PENNSYLVANIA GEOLOGY

THE PENNSYLVANIA GEOLOGICAL SURVEY

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COMMONWEALTH OF PENNSYLVANIA
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DEPARTMENT OF ENVIRONMENTAL RESOURCES
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TOPOGRAPHIC AND GEOLOGICAL SURVEY
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ON THE COVER: Catastrophic results of landsliding in Allegheny County. Note collapsing foundation in lower right foreground; this house has since had to be demolished. Home in upper part of photo shows exposed basement and ruined patio due to sliding of side yard and back of lot. Area between these two houses once was occupied by two additional homes destroyed by slide. *Photo courtesy of Dr. Jesse L. Craft.*

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DECEMBER 1977

FROM THE DESK
OF THE
STATE GEOLOGIST . . .

MINERAL ECONOMICS
A TALE OF TWO COMMODITIES

It is commonly believed that "harvesting" the mineral wealth of an area is simply a function of discovering the resource and then proceeding to extract it from the ground. Two recent Pennsylvania developments point up the primary role which basic economics plays in the success or failure of locating and utilizing the mineral resources with which we were endowed.

At Morgantown, Pennsylvania, one of the nation's most modern underground iron mines, the Grace Mine, has closed down, even though the reserves of this major orebody are large and the grade of the ore is high. But the effect of foreign steel imports and the availabliity of low cost, high grade, foreign iron ore to supply the remaining domestic steel furnaces has created an economic situation with which the Pennsylvania iron mine could not compete.

Mineral economics, however, can work both ways. As the need for natural gas has increased, so has the price. First came the price increase for unregulated, intra-state gas (produced and consumed within the state), and then the slow, step-by-step increase of regulated, interstate gas prices. The result in Pennsylvania has been a markedly increased program of exploration and drilling for gas, both by established gas-producing utilities, as well as by small industries seeking only to obtain their own gas needs. The higher natural gas prices made it worthwhile to drill deeper than before, and in places where the risks were greater. The result of this favorable economic climate has been a string of impressive new gas discoveries in Pennsylvania involving many areas, including Somerset, Centre, and Lycoming Counties. More discoveries are likely as the drilling pace continues.

Geologists play a vital role in developing our vital mineral resources. We can "point" to where the geologic conditions indicate the likelihood of finding various additional mineral concentrations. It is economics, however, that in the final analysis determines whether the mineral resource will be developed. The examples above demonstrate that economic conditions do not remain static; for any particular commodity they may improve or worsen. Geologists, such as the Pennsylvania Geological Survey, have an obligation to identify and inventory the mineral resources with which we have been blessed, so that when the economic conditions become favorable, rapid strides can be made to utilize those resources to serve the needs of our society.

Arthur A. Socolow

The Meadowcroft Rockshelter
The Earliest Evidence of Stoneage Man in North America

by William H. Bolles
Dept. of Education

Standing under a massive sandstone overhang on a ledge some 50 feet above Cross Creek it taxes the imagination to go back some 16,000 years and visualize the rockshelter being occupied by the Paleo-Indians, the most ancient man known to the new world and the contemporaries of the Cro-Magnons who decorated the walls of their caves in northern Spain with paintings of bisons.

The Meadowcroft Rockshelter is located about 2.5 miles northwest of the town of Avella in Washington County on the north bank of Cross Creek, a small tributary of the Ohio River which lies 7.5 miles to the west. The exact location of the site is 40° 17′ 12″ N, 80° 29′ 0″ W (USGS Avella, Pennsylvania 7.5′ Quadrangle).

A view of the Meadowcroft Rockshelter's eastern overhang. The exposed rock is the Morgantown-Connellsville sandstone, a massive fluvial or channel sandstone of the Casselman Formation of the Pennsylvanian Period. The site has been roofed over to keep it dry while the excavation is in progress.

Underneath the roof over the excavation, students from Pitt carry out the painstaking job of digging, locating and marking each artifact, bone and seed. Carrying out this process through a cubic meter of strata can take two persons an entire summer to complete.

