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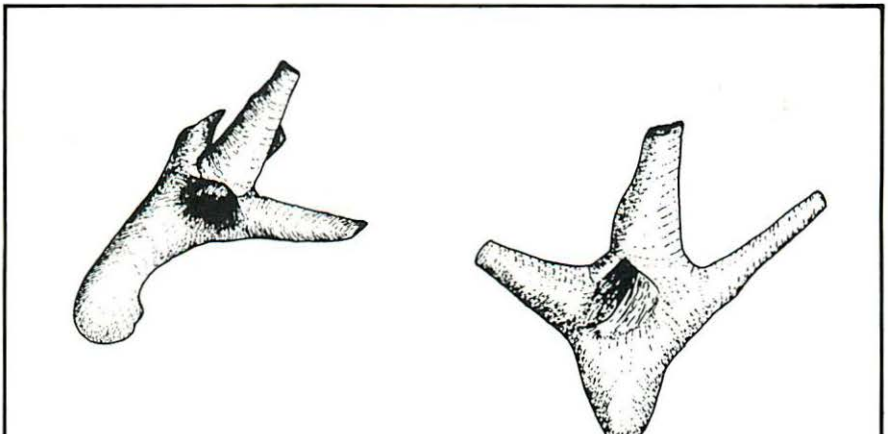

COMMONWEALTH OF PENNSYLVANIA
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TOPOGRAPHIC AND GEOLOGIC SURVEY
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CONTENTS

ON THE COVER

Bulbous holdfasts of the crinoid *Ancyrocrinus* from the "garden" beds at the Swope pit, near Turbotville in Northumberland County. These rootlike structures anchored the crinoids to the substrate. For further details concerning these and other fossils at the Swope pit, see the article on page 7. Sketch by John G. Kuchinski.

PENNSYLVANIA GEOLOGY

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VOL. 24, NO. 1 **SPRING 1993**

STATE GEOLOGIST'S EDITORIAL

In Our Own Back Yard
(the Status and Future of Geologic Mapping)

Nearly a decade ago, the Board on Earth Sciences of the National Research Council (NRC) began to examine the geologic mapping program of the U.S. Geological Survey and to assess the future needs of geologic mapping in our nation. Geologic mapping, originally oriented toward discovery of mineral resources, now provides the basic data used for most wise human interactions with our earth. Determining the location of groundwater resources and finding suitable sites for development and waste repositories are but a few of the many examples that can be cited in which geologic mapping is critical to making proper decisions. The results of the NRC studies, published by the National Academy of Sciences, were troubling in that they concluded that no national program existed to address the clearly evident and increasing need of users for large-scale (i.e., detailed) geologic maps from which informed land management decisions could be made. Further, it was found that only about 20 percent of the nation's surface is mapped to an accuracy and scale presently needed. This situation has come about even though geologic maps have long been recognized as "rank[ing] with mathematical equations as being amongst the most effective ways ever devised of conveying vast amounts of special information in a minimum amount of space" (John C. Reed, Jr., *Geotimes*, June 1989, p. 6) . Geologic maps, however, require long periods of physical exertion, extensive data measurements, and synthesis. Publishing the results of these efforts is necessarily slow and generally results in fewer numbers of reports than other styles of geologic research, thereby reducing its attractiveness to geologists seeking rapid academic or professional recognition.

The USGS responded to the Academy's published reports by establishing a federal program for geologic data acquisition and a cooperative program (COGEOMAP) with state geological surveys. It was recognized that any national geologic mapping program must include the efforts of state geological surveys, which have historically prepared geologic maps as one of their principal activities. Unfortunately, federal funding for these efforts never fully addressed national needs; geologic mapping remains at inadequate levels in our nation.

Spearheaded by the member Surveys of the Association of American State Geologists and in cooperation with numerous national, geological, environmental, and mineral-resource organizations

(continued on page 6)

TELL-TALE TALCS–
Chemical Clues to Unravel the Earth's Secrets

by Robert C. Smith, II
Pennsylvania Geological Survey

While searching for mineral resources along the Susquehanna River, Lancaster County, during January 1989, the tell-tale orange color of soil derived from ultramafic and mafic rocks was observed. This color was detected at the contact of the Cardiff Conglomerate and the Peters Creek Formation on the southeastern side of an enigmatic bedrock configuration known as the Peach Bottom structure in the Piedmont physiographic province (Figure 1). Within several minutes, a 2-m- (7-ft-) thick zone of noneconomic talc-magnesite schist was uncovered with a shovel (this tool being at least as useful as a hammer in the Piedmont) and was channel sampled. Knowing of Charles Behre's (1933) hypothesis that the Peach Bottom structure is a syncline, a folded bedrock structure in which rocks seen on one side might also be found on the opposite side, an attempt was immediately made to confirm the presence of a similar section on the northwest side of the structure. There, a few tens of meters above the level of the railroad tracks, a small, more subtle area of orange-colored soil containing a few small talc chips was detected. Using a bit more effort because of the defending tree roots, the tell-tale area on the northwestern side was exposed and also channel sampled. Mineralogic and lithologic similarity between these rocks and those originally exposed on the southeastern side provided circumstantial evidence that they are genetically related. As the analyses of the two samples ("Peach Bottom Southeast" and "Peach Bottom Northwest") reveal (Table 1), there is a tale to be told. Although this certainly is not the last of the tales to be told here, it is desirable to share this data with others so they can decide if a "tall tale" is being told.

