group tours are available from April through October.

Ohio Caverns: (937) 465-4017

Heineman's Winery Crystal Cave: (419) 285-2811. Tours are offered seven days each week from early May to late September.

Olentangy Indian Caverns: (740) 548-7917. Tours offered April through October, 9:30 a.m. to 5:00 p.m.

Zane Shawnee Caverns and Museum: (937) 592-9592

OHIO NATURAL HISTORY MUSEUMS

Adams County

Serpent Mound State Memorial, 3850 State Route 73, Peebles, Ohio 45660, (937) 587-2796, (800) 752-2757. The museum contains exhibits of the effigy mound and the geology of the surrounding area.

Canton

William McKinley Presidential Library and Museum, 800 McKinley Monument Drive NW, Canton, Ohio 44708, (330) 455-7043, fax (330) 455-1137. Hands-on Interactive Science Center.

Cincinnati

Cincinnati Museum Center at Union Terminal,

Cincinnati Natural History Museum, 1301 Western Avenue, Cincinnati, Ohio 45203, (513) 287-7000, (800) 733-2077, TTY (800) 750-0750.

Durrell Museum, University of Cincinnati, Department of Geology, P.O. Box 210013, Cincinnati, Ohio 45221-0013, (513) 556-3732, fax (513) 556-6931. Museum Tour by appointment only: (513) 556-4530.

Cleveland

The Cleveland Museum of Natural History, 1 Wade Oval Drive University Circle, Cleveland, Ohio 44106-1767, (216) 231-4600, (800) 317-9155

Great Lakes Science Center, 601 Erieside Avenue, Cleveland, Ohio 44114, (216) 694-2000

Columbus

Orton Geological Museum, The Ohio State University, School of Earth Sciences, 155 South Oval Mall, Columbus, Ohio 43210-1398, (614) 292-6896.

Ohio Historical Center, 1982 Velma Avenue, Columbus, Ohio 43211, (614) 297-2300, fax (614) 297-2358, Group Tours (614) 297-2266, Archives-Library (614) 297-2510. The Center has exhibits that explore five themes of Ohio's natural history: plants, animals (including the Conway Mastodon), geology, geography, and climate.

Dayton

Boonshoft Museum of Discovery, 2600 DeWeese Parkway, Dayton, Ohio 45414, (937) 275-7431 fax (937) 275-5811

Killbuck

Killbuck Valley Museum (Holmes County Historical Museum), Front Street, Killbuck, Ohio 44637, (330) 377-4572. Museum features the natural and cultural history of the Killbuck Valley Area. Exhibits include mastodon bones, rocks, minerals, and the history of mill stones production and use.

Marietta

Ohio River Museum, 601 Second Street, Marietta, Ohio 45750, (740) 373-3750 (Campus Martius Museum) or (800) 860-0145. The Ohio River Museum displays the natural history, origin, and ecology of the Ohio River.

Newark

The Works: Ohio Center for History, Art, and Technology (a Smithsonian Institution Affiliate), P.O. Box 721, 55 South First Street, Newark, Ohio 43058, (740) 349-9277, fax (740) 345-7252. Museum has displays about local geology, glassmaking, and the Pure Oil Company.

Oxford

Karl E. Limper Geology Museum (Miami University), (513) 529-3220 or the Department of Geology office (513) 529-3216

Springfield

Geology Learning Center, Wittenberg University, Department of Geology, P.O. Box 720, 200 West Ward Street, Springfield, Ohio 45501-0720, (937) 327-6231, (937) 327-7335, (800) 677-7558, fax (937) 327-6340. A small museum designed to encourage student research.

Youngstown

The Clarence R. Smith Mineral Museum, Youngstown State University, Department of Geological & Environmental Sciences, 2120 Moser Hall, Youngstown State University, One University Plaza, Youngstown, Ohio 44555, (330) 941-3612, fax (330) 941-1754. The museum, managed by the geology department, is located in the atrium of Moser Hall.