Geologically, Meadowcroft is located in the Pittsburgh Plateaus Section of the Appalachian Plateaus Province. The surface rocks of the area are those of the Casselman Formation of Middle to Upper Pennsylvanian Age. The dominant lithologies are shale, sandstone, limestone, and coal in decreasing order of abundance. Topographically the region is a maturely dissected plateau with more than 50% of the area in valley slopes with upland and valley bottom areas in the minority. Since the Wisconsin Glacial boundary in northern Beaver County is about 25 miles to the north, the present topography was most likely developed during the Pleistocene when increased precipitation and runoff caused extensive downcutting. The Meadowcroft Rockshelter and the Cross Creek Valley probably existed in almost their present configuration well before the close of the Wisconsin Glacial Period, ca. 11,000 B.P.

The excavation at the Meadowcroft site has been going on for the past five summers under the direction of Dr. James M. Adovasio, Assistant Professor of Anthropology at the University of Pittsburgh.

At the end of this field season, the rockshelter will be closed for at least a decade. The materials already taken from the site will keep laboratory analysts busy for many years and the undisturbed deposits, about 35 percent of the original, will remain ready for use when new methods of recovery and analysis are developed.

The Meadowcroft Rockshelter represents not only the oldest dated site in North America but also one of the longest occupied stratified sequences in the northern hemisphere of the New World. The Paleo-Indians who first occupied the rockshelter possessed a relatively sophisticated lithic technology which included the production of prismatic blades, unifacial blades, bifaces and delicately flaked "knives". They were most probably attracted to the site by the same factors which make it attractive at present. These are readily available water, protection from the elements, and abundant edible flora and fauna. Meadowcroft was a station for hunting, collecting, and food processing activities; a stopping-off place for Ice Age nomadic hunters and food-gatherers.

Human remains in the rockshelter are rare and include only one possible human burial and some 30+ isolated occurrences of individual bones or teeth. The single human burial was recovered from a trash or refuse pit in a context suggestive of cannibalism. A higher level strata, from the Late Woodland period, disclosed a fully articulated dog skeleton which appears to have been intentionally buried.

The oval basin-shaped firepits, still containing charcoal and ash, and reddened by fire, have been the source of the charcoal used to establish the earliest dates by radiocarbon methods carried out by the Radiation Biology Laboratory of the Smithsonian Institution.

As of last summer, Meadowcroft yielded about 1,300 stone tools, 162 firepits and 29 refuse or storage pits.The bones, or bone fragments, numbered 211,818 from more than 65 animal species. Plant remains have been found from over 50 species and included 26,640 hackberry seeds.

The name of the rock shelter was derived from Meadowcroft Village, a restoration of a 19th century rural community established nearby by Albert and Delvin Miller on the farm which their great, great grandfather settled in 1795. Albert Miller had always been fascinated by the American Indians and over the years had collected a large number of artifacts. The shelter beneath the cliff had impressed him as a possible Indian campsite and upon probing the rubble strewn floor one day in 1969, he discovered some animal

bones, fragmentary mussel shells, and a dozen chips of flint-like stone. He realized then he was right and knowing something about archaeology sought professional help as unskilled digging would have only ruined the fragile evidence of early man's occupation of the site.

A long time passed before Mr. Miller succeeded in finding a qualified archaeologist to investigate the rockshelter, but by the summer of 1973 test holes were drilled and the site proven. Dr. Adovasio and 14 students from Pitt began their painstaking work.

The story of the Meadowcroft Rockshelter is not over for the work of this past summer remains to be evaluated and firepits from lower levels may yield charcoal producing older radiocarbon dates. Prior to the discoveries at Meadowcroft, it was believed that the first Asian hunters migrated across the Bering Strait into Alaska during a period in which the ocean level was very low, exposing a land bridge. Several such periods are known to have occurred, the most recent around 13,000 B.C., or almost 15,000 years ago. Since Stone Age man was living at the Meadowcroft Rockshelter at least 16,000 years ago the crossings must have been made at an earlier time. The previous exposure of the Asia-to-Alaska land bridge is believed to have taken place from 23,000 to 28,000 years ago. It is during this time that the first migrations are now thought to have occurred.

We now have evidence that Stone Age man roamed western Pennsylvania as the Wisconsin ice front stalled near the present location of Butler and while to the northeast mastodons roamed the bogs of the Poconos.