Talc can form by the alteration of at least three different rock types: ultramafic rocks, mafic rocks, and dolomitic rocks. Samples from the two Peach Bottom talc occurrences were compared chemically with talc samples from three other occurrences in the area, because geochemistry can help one to determine the kind of rock from which each was derived. Surprisingly, the very high chromium and nickel contents (Table 1) of the five samples suggest that *all* were derived from ultramafic rocks! This is not a surprise for the "Scout

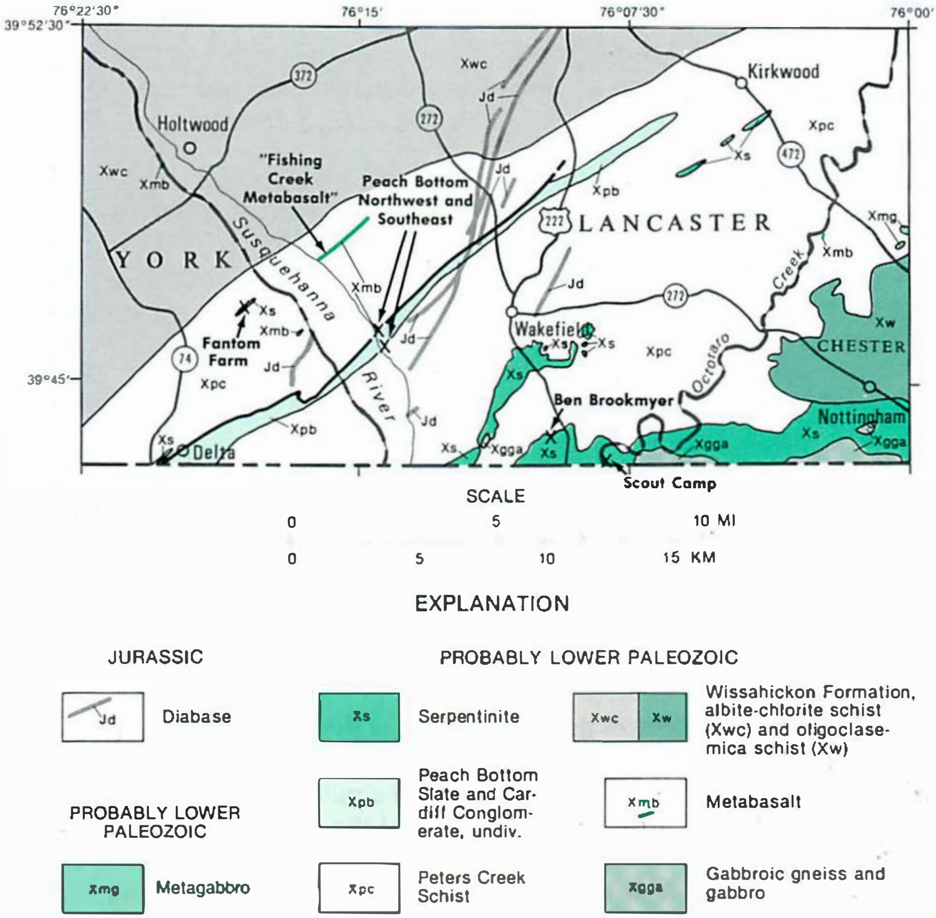

Figure 1. Geologic map of part of southeastern Pennsylvania (modified from Berg and others, 1980) showing the locations of sampled talcs.

Camp" sample (Figure 1), which is from a shear zone near the serpentinite-pyroxenite contact within the Baltimore Mafic Complex. Nor was it a surprise for the "Ben Brookmyer" sample, which is from a potentially commercial talc prospect in serpentinite in what a talc miner would term a "blackwall" setting, near the north margin of the Baltimore Mafic Complex. The surprise was the "Fantom Farm" occurrence, which is on apparent regional strike with a recently rediscovered metabasalt horizon, and which might, therefore, be expected to have been derived from mafic rocks. We shall return to the case of the "Fantom Farm" shortly.