Zanesville

National Road / Zane Grey Museum, 8850 East Pike, Norwich, Ohio 43767, (740) 872-3143 or (800) 752-2602

OHIO OIL AND GAS MUSEUMS AND EXHIBITS

Ohio Oil and Gas Energy Education Program

For information about the Ohio Oil and Gas Energy Education Program, contact: Rhonda Reda, Executive Director, P.O. Box 187, Granville, Ohio 43023, (740) 587-0410, fax (740) 587-0446. Office: 1718 Columbus Road SW, Granville, Ohio 43023

Bowling Green

Wood County Historical Center and Museum, 13660 County Home Road, Bowling Green, Ohio 43402, (419) 352-0967, fax (419) 352-6220. See the Crude Oil Production display at the Wood County Museum in Bowling Green.

Findlay

Hancock Historical Museum, 422 West Sandusky Street, Findlay, Ohio 45840, (419) 423-4433, fax (419) 423-2154. Museum has exhibits on Findlay's oil boom and geology.

Lima

The Allen County Museum, 620 West Market Street, Lima, Ohio 45801, (419) 222-9426, fax (419) 222-0649. Museum has exhibits relating to Lima's oil boom period.

Newark

The Works: Ohio Center for History, Art, and Technology (a Smithsonian Institution Affiliate), P.O. Box 721, 55 South First Street, Newark, Ohio 43058, (740) 349-9277, fax (740) 345-7252. Museum has displays about local geology, glassmaking, and the Pure Oil Company.

Shreve

Ken Miller Supply's Oil, Gas, Car & Truck Museum. Tour arrangements upon request: (330) 264-9146 or (330) 263-7890.

OHIO INDUSTRIAL MINERAL AND COAL MUSEUMS

Amherst

Amherst Historical Society Quigley and Sandstone Museum Center, 113 South Lake Street, Amherst, Ohio 44001, (440) 988-7255, fax (440) 988-2951. Museum preserves the history of the "Sandstone Center of the World" and the history of quarries in the greater Cleveland area.

Cadiz

Harrison County History of Coal Museum, 200 East Market Street, Cadiz, Ohio 43907-1214, (740) 942-2623. Harrison Coal & Reclamation Historical Park (HCRHP), P.O. Box 403, Cadiz, Ohio 43907, (740) 942-2602.

Caldwell

The Big Muskie Bucket and Miners Memorial Park, west of Caldwell in Noble County. This park is a good example of coal reclamation and successional land use.

Little Cities of Black Diamonds

Little Cities of Black Diamonds Council, P.O. 128, Shawnee, Ohio 43782, (740) 394-3011, (866) 394-3011. This is a collection of cities that feature information and history about mining in southeastern Ohio.

OHIO CERAMICS AND BRICK MUSEUMS

East Liverpool

The Museum of Ceramics, 400 East Fifth Street, East Liverpool, Ohio 43920, (330) 386-6001, (800) 600-7180.

Roseville

National Ceramic Museum & Heritage Center, 7327 Ceramic Road NE, Roseville, Ohio 43777, (740) 697-7021, fax (740) 697-0246

OHIO NATURAL HISTORY MUSEUMS (cont.)

OHIO GLASS MUSEUMS**Caldwell**

Baker Glass Museum and Antique Gallery, 805 Cumberland Street, Caldwell, Ohio 43724, (740) 732-6410

Cambridge

The National Museum of Cambridge Glass, 136 South Ninth Street, Cambridge, Ohio 43725, (740) 432-4245. Tour groups are accepted during additional hours by making arrangements with the museum. Open April through October, Wednesday - Saturday from 9:00 a.m. to 4:00 p.m. and Sunday from noon to 4:00 p.m.

Lancaster

Ohio Glass Museum and Gift shop, 126 W. Main Street, Lancaster, Ohio 43130, (740) 687-0101. Museum features exhibits on glass, oil, and gas.