New List of Earth Science Books

Selected Earth Science Books is the title of a new pamphlet which has been published by the American Geological Institute in cooperation with the National Association of Geology Teachers. The list identifies outstanding recent reference books under the major subdivision of earth sciences: astronomy, geomorphology, earthquakes, economic geology, energy resources, environmental geology, glaciers, oceanography, regional geology, and physical geology. This list of major references will be of particular interest to schools, libraries, teachers, and earth science students. Single copies of the new pamphlet are available at no charge by sending a stamped, self-addressed business envelope to Dr. William H. Mathews III, Box 10031, Lamar University Station, Beaumont, Texas 77710.

Fossils in the Lock Haven Formation (Upper Devonian) Near Lock Haven, Pennsylvania

by Richard B. Wells and Jon D. Inners

One of the results of recent detailed geologic mapping in the Lock Haven-Jersey Shore-Williamsport area has been the definition of a new stratigraphic unit in the Upper Devonian deltaic sequence. Fossiliferous, marine rocks formerly called the "Chemung Formation" have been renamed the Lock Haven Formation, and a type section has been established along the east side of the West Branch, Susquehanna River, a few miles north of Lock Haven, Pennsylvania (Faill, Wells and Sevon, 1977; Taylor, 1977). In an inactive borrow pit near the top of the Lock Haven type section, large numbers of some invertebrate fossils diagnostic of the Upper Devonian in Pennsylvania can be collected. The beds in which the fossils occur are about 3600 feet above the contact of the Lock Haven Formation with the underlying Brallier Formation and about 200 feet below the base of the overlying Catskill Formation.

The collecting site is situated just south of the intersection of the Farrandsville road (L.R. 18014) with the Swissdale road (L.R. 18011) about 2.0 miles northwest of the Lockport-Lock Haven bridge, Woodward Township, Clinton Co. (Fig. 1). (Lat. 41° 09′ 50″ N, Long. 77° 27′ 54″ W, Lock Haven 7 1/2-minute Quad.). The land is owned by Mr. William E. Miller, who resides on the premises. Mr. Miller has granted permission for small groups to collect at the pit, but requests that they first stop at the house to announce their presence.

The rocks exposed in the borrow pit consist of light olive gray, sub-fissile to blocky clay shale with thin, blocky, rippled siltstone and very fine sandstone interbeds (Figs. 2, 3). In the middle of the exposure is a five-foot interval of medium bedded, cross-bedded sandstone with a prominent sand wave about 15 feet above the floor of the pit. Fossils are most numerous in the shaly beds below the sandstone unit. Since bedding dips about 40° to the north and is undercut by the excavation, new material for collecting is constantly being shed from the rock face and exposed on the surface of the outcrop. The fossils occur as molds and sediment casts which sometimes preserve fine details of the shell structures. A little carbonaceous material is sometimes associated with the casts of plant stems.

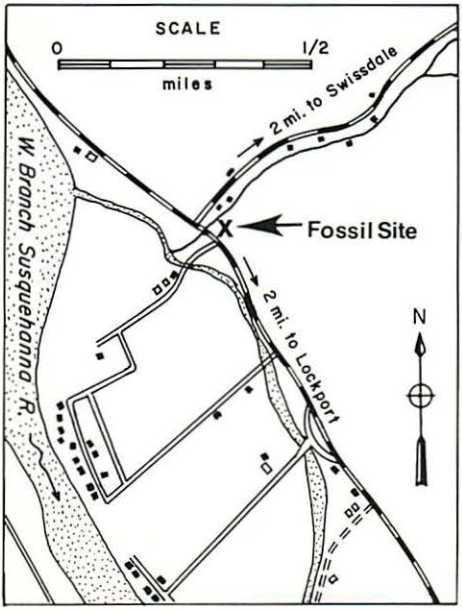
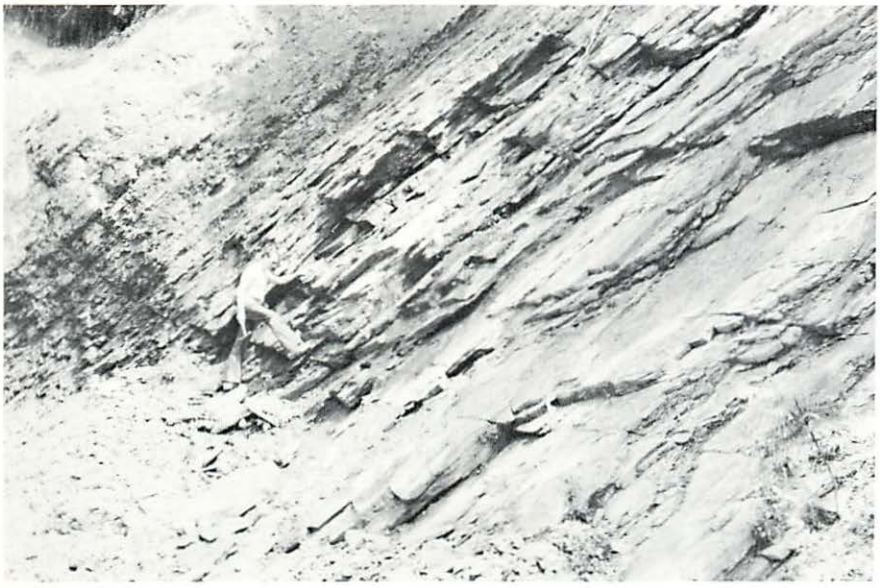