Table 1. *Composition of Some Talc Channel and Composite Chip Samples*

(All values are in parts per million; 10,000 parts per million equals 1 percent)

	Peach Bottom Northwest, Lancaster County	*Peach Bottom Southeast, Lancaster County*	*Fantom Farm, York County*	*Scout Camp, Chester County*	*Ben Brookmyer, Lancaster County*
Ba	10	10	<10	<10	<10
Co	100	100	70	70	50
Cr	1,500	2,000	2,000	2,000	1,500
Fe	50,000	30,000	15,000	15,000	15,000
Mn	700	1,000	150	500	300
Mo	2	2	<2	<2	<2
Ni	1,500	1,000	1,500	1,500	1,500
Sc	20	20	<10	<10	<10
Ti	3,000	2,000	50	<20	30
V	70	100	20	10	10
Y	20	50	<10	<10	<10
Zr	50	20	<20	<20	<20

From the similarity of the composition of the Peach Bottom Northwest and Peach Bottom Southeast samples, it seems likely that they were either from the same or an extremely similar body, even though they were collected from opposite sides of the Peach Bottom structure. This suggests that Behre was, at least in part, correct. Based on the somewhat elevated contents of the elements Ba, Mo, Sc, Ti, V, Y, and Zr, it is inferred that the ultramafic parent of the talc could have somehow interacted with or possibly assimilated a small amount of basalt or some other continental or island-arc material. These observations, together with the fact that ultramafic rocks, especially talc, tend to become the foci of faults, suggest that the basal Peach Bottom talc (and perhaps related serpentinite bodies, such as the larger one near Delta) constitute the slippery surface or zone of weakness upon which the Cardiff Conglomerate, Peach Bottom schist (an informal unit of Behre, 1933), and Peach Bottom Slate (in ascending order) might have been thrust into the area, presumably during the Taconic orogeny approximately 450 million years ago. According to this hypothesis, the Peach Bottom thrust would have been folded into a syncline somewhat later. This synclinal aspect is not very surprising in view of the circumstantial evidence that the Arvonia and Quantico synclines of Virginia contain rocks that have a lithologic sequence similar to those at Peach Bottom. Thus, the rocks within the Peach Bottom structure in this area are probably younger than those both immediately to the northwest and southeast. By analogy to rocks in the Arvonia and Quantico structures, the clastic rocks within the Peach Bottom structure might also be of Ordovician age.

Meanwhile, back at the "Fantom Farm" talc occurrence, apparently conflicting evidence presented itself in the form of an ultramafic pod, which was later transformed into talc, along the regional strike of a recently rediscovered mafic body, herein informally called the "Fishing Creek metabasalt" (Figure 1). The affinity of this metabasalt, which was overlooked for many years because the ink color used to depict it on Knopf and Jonas's (1929) map closely resembled that used for more common diabase, is as yet uncertain, but the alignment of metabasalt with the northwesternmost known ultramafic pod suggests that one might be dealing with the edge of an ophiolitic mélange (A. A. Drake, Jr., personal communication, 1989) or, in other words, a mixture of various types of ocean-floor and related "sweepings." Such an edge might mark the boundary between two terranes that originated somewhat independently of each other and were later thrust together.

A complicating feature in the exposure through the Peach Bottom structure along the east shore of the Susquehanna River is an apparent 3.6-m- (11.8-ft-) wide mylonitic fault zone at Behre's (1933) contact between Peach Bottom Slate on the northwest and Peach Bottom schist on the southeast. The material in this apparent fault zone consists of ultrafine-grained, sheared insoluble residue that is now composed of dark mica and "carbon," and rounded, milky quartz balls that are extremely deformed internally. It is suggested that the quartz might have come from veins of Taconic age that were later structurally ball-milled into their present, deformed, floating condition by high-angle, post-Taconic faulting. Based on this and the circumstantial evidence of a few small cross folds observed in an ocean-floor metabasalt just north of the Peach Bottom structure, it was hypothesized that this fault might be a right-lateral Alleghanian or even Acadian fault. In the presence of such evidence-concealing structures that are only vaguely understood by the present author, the trail to any ore deposits, the original purpose for looking at these outcrops, is expected to be very faint.

Geochemistry is but one of the tools available to the geological sleuth. When used cautiously in combination with other observations, geochemistry can not only help to find economic ore deposits within the earth's crust (Rose and others, 1979), but, as we have seen here, also help unravel the depositional, tectonic, mineralogic, and lithologic setting of many kinds of rocks (Turekian and Wedepohl, 1961). Using similar techniques, other metabasalts in southeastern Pennsylvania are being studied in the hope of grouping them according to their affinities and economic potential. Because most of the easily discovered metallic and nonmetallic ore deposits have already been found, one should consider as many types of geological clues as are available in searching for additional deposits. Until such investigations are carried out, many big mysteries will remain unsolved.

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In Our Own Back Yard *(continued from page 1)*

and the U.S. Geological Survey, efforts were made to establish a federally authorized *and* funded national geologic mapping program. On May 18, 1992, President Bush signed Public Law 102-285, the National Geologic Mapping Act, which authorizes and sets funding limits for national activities related to geologic mapping. With this law, our country can now begin to address national needs for detailed geologic data that will become increasingly critical as our population grows and demands greater use of the available land surface and subsurface resources, both water and mineral.