Marietta

Glass Pass. The Glass Pass is a unique discount package that can be used at nine historic glass attractions. Contact the Marietta Convention and Visitor Bureau, 121 Putnam Street, Marietta, Ohio 45750: (740) 373-5178, (800) 288-2577.

Glass attractions participating in the pass include: The Fenton Art Glass Factory & Museum in Williamstown, WV; Fostoria Glass Museum in Moundsville, WV; The Duncan & Miller Glass Museum in Washington, PA; Baker Family Museum in Caldwell, OH; The National Museum of Cambridge Glass in Cambridge, OH; Degenhart Paperweight & Glass Museum in Cambridge, OH; The National Heisey Glass Museum in Newark, OH; The Works: Ohio Center for History, Art & Technology in Newark, OH; and the National Imperial Glass Museum in Bellaire, OH.

Newark

The Works: Ohio Center for History, Art, and Technology (a Smithsonian Institution Affiliate), P.O. Box 721, 55 South First Street, Newark, Ohio 43058, (740) 349-9277, fax (740) 345-7252. Museum has displays about local geology, glass making, and the Pure Oil Company.

EARLY IRON PRODUCTION IN OHIO

Read about Ohio's Iron Age on the Ohio Department of Natural Resources' website,

Wellston

Buckeye Furnace, 123 Buckeye Park Rd. T-167, Wellston, Ohio 45692, (614) 297-2457, (800) 686-1534

Youngstown

Youngstown Historical Museum of Industry and Labor, P.O. Box 533, Youngstown, Ohio 44501, (330) 743-5934, (800) 262-6137. Museum provides a dramatic overview of the impact of the iron and steel industry on Youngstown and other Mahoning Valley communities.

FLINT MUSEUM**Glenford**

Flint Ridge State Memorial, 7091 Brownsville Road S.E., Glenford, Ohio 43739, (740) 787-2476, (800) 283-8707.

OHIO OIL AND GAS MUSEUMS AND EXHIBITS (cont.)

OHIO TOURISM INFORMATION**Ohio Department of Development, Division of Travel and Tourism:**

P.O. Box 1001, Columbus, Ohio 43216-1001, (800) BUCKEYE [(800) 282-5393]

Discover Ohio: www.discoverohio.com/

Travel Ohio: <http://www.travelohio.com/>

ROADSIDE GEOLOGY OF OHIO, FIRST EDITION***Roadside Geology of Ohio*****Available by mail from the Ohio Geological Survey**

Authored by Dr. Mark J. Camp of the University of Toledo Department of Environmental Sciences and available as a 416-page, 6 x 9 inch paperback book. Mountain Press Publishing can be contacted at (800) 234-5308.

From the publisher:

Ohio's geology reveals a rich story of the ancient landscapes and animals—foot-long clams, massive meat-eating reptiles, and lumbering mammoths—that existed thousands to hundreds of millions of years ago. Fluctuating seas full of marine life, widespread floodplains and rivers choked with sediment, and mile-thick ice sheets all shaped Ohio's present landscape. However, Ohio's geologic tale has a human side too. Native Americans used Ohio's flint to fashion razor-sharp spear points; oil, gas, and coal fueled several economic booms; sandstone and limestone became the building stones of communities and thriving economies throughout the state.

Roadside Geology of Ohio contains 25 road guides, complete with 59 maps and figures and 172 photographs, covering one corner of the state to the other—from the flat till plains of the west to the hilly eastern Allegheny Plateau, and from the Ohio River Valley to the Lake Erie shoreline. Mark Camp clearly explains how caverns and disappearing streams form in karst terrain; why mud cracks, ripple marks, and cross-bedded layers are entombed in sedimentary rock; and how grooves up to 10 feet deep were gouged into the limestone of Kelleys Island. *Roadside Geology of Ohio* thoroughly reveals the Buckeye State's fascinating and dynamic geology.