Fig. 1 Location map.

Fig. 2 Borrow pit in olive-gray shale with thin, very fine grained sandstone interbeds, near top of Lock Haven Formation at type section. Beds on right side of photo are very fossiliferous.



The faunal assemblage at this site has a rather low diversity, but several species are very abundant. The spiny productid *Productella lachrymosa* (Conrad) (Fig. 4) is the most conspicuous of the several large brachiopods which dominate the fauna. An unidentified species

Fig. 3 Current-ripples in olive-gray, very fine grained sandstone of Lock Haven Formation at described site. Note brachiopod valves scattered convex-upward over surface of bed. (Current from right to left.)

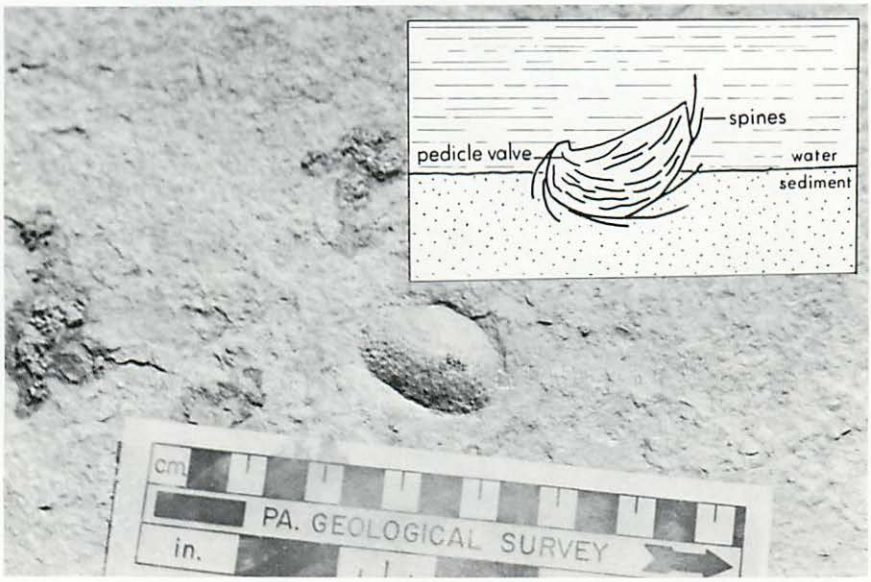


Fig. 4 *Productella lachrymosa* (Conrad) (internal mold of pedicle valve) on bedding surface. Insert in upper right shows this brachiopod in probable life position.

of the spiriferid genus *Cyrtospirifer*, an Upper Devonian guide fossil, is also well represented. A complete listing of the fossils collected by the writers is as follows (relative abundance shown by a=abundant; c=common; unc=uncommon;r=rare):

Bryozoans
- A fragile, branching type.....(c)

Brachiopods
- *Cyrtospirifer* sp. .....(c)
- *Tylothyris mesacostalis* (Hall).....(unc)
- *Schellwienella chemungensis* (Conrad) .....(c)
- *Productella lachrymosa* (Conrad) .....(a)
- *Cupulorostrum* sp. .....(c)

Bivalves
- *Leptodesma* sp. .....(c)
- *Cypricardella* sp. .....(unc)

Crinoids
- Stems and disarticulated columnals.....(c)

Plants
- Casts of stems .....(f)

These organisms probably inhabited waters of normal marine salinity in a nearshore, shallow subtidal environment. Except for *Cypricardella* sp., which was an infaunal filter feeder, the invertebrates listed above consist entirely of epifaunal filter feeders. Mild current and wave activity is indicated by ripple marks in the sandy beds, by the disarticulation of most of the specimens, and by the convex-upward pedicle valves of *Productella* scattered over the bedding surfaces (Figs. 3, 4). The fact that some articulated crinoid stems 16 inches or more in length were preserved in the sediment suggests that wave and current agitation was not great, however. The cross-bedded sandstone unit with sand-waves which overlies the fossiliferous shales may have been deposited in the intertidal zone, possibly in a small tidal channel.