Should funding be provided, successful implementation of this act will require cooperation from the entire national geologic community. Students need to be taught the value and process of geologic mapping; surveys (federal and state) need to support geologic mapping and to devise methods of rapid transfer of data and syntheses to users; users need to support efforts to provide the resources that will be required to address this national need. As with many present national problems, the solution will require long-term labors in "our own back yards." Our nation and the geologic community need to make a commitment to long-term geologic mapping goals if the citizens of future generations are to possess the basic data that will allow use of our earth in a responsible manner.

Donald M. Hoskins

Donald M. Hoskins
State Geologist

Sea Lilies, Corals, and Lamp Shells in a Fossilized Devonian "Garden," Northumberland County, Pennsylvania

by William E. Kochanov and Jon D. Inners
Pennsylvania Geological Survey

Throughout central Pennsylvania, the Middle Devonian Mahantango Formation has long been known for the abundance and diversity of its invertebrate fossils. In fact, nearly 40 percent of the fossil sites listed for central and eastern Pennsylvania in *Fossil Collecting in Pennsylvania* (Hoskins and others, 1983) are in this formation. Even in the Mahantango, however, exposures of fossiliferous bedrock are often elusive. New roadcuts and borrow pits may yield only a few poorly preserved fossils in a mountain of rock. Once in a while, however, the collector gets lucky and finds an exposure where the fossils are many and the preservation is excellent. And once in a great while, a site is discovered that yields highly unusual or rarely preserved fossils. Such was the experience of the senior author while searching for trilobites in the Turbotville area of Northumberland County. Almost inadvertently, he stumbled upon an abandoned Mahantango shale pit containing an abundance of well-preserved invertebrate fossils in association with excellent specimens of the stony "roots" of sea lilies, or crinoids. In short, he had found the fossilized remains of a 385-million-year-old Devonian "garden"!

LOCATION. The Mahantango "garden spot" is located in Lewis Township about 2 miles north of Turbotville (Figure 1; 41°7′47″N/76°45′43″W, Muncy quadrangle). To reach the site, take the Turbotville exit off Interstate Route 180 and travel on Pa. Route 54 east towards Turbotville. Drive approximately 1 mile, turn north on SR (State Route) 1011 (Warrior Run Road), proceed about 1.4 miles, and turn east on SR 1010. The borrow pit lies on the north side of the road, approximately 0.2 mile from this last intersection. There is room to park one or two vehicles on the floor of the pit.

Collecting at the site is fairly easy, but be wary of a drop of about 5 feet along one side of the outcrop, and take proper safety precautions to avoid a fall. Mr. Swope of Turbotville owns the site, and he has generously given permission for individuals or groups to collect fossils there. As with all collecting sites, whether on public or private

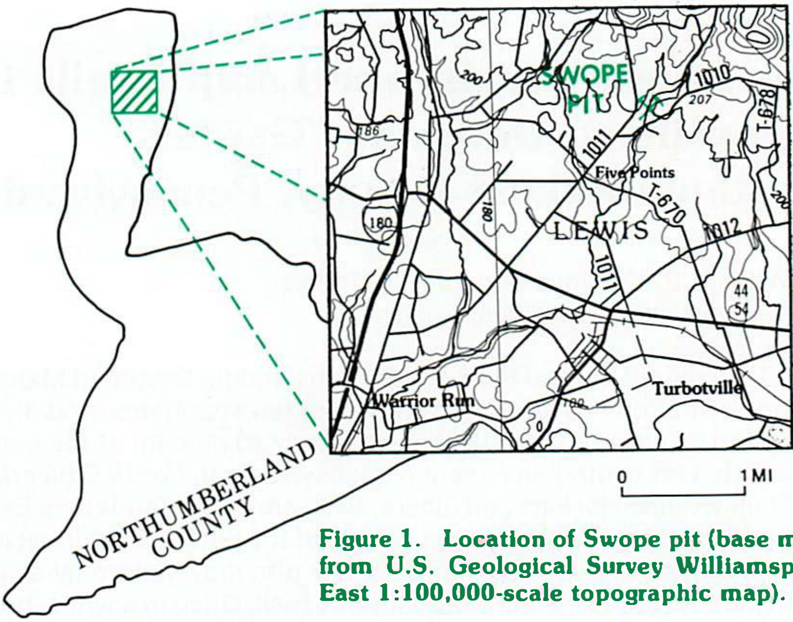

Figure 1. Location of Swope pit (base map from U.S. Geological Survey Williamsport East 1:100,000-scale topographic map).

property, please respect the rights of others. Do not litter; if you see litter, pick it up and dispose of it properly. Also, do not "over collect"—leave some fossils for others to enjoy.

STRATIGRAPHY AND DEPOSITIONAL ENVIRONMENT. The outcrop exposes part of the lower member of the Mahantango Formation (Faill, 1979). As shown on the generalized stratigraphic column (Figure 2), the rocks at the Swope borrow pit grade upward from a medium-dark-gray fissile shale to a calcareous clay shale and argillaceous limestone. The main fossil-bearing zone—the "fossil garden"—is located at the level of the first bench (Figure 3). This layer corresponds to the argillaceous limestone and calcareous clay shale highlighted in Figure 2. Fossils are also found above this bench, but they appear to be less common and confined to thin layers.

