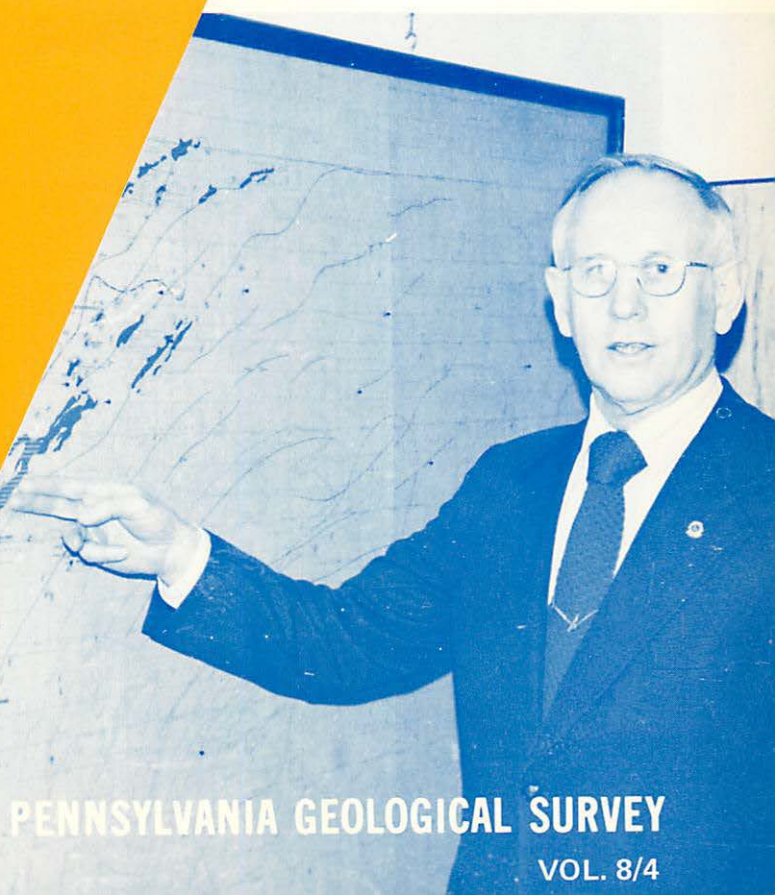
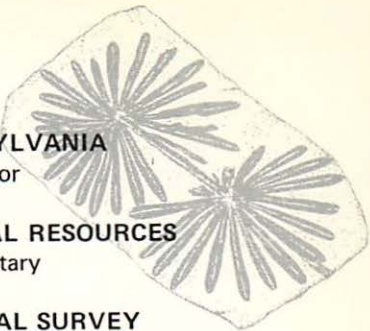



P GEOLOGY N N S Y L V A N I A



THE PENNSYLVANIA GEOLOGICAL SURVEY

VOL. 8/4



COMMONWEALTH OF PENNSYLVANIA

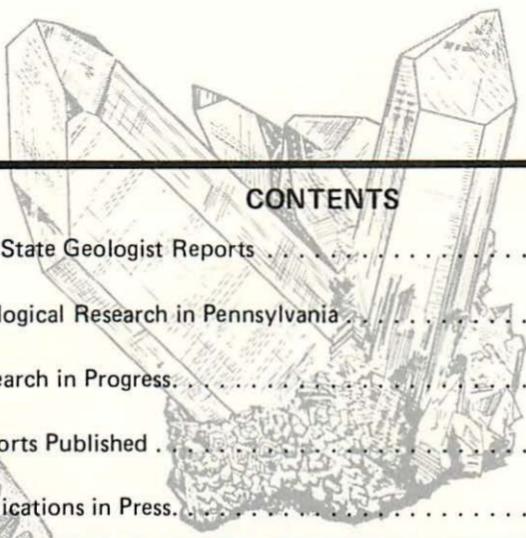
Milton J. Shapp, Governor

DEPARTMENT OF ENVIRONMENTAL RESOURCES

Maurice K. Goddard, Secretary

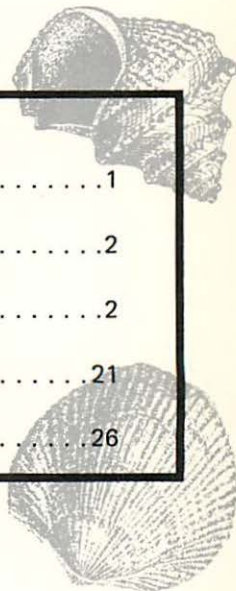
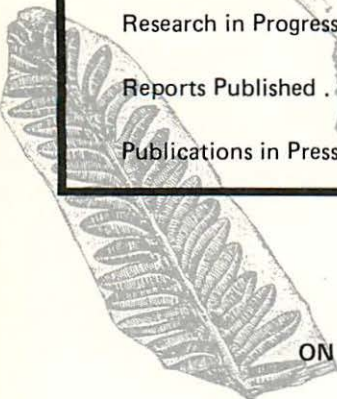
TOPOGRAPHIC AND GEOLOGICAL SURVEY