Specimens from this site are available for study in the Paleontologic Reference Collection of the Pennsylvania Geological Survey.

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Faill, Rodger T., Wells, Richard B. and Sevon, William D. (1977), Geology and mineral resources of the Salladasburg and Cogan Station Quadrangles, Lycoming County, Pennsylvania: Pa. Geol. Surv., 4th Ser., Atlas Rept. 133cd.

Taylor, Alfred R. (1977), Geology and mineral resources of the Lock Haven 7 1/2-minute Quadrangle, Lycoming and Clinton Counties, Pennsylvania: Pa. Geol. Surv., 4th Ser., Atlas Rept. 124a.

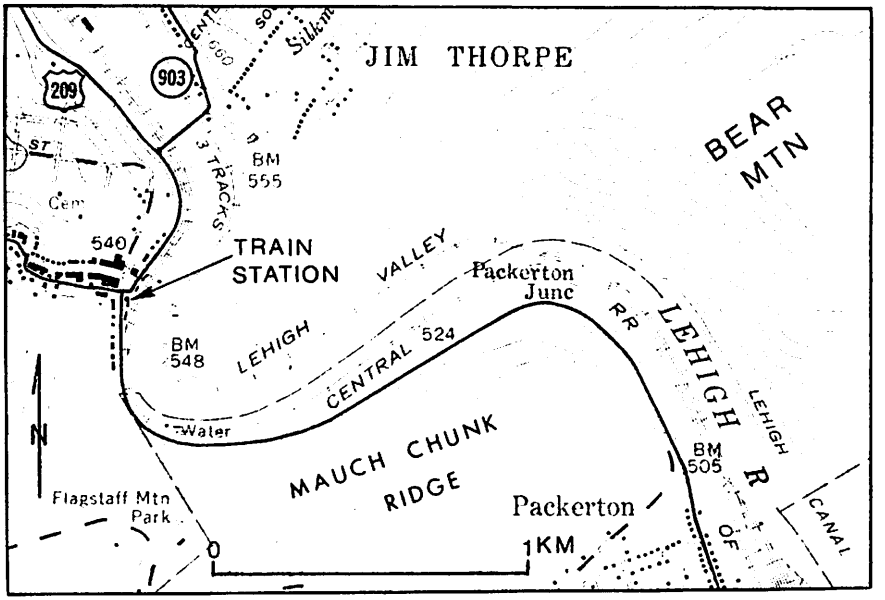
ZIMMERMAN URANIUM PROSPECT, CARBON COUNTY

Because of the recent interest in uranium occurrences in the Catskill Formation of Carbon County, the Pennsylvania Survey has located and sampled the previously noted but undescribed Zimmerman prospect on the east side of the Lehigh River, Jim Thorpe.

Klemic and others (1963, p. 83) list the occurrence as 1^E; they note that small amounts of malachite staining were observed in the radioactive rocks, and report that the area was prospected by Raymond Zimmerman of Weissport, Pennsylvania. The approximate location of 1^E is given on Plate 1 of U.S.G.S. Bull. 1138.

What is believed to be the Zimmerman prospect is located 1.55 km east of the train station in Jim Thorpe on the northeast side of the Lehigh River, and is approximately 340 m due east of center of a railroad bridge (Fig. 1). The prospect is reached by going 360 m to the southeast along a path from the northwest end of the railroad bridge, then approximately 30 m northeast from the path, to near the base of Bear Mountain. Seventy-five meters S65° E along the path from the prospect there is a large, wild rosebush on the southwest side of the path and 160 m southeast from the prospect along the path there is a large stone canal-lock pier. The latitude and longitude are 40°51′52″N, 75°43′11″W. The approximate elevation (estimated from the Lehighton 7-1/2′ topographic map) is 160 m.