The change in lithology from fissile shale to argillaceous limestone probably reflects a transgressive or onlap period during the Middle Devonian when shorelines encroached on land and seawater deepened. The presence of crawling (trilobites), grazing (gastropods), burrowing (bivalves, worms), and filter-feeding organisms (crinoids, bryozoans, and brachiopods, or lamp shells) indicates that "optimal" environmental conditions created a variety of ecologic niches.

The variations in lithology throughout the section suggest that there was alternating deposition of terrigenous and marine (carbon-

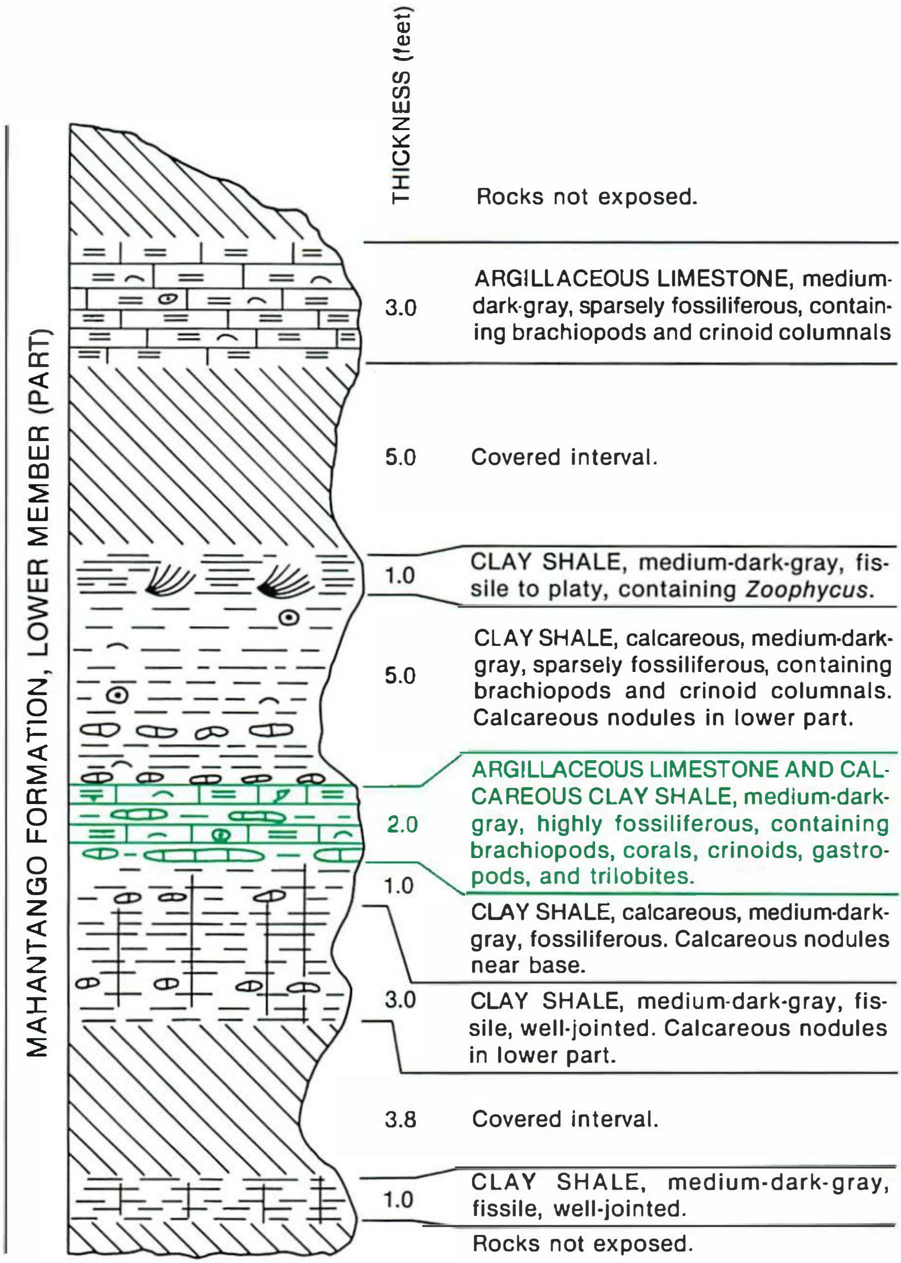

Figure 2. **Stratigraphic section (part of the lower member of the Mahantango Formation) exposed in the Swope pit. Note the position of the "fossil garden" beds, shown in color.**

Figure 3. Highly fossiliferous crinoid-coral-brachiopod beds (the "fossil garden") forming a resistant bench in the lower part of the Swope pit.

ate) muds, the marine mud becoming more common as time went on. The fine-grained sediment and the random orientation of the fossils indicate relatively quiet water. Strong currents would have given a preferred orientation to the shells of the organisms as well as remove or winnow mud from the sediment being deposited. The lack of distinct bedding partings throughout much of the exposed section is mainly due to disturbance of the substrate by burrowing organisms. (Note particularly the *Zoophycus*-swirled clay shale about 5 feet above the highly fossiliferous bed.) Only the 6 or 7 feet of fissile, thinly laminated shale exposed at the base of the section appears to be undisturbed by burrowers.