Arthur A. Socolow, State Geologist

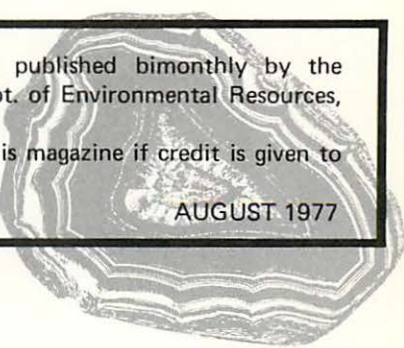
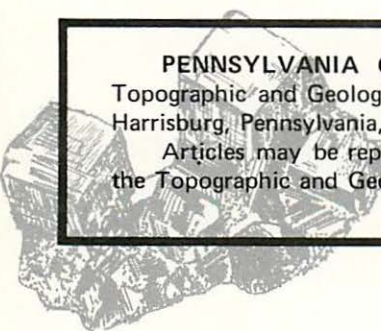


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ON THE COVER: William S. Lytle



PENNSYLVANIA GEOLOGY is published bimonthly by the Topographic and Geologic Survey, Dept. of Environmental Resources, Harrisburg, Pennsylvania, 17120.

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AUGUST 1977

FROM THE DESK
OF THE
STATE GEOLOGIST . . .



Thank You Bill Lytle for a Job Well Done

When William S. Lytle retires on July 20 from the position of Chief of the Pennsylvania Geological Survey's Oil and Gas Geology Division, he will have achieved a record of service to the Commonwealth and its citizens of which he can be truly proud and for which the Commonwealth must be everlastingly grateful.

Born in Pleasantville, Pennsylvania, with a family background in the oil industry, and having received a degree in Petroleum and Natural Gas Engineering from the Pennsylvania State University, Bill Lytle came to work full time with the Pennsylvania Survey in 1940. Since that beginning, with time out for a four-year tour of duty with the Army Corps of Engineers in World War II, Bill has been the Survey's mainstay in all matters relating to the Commonwealth's oil and gas resources.

Bill Lytle's outstanding record should not be viewed simply in terms of the 34 year length of service to the Commonwealth. It is the quality of that service, and the dedication to the complex, ever-changing problems and needs of Pennsylvania's oil and gas industry which distinguish Bill Lytle's record. Bill has professionally and methodically performed the geologic services, research, and data collection necessary to delineate and comprehend the occurrence and nature of the oil and gas resources in the Commonwealth. Thru his efforts and those of the Oil and Gas Geology Division, the distribution of Pennsylvania's oil and gas resources has been defined and their reserves calculated; this has served to stimulate the oil and gas industry, so vital to the energy and industrial needs of Pennsylvania. Lytle's report on the calculated oil reserves stands as the basic reference on this subject. His reports on various individual oil fields and his progress reports each year on oil and gas developments have been widely used by government officials, industry, and the public.

Continued on page 28

GEOLOGICAL RESEARCH IN PENNSYLVANIA 1977

INTRODUCTION

This publication is the twentieth annual report on Geological Research and Publications in Pennsylvania. This is an attempt to list all current geologic research in Pennsylvania and includes persons and projects other than those of the Pennsylvania Geological Survey. Because of the extensive response and large number of projects reported to us, we have had to exercise editorial license to reduce the description of the research projects to fit our available space. We have also attempted to determine an anticipated completion date (ACD) for each project. The anticipated completion date is the estimate of the date when the author will complete his report; additional time for publication should be projected.

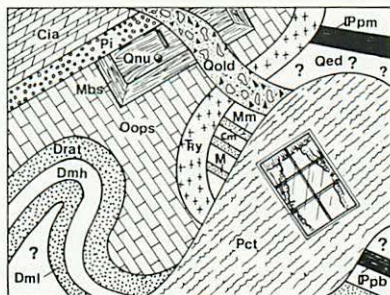
The listings are grouped into major categories of research to facilitate your search for information on a particular subject. Publications in press are listed by author.

As with all compilations, there may be omissions; this is unintentional. Additional copies of this report may be obtained by writing to the Bureau of Topographic and Geologic Survey, Department of Environmental Resources, Harrisburg, Pennsylvania 17120.