The Zimmerman prospect consists of a single trench which is 8 m long, 0.5-2 m wide and 50 cm deep at most. The trench follows bedding which strikes N84° E and is vertical. The dump from the trench is on the south side. The dump has an overall radioactivity of only 0.05 mR/hr. A composite chip sample from the dump was found to contain 380 ppm U, 160 As, 200 Ba, 165 Cu, 8 Mo, 1,200 Pb, 35 Se, and 500 ppm V. All of these except Ba, Mo, and possibly V are strongly anomalous, showing that the rock is definitely mineralized. The unexpected, high concentration of the relatively immobile element Pb suggests that the U content may have been higher initially. Hand samples have an activity on contact of 0.5 to 1.0 mR/hr. The radioactivity in the trench itself is $\geqslant$ 0.1 mR/hr over a width of 40 cm. In the center of this, the activity on contact is 0.5 mR/hr. Carbonaceous seams up to 1 x 10 cm occur in the center of the zone.



The host rock to the uranium mineralization is a gray graywacke, which is quite phyllitic in some zones. Shale chips are sparse but present. The rock to the south of the trench is mostly reduced (grayish), and that to the north mostly oxidized (reddish). The lithology of uranium localization fits the observations of Schmiermund (1977). According to the mapping of Sevon (Epstein and others, 1974) the prospect would be located near the contact between the Clark's Ferry (braided-river system) and the overlying Duncannon (alluvial plain) Members of the Upper Devonian Catskill Formation.

Carbonaceous plant fragments are moderately common, but crumble readily because of intergrown pyrite. Pyrite also occurs in the graywacke matrix as fine-grained disseminations. Decomposition of the pyrite has yielded jarosite and limonite on many bedding and joint surfaces. No definite secondary uranium minerals were observed, possibly because of acidity from decomposing pyrite. The barest traces of a bright apple green secondary mineral could be weathered metatorbernite or malachite. Fluorescent green stains were observed with an ultraviolet light, but these are rare and cannot be correlated with observations under a binocular microscope.

There was no sign of chipping at the trench or dump, so the prospect probably has not been located by companies now working in the

area. One boulder of pink conglomerate to the south is very slightly radioactive, and was chipped recently. The outcrops of reduced graywacke to the south are not noticeably radioactive with a geiger counter.

Bob C. Smith, II

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Epstein, J. B., Sevon, W. D., and Glaeser, J. Douglas (1974), *Geology and mineral resources of the Lehighton and Palmerton quadrangle, Carbon and Northampton Counties, Pennsylvania,* Pa. Geol. Survey, 4th ser., Atlas 195 cd.

Klemic, Harry, Warman, J. C., and Taylor, A. R. (1963), *Geology and uranium occurrences of the northern half of the Lehighton, Pennsylvania, quadrangle and adjoining areas,* U.S.G.S. Bull. 1138.

Schmiermund, R. L. (1977), *Geology and geochemistry of uranium deposits near Penn Haven Junction, Carbon County, Pennsylvania,* unpub. M.S. thesis, The Pennsylvania State University, University Park, Pa.

Western Pennsylvania Drainage Changes

Frank W. Preston's "Drainage Changes in the Late Pleistocene in Central Western Pennsylvania" has been published by the Carnegie Museum of Natural History, Carnegie Institute. Preston has aimed the book at local residents, visitors, naturalists and conservationists who would be interested in the changes which shaped such familiar places as McConnell's Mill State Park, Moraine State Park, Queens Junction, Lake Arthur, and the Slippery Rock Creek area. Dr. Preston is a scientist and nature lover who spent over a decade conducting the necessary field observations and research for this book.

In his account of the stages which occurred, Preston describes specific geographic features, the types of fossils which can be discovered and areas which have literally remained unchanged. This paperback book, with numerous photographs, illustrations and topographic maps is currently available in the Carnegie Museum of Natural History Gift Shop for $5.50 or by mail at $6.00 (includes postage) plus tax.

SURVEY ANNOUNCEMENTS

PENNSYLVANIA OIL AND GAS FIELDS MAP

With Pipeline Maps

Responding to the current interest and need for detailed, up-to-date data on Pennsylvania's oil and gas resources, the Pennsylvania Geologic Survey has issued a completely revised map showing the locations and boundaries of the 811 oil and gas fields of the Commonwealth. Published at a scale of 4 miles to the inch in multicolor on a large single sheet (40 x 56 inches), the reverse side of the oil and gas fields map carries updated maps of the oil and gas pipelines of Pennsylvania.