FOSSILS. Table 1 is a list of the fossils that have been identified from the Swope pit, most of which are from the beds composing the "fossil garden." Although most of the fossils occur as internal and external molds (from which the original carbonate shells have been dissolved), some of the the crinoidal fragments and corals and a few of the trilobites and brachiopods retain their calcite "skeletons." Many of the corals (both rugose and tabulate forms) can be "popped out" of the rock without falling apart. Both the outer calcite shell and the internal molds of individual brachiopods can be collected easily. Whole specimens as well as heads and pygidia ("tails") of the trilobite *Phacops rana* (Pennsylvania's official state fossil) are most common in the top foot of the first bench.

If you are careful when splitting the fossiliferous rocks, you may expose structures that appear as short, thick, tapering roots or branches (see cover). They are "roots" in the sense that they are used as anchors, or holdfasts, of crinoids. Crinoids, the sea lilies, are echinoderms and are related to starfish and sea urchins. The thick and bulbous nature of the holdfast is due to a secondary growth of

Table 1. *Invertebrate Fossils from the Swope Borrow Pit*

(Abbreviations are as follows: va, very abundant; a, abundant; c, common; unc, uncommon; r, rare. See Ellison, 1965, and Hoskins and others, 1983, for illustrations of representative specimens.)

CORALS
Tabulate
Trachypora sp., va
Favosites sp., r
Pleurodictyum styloporum (Eaton), r
Aulopora sp., c
Rugose
Heterophrentis sp., a

BRYOZOANS
Fenestella emaciata (Hall), c
Ramose type, r

BRACHIOPODS
Rhipidomella vanuxemi (Hall), c
Douvillina inaequistriata (Conrad), c
Devonochonetes scitulus (Hall), unc
Desquamatia reticularis (Linne), r
Mucrospirifer mucronatus (Conrad), unc
Mediospirifer audaculus (Conrad), c
Delthyris sculptilis Hall, unc
Ambocoella umbonata (Conrad), c
Athyris spiriferoides (Eaton), c

GASTROPODS
Bellerophontid, r
Bembexia sulcomarginata (Conrad), c

BIVALVES
Palaeoneilo constricta (Conrad), r
Modiomorpha sp., r
Cypricardella tenuistriata (Hall), r

CEPHALOPODS
Michelinoceras sp., r
Spyroceras sp., unc

TRILOBITES
Phacops rana (Green), c

CRINOIDS
Ancyrocrinus bulbosus Hall (holdfasts), c
Stems and isolated columnals, a

TRACE FOSSIL
Zoophycus sp.,* a

*Probably the feeding trace of a wormlike organism.

calcareous material around the primary root structure. These encrusting growths generally deform the primary root and give the resultant root its strange shape (Ubaghs, 1978). After careful searching, you may find the primary root structure, which appears as a series of interconnected, small crinoid columnals. (Do not confuse the root systems with the coral *Aulopora*!)

If you should find a holdfast, it probably will break in distinct sections. (This is also true of the primary root structures.) Such breakage is due to the fact that the holdfasts are composed of the mineral calcite, which has regular planes of weakness (cleavage) within its crystal structure.

The holdfast can be reconstructed, however. Collect all of the pieces and keep them together (empty 35-mm-film containers are excellent for this purpose). When you have returned home, set out all of the pieces on a table or other flat, stable surface. Determine how the pieces fit together, and then reconstruct the holdfast using glue.

Not all of the pieces may be there, but you should be able to put enough of the holdfast together to make an unusual addition to your fossil collection.

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EARTH SCIENCE TEACHERS' CORNER

The Geology of Radon: A Review

by John H. Barnes
Pennsylvania Geological Survey

The U.S. Geological Survey has published a 28-page booklet entitled **The Geology of Radon,** by James Otton. This booklet should be of particular interest to earth science teachers seeking materials to use in teaching about natural hazards, but also to residents of Pennsylvania in general because of the concern that has been raised in recent years about the potential danger of this odorless, invisible radioactive gas seeping into their homes from the ground. Although not a "how-to" booklet for people who are concerned about ridding their homes of radon, this colorfully illustrated booklet contains an interesting and lively discussion of the nature of radon, the ways in which it can enter a home, the methods that scientists use to measure it and predict its occurrence, and where one can turn for help.

The strongest points of this booklet are the discussions on the nature of radon and the ways in which it can invade a dwelling.

The author points out that, although radon is a product of the radioactive decay of uranium, its occurrence in buildings is dependent on other factors in addition to the abundance of uranium in the ground. Among these are the amount of pore space in the soil under the building, the presence of water in the pore space, and the extent to which the pore spaces are interconnected. He provides a good explanation of the methods by which radon enters a building, both by being drawn directly through the foundation and by entry through well water.

The booklet is not without a few flaws. A radioactivity map of the United States could be misleading because of the use of very generalized red lines, which could be misconstrued as boundaries of geologic provinces, to encircle areas of special interest. The Reading Prong, for example, is actually a well-defined narrow strip of granitic rock that extends from the east side of Reading toward Easton and into New Jersey. On this map, however, an area extending from Matamoras to Johnstown is incorrectly circled and labeled as "Reading Prong."

Although the section of this booklet on the use of geological studies to predict potential indoor radon problems is interesting, *we urge our readers to keep in mind that high levels of indoor radon have been reported in all parts of Pennsylvania and that the Department of Environmental Resources recommends that all residents of the state have their homes tested for the presence of radon.* Such tests are easy to perform using inexpensive charcoal-cannister or alpha-track detectors available at many stores and by mail order.

The importance of testing your home, rather than relying solely on maps that show the predicted potential for indoor radon problems in a region, is illustrated by a map in the booklet showing radon potential in three suburban counties in the Washington, D. C., area. A large area of Montgomery County, Maryland, is shown as having a moderate potential, and an adjacent large area of Fairfax County, Virginia, is shown as having a high potential. Such a difference in results that coincides with a county or state line can usually be explained by the use of different methods of study rather than by a real difference in nature. The author points out that, in fact, different methods of study were used to determine the radon potential in each of those counties. Such uncertainty in the prediction of radon potential plus the effects of differences in individual home construction that no map can account for make individual home testing the only sure way to determine whether you have a radon problem.

The Geology of Radon, by James Otton, published in 1992 as one in a series of general interest publications by the U.S. Geological Survey, is available free of charge by writing to Book and Open-File Report Sales, U.S. Geological Survey, Federal Center, Box 25425, Denver, CO 80225.

NEW PUBLICATIONS

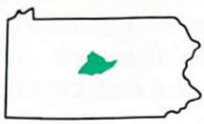
Oil and Gas Developments in Pennsylvania in 1990

The Pennsylvania Geological Survey has released Progress Report 204, **Oil and Gas Developments in 1990 with Ten-Year Review and Forecast**. The report, authored by Survey staff members John A. Harper and Cheryl L. Cozart, is the latest addition to an annual series on oil and gas developments in the state.

Topics covered for 1990 include oil and gas production and reserves, drilling and completions, exploratory and development activities, deep and shallow drilling and production, activities on state forest and park lands, and a summary of projects in progress in the Subsurface Geology Section of the Survey. In addition, the report contains a review of oil and gas developments in Pennsylvania in the past decade and a discussion of prospective trends for the 1990's, including potential new reservoirs.

Progress Report 204 may be purchased from the State Book Store, 1825 Stanley Drive, Harrisburg, PA 17103, for $2.15 plus 13¢ state sales tax for Pennsylvania residents. Orders must be prepaid; please make checks payable to *Commonwealth of Pennsylvania*.

Sinkholes and Karst-Related Features of Centre County



Sinkholes and Karst-Related Features of Centre County, Pennsylvania is the ninth in a series of open-file county-based reports issued by the Pennsylvania Geological Survey that relate to sinkhole occurrences in Pennsylvania. Released as Open-File Report 92-01 and compiled by staff geologist William E. Kochanov, the report consists of a brief explanatory text and fifteen 7.5-minute-quadrangle maps at 1:24,000 scale. The text contains a description of methods used in compiling the report, references, and a glossary. The maps show depressions (closed, semiclosed, and linear), sinkholes, surface mines, cave entrances, and bedrock geology.

Open-File Report 92-01 may be examined at the Pennsylvania Geological Survey, 2nd floor, Evangelical Press Building, Third and Reily Streets, Harrisburg. Copies of the report may be purchased by mail from the Pennsylvania Geological Survey, P.O. Box 8453, Harrisburg, PA 17105-8453, for the prepaid copying and shipping cost of $39.75, plus $2.39 state sales tax for Pennsylvania residents. Please make checks payable to *Commonwealth of Pennsylvania*.

ANNOUNCEMENTS

Appalachian Gas Atlas Project

The Pennsylvania Geological Survey has received a subcontract from West Virginia University (WVU) to study the geological and engineering aspects of Pennsylvania's major gas plays and to provide the federal government with a data base of the information accumulated during the project. This project is the second federally funded study awarded to the Appalachian Oil and Natural Gas Research Consortium, a group that includes the Department of Geology and Geography and Department of Petroleum Engineering at WVU, and the state geological surveys of Kentucky, Ohio, Pennsylvania, and West Virginia.

The purpose of the gas project is to identify, define, and detail the major gas plays in the seven gas-producing states of the Appalachian basin with two ultimate objectives in mind. The first objective is to help develop a national data base of information on natural gas. The data base should help the federal government determine more accurately the state of the nation's natural gas resources. The second objective is to complete and publish an atlas of the plays that will aid the natural gas industry in the basin in understanding the geological and engineering characteristics of the more important gas reservoirs. This in turn should help stimulate exploration strategies, improve production techniques, and identify conservation methods in order to promote the wise use of this natural resource.