Map #3, Oil and Gas Fields of Pennsylvania, by William S. Lytle and Lajos J. Balogh, is available from the State Book Store, P.O. Box 1365, Harrisburg, Pa. 17125. The price is $2.30 (plus tax for Pa. residents).

1976 OIL AND GAS DEVELOPMENTS

The record of oil and gas drilling, production, and reserves for Pennsylvania in 1976 is presented in a report newly released by the Pennsylvania Geologic Survey. The 50-page book, entitled "Oil and Gas Developments in Pennsylvania in 1976", is co-authored by W.S. Lytle, Louis Heyman, R.G. Piotrowski, and S.A. Krajewski. This latest annual report on the subject provides data for the year as well as comparisons with activities in prior years. Particularly noteworthy was the drilling of 1262 new oil and gas wells and the production of 2.9 million barrels of crude oil and 76.6 billion cubic feet of natural gas.

Progress Report 190, *Oil and Gas Developments in Pennsylvania in 1976,* is available for $1.40 (plus 6% tax for Pa. residents) from the State Book Store, P.O. Box 1365, Harrisburg, Pa. 17125.

NEW GEOLOGIC ATLASES ISSUED

Four new Geologic Atlases have been issued by the Pennsylvania Geologic Survey for portions of Lycoming, Clinton, and Monroe counties. Each of the atlases contains detailed, full-colored geologic maps of the bedrock as well as the unconsolidated surficial deposits. The detailed maps (scale 1:24,000) and accompanying reports pay particular attention to the economic importance of the various geologic formations, as well as the engineering and environmental characteristics which will affect development and land use planning. These atlases will be of importance to residents of the areas, planners, local officials, industry, and conservationists.

Atlas 124a, *Geology and Mineral Resources of the Lock Haven Quadrangle, Clinton and Lycoming Counties,* by Alfred R. Taylor, is available for $5.55 (plus tax for Pa. residents).ents).

Atlas 133cd, *Geology and Mineral Resources of the Salladasburg and Cogan Station Quadrangles, Lycoming County,* by Rodger Faill, Richard Wells, and William Sevon, is available for $11.25 (plus tax for Pa. residents).

Atlas 134ab, *Geology and Mineral Resources of the Linden and Williamsport Quadrangles, Lycoming County,* by Rodger Faill, Richard Wells, and William Sevon, is available for $13.20 (plus tax for Pa. residents).

Atlas 204cd, *Geology and Mineral Resources of the Pocono Pines and Mount Pocono Quadrangles, Monroe County,* by Thomas Berg, William Sevon, and Milena Bucek, sells for $11.45 (plus tax for Pa. residents).

The above publications should be ordered from the State Book Store, P.O. Box 1365, Harrisburg, Pa. 17125.

GROUNDWATER REPORTS ISSUED

Three new groundwater reports have been published by the Pennsylvania Geologic Survey, dealing with Lancaster, Luzerne, and York counties. These reports provide basic data and descriptions and detailed hydrogeologic maps of the availability of subsurface water in the areas which were investigated. With a growing population and an expanding consumption of water by industry, these reports serve to focus attention on one of Pennsylvania's important, underdeveloped sources of quality water. These reports will be of assistance to planners, developers, and all future water users.

These reports are the products of an ongoing cooperative program with the Water Resources Division of the U.S. Geological Survey.

Water Resource Report 40, *Summary of Ground-Water Resources of Luzerne County,* by Thomas Newport, is available for $5.55 (plus tax for Pa. residents).

Water Resources Report 42, *Ground-Water Resources of Central and Southern York County,* by Orville Lloyd, Jr. and Douglas Growitz, sells for $10.95 (plus tax for Pa. residents).

Water Resources Report 43, *Summary of Ground-Water Resources of Lancaster County,* by Charles Poth, is available for $6.75 (plus tax for Pa. residents).

The above water resources reports should be ordered from the State Book Store, P.O. Box 1365, Harrisburg, Pa. 17125.