Project participants will compile information from government, reference, and private-industry sources, filling in major gaps by conducting original research. Much of the information required for this project is in private collections. Thus, the cooperation of the oil and gas industry will be necessary in the collecting of reservoir and production information. The collected information will then be compiled into a large atlas that will include text, maps and cross sections, and tables.

Two new geologists, Kathy J. Flaherty and Joseph R. Tedeski, joined the staff of the Pennsylvania Geological Survey in 1992 to work on this project. Kathy, a native of Long Island, New York, has a degree in geology from the State University of New York at Binghamton. She comes to the project with over 10 years of experience in Appalachian petroleum geology, including working as a staff geologist with both Consolidated Gas Supply Corporation and Patrick Petroleum. She also worked as a consultant to industry for several years before joining the Survey. Joe, a Ford City, Pennsylvania, native, is a recent graduate of Indiana University of Pennsylvania. While working on his B.S. in geology, Joe was employed by the Tanoma Mining Company in Indiana County. He acquired broad experience in various geological studies of the Tanoma mine, including investigations of geological structures, examination of strata and roof conditions associated with the coal seam, and monitoring water conditions.

For those interested in additional details of the project, contact John Harper, Pennsylvania Geological Survey, Subsurface Geology Section, 500 Waterfront Drive, Pittsburgh, PA 15222-4745, telephone 412-442-4235.

Pennsylvania Survey Relocates

The Pennsylvania Geological Survey moved on June 11 to the Evangelical Press Building on Third and Reily Streets, Harrisburg. The new mailing address is

Department of Environmental Resources
Bureau of Topographic and Geologic Survey
P. O. Box 8453
Harrisburg, PA 17105-8453

The new street address is

Evangelical Press Building, 2nd floor
Third and Reily Streets
Harrisburg, PA 17102-1910

Telephone numbers remain the same. There will be more information concerning the move in the upcoming summer issue of *Pennsylvania Geology*.

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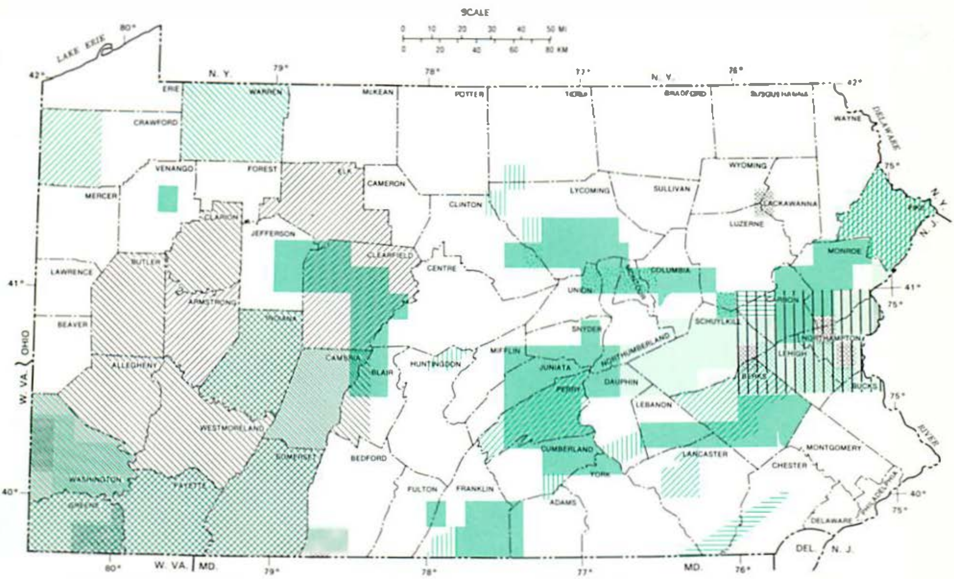
IN COOPERATION WITH THE U.S. GEOLOGICAL SURVEY

TOPOGRAPHIC MAPPING
GROUNDWATER-RESOURCE MAPPING

STATUS OF MODERN GEOLOGIC MAPPING IN PENNSYLVANIA

(See editorial on page 1)



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PUBLISHED		IN PRESS OR IN PREPARATION
	Atlas Series (mostly 1:24,000 scale)	
	Mineral Resource Reports (county coal reports; mostly 1:62,500 scale)	
	Water Resource Reports (mostly 1:50,000 scale)	
	Other series (County Report, General Geology Report, Open-File Report, Progress Reports; various scales)	

MAPPING BY U.S. GEOLOGICAL SURVEY

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	Geologic Quadrangle Maps (mostly 1:24,000 scale)	
	Miscellaneous Investigations Series (mostly 1:24,000 scale)	
	Other series (Bulletins, Open-File Reports; mostly 1:24,000 scale)	
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