STONES FROM ALL THE WORLD – IN HARRISBURG

The diversity and origin of the many different types of stone which make up the buildings of the Capitol complex and other well known historical structures of the Greater Harrisburg area are the subject of a well-illustrated publication which has been released by the Bureau of Topographic and Geologic Survey. The new 47-page booklet is entitled "Building Stones of Pennsylvania's Capital Area", by Alan R. Geyer. Not only is the nature and source of the stone in each building carefully described, but a written guide for a walking tour is provided so that interested readers may proceed in sequence from building to building in the Harrisburg area.

Among the 45 outstanding structures reviewed in the new publication are such buildings and features as the Main Capitol Building (outside and inside), the Capitol statuary, Education Building, Labor and Industry Building, William Penn Memorial Museum, Boise Penrose Statue, Federal Building, Market Street Bridge, John Harris Mansion, Cameron Mansion, Pine Street Presbyterian Church, and the Civil War Veterans Monument. While some of the building stones were quarried in Pennsylvania, others have originated from such distant sources as Indiana, Tennessee, Minnesota, Alabama, Georgia, Vermont, Ireland, Italy, southern France, and Africa.

"Building Stones of Pennsylvania's Capital Area" (designated as Environmental Geology Report No. 5) is available for $0.95 (plus 6¢ tax for Pennsylvania residents) from the Pennsylvania State Book Store, 10th and Market Streets, P.O. Box 1365, Harrisburg, 17125.

STRATIGRAPHY OF WESTERN PENNSYLVANIA

The subsurface stratigraphy of western Pennsylvania has been refined and interpreted in the Pennsylvania Geological Survey's new report, *Tully (Middle Devonian) to Queenston (Upper Ordovician) Correlations in the Subsurface of Pennsylvania.* Authored by Louis Heyman, the report includes a text and 3 plates with 9 correlation sections based on lithologic and geophysical logs from oil and gas wells of western Pennsylvania.

The new data and interpretations will help to resolve some of the stratigraphic complexities of the regions and should be particularly helpful in the exploration for new oil and natural gas resources in Pennsylvania.

Mineral Resources Report M 73 is available for $3.60 (plus 6% tax for Pa. residents) from the State Book Store, P.O. Box 1365, Harrisburg, Pa. 17125.

COAL DATA PUBLISHED

The third in a series of comprehensive reports on the geology, chemistry, and physical properties of western Pennsylvania bituminous coal has been published by the Pennsylvania Geological Survey. *Analyses and Measured Sections of Pennsylvania Bituminous Coal, Part III* by V.K. Skema, W.E. Edmunds, A.D. Glover, J.D. Inners, and M.A. Sholes, provides detailed data on coal samples and related geology from approximately 200 sites in 20 counties of western Pennsylvania.

With increasing development of coal in Pennsylvania, the new data will assist coal producers, local officials, energy planners, and environmentalists in their respective activities.

Mineral Resources Report M 74, *Measured Sections of Pennsylvania Bituminous Coal, Part III,* is available for $3.65 (plus 6% tax for Pa. residents) from the State Book Store, P.O. Box 1365, Harrisburg, Pa. 17125.

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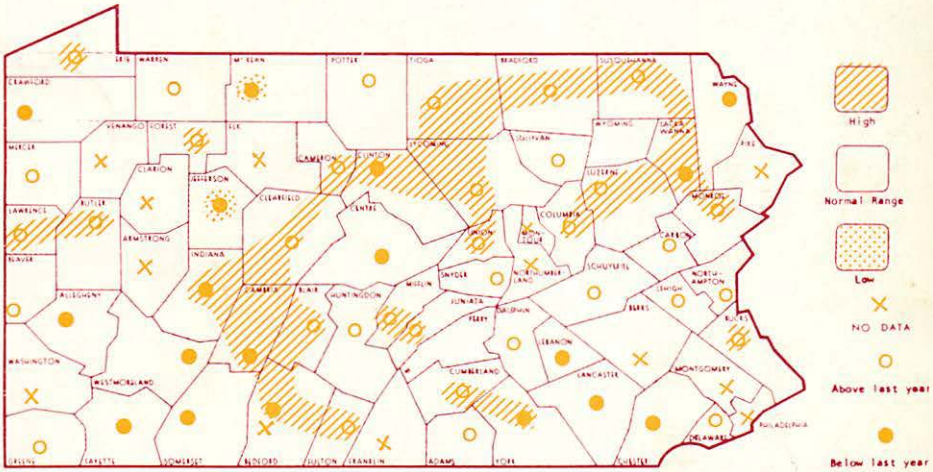

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