RESEARCH IN PROGRESS

AREAL

GEOLOGY



T. M. BERG, A. A. SOCOLOW, D. M. HOSKINS, A. R. GEYER, S. I. ROOT, W. E. EDMUNDS, D. B. MacLACHLAN, W. D. SEVON, and A. D. GLOVER, Pa. Geol. Survey. Revision of Pennsylvania State Geologic Map. Compilation work for the new state geologic

map is complete. Approximately one fourth of the state has been newly mapped and published since the 1960 revision. Approximately one half of the state has been revised by these methods: 1) extrapolation into adjacent areas from the new, post-1960 mapping; 2) extensive aerial photo interpretation, backed up by field checking and reference to Survey files; 3) adjustment of contacts to fit new 1:24,000 topographic maps; and 4) inclusion of much unpublished work contributed by geologists from industry, academic institutions, and government agencies. Approximately one fourth of the state will show no change or will show nomenclatural change only. Remaining work to be done is primarily editorial. ACD: Late 1977 or early 1978.

M. J. BERGIN, U. S. Geol. Survey. Northern Anthracite Field. This year's work will consist of geologic map compilation for Kingston, Pittston, and Wilkes-Barre West quadrangles. ACD: Continuing.

J. B. EPSTEIN, U. S. Geol. Survey. Wind Gap and Adjacent Quads. Continue map and report preparation and field work in the Saylorsburg quad. ACD: 1977.

A. D. GLOVER, J. H. WAY, JR., and R. T. FAILL, Pa. Geol. Survey. Geology and Mineral Resources of the Altoona 15' Quad., Blair, Cambria, Clearfield, and Centre Cos., Pa. Encompasses mapping of bedrock units (Cambrian to Pennsylvanian age), structures (Nittany anticline, Appalachian Front, Allegheny Plateau and associated thrust, wedge, and strike-slip faults) and surficial deposits (alluvium and colluvium) with discussions of minerals, economic deposits (primarily coal), and engineering properties. ACD: 1978.

LOUIS HEYMAN, Pa. Geol. Survey. Subcrop beneath the Onondaga-Huntersville-Bois Blanc Formations in the Subsurface of Western Pa. The above units overlie, with increasing unconformity, rocks from Lower Devonian to the south to Upper Silurian in the north. The pattern may delineate otherwise concealed deeper structure and hydrocarbon traps. ACD: 1978.

J. D. INNERS, Pa. Geol. Survey. Geology and Mineral Resources of the Berwick Quad., Luzerne and Columbia Cos., Pa. ACD: 1977.

J. D. INNERS, Pa. Geol. Survey. Geology and Mineral Resources of the Bloomsburg and Mifflinville Quads., Columbia Co., Pa. ACD: 1980.

W. D. SEVON, Pa. Geol. Survey. Surficial Map of Pa. (1:1,000,000). Generalized map of gross surficial units throughout the state (compiled at 1:250,000 for reduction to 1:1,000,000). ACD: May 1977.

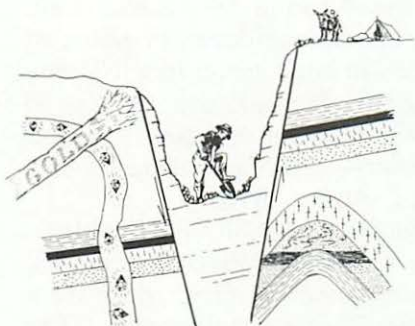
W. D. SEVON and T. M. BERG, Pa. Geol. Survey, and L. SCHULTZ, Gilbert Assoc. Geology and Mineral Resources of Pike Co., Pa. Bedrock and surficial maps, structure cross sections, photographs, environmental, engineering, economic, and ground-water interpreta-

tions, microscopic petrology, described sections, and brief text. ACD: May 1978.

S. I. ROOT, Pa. Geol. Survey. Geology and Mineral Resources of the Mechanicsburg and Carlisle Quads., Pa. ACD: 1977.

R. B. WELLS, Pa. Geol. Survey, and M. F. BUCEK, H. R. B. Singer, Inc. Geology and Mineral Resources of Montoursville North and Huntersville Quads., Lycoming Co., Pa. Geologic mapping of Lower Devonian through Lower Pennsylvanian bedrock formations and Pleistocene and Recent surficial materials, sampling and analysis of units with possible economic potential, description and evaluation of environmental and engineering characteristics of rock units. Report will include both bedrock and surficial geologic maps, cross sections, and a brief text. ACD: June 1977.

G. H. WOOD, JR., U. S. Geol. Survey. Southern Anthracite Field. Continue to compile and interpret geologic and coal maps on the stratigraphy, structure, depositional environments, sedimentology, and correlation of Silurian to Pennsylvanian age rocks. ACD: Continuing.



ECONOMIC GEOLOGY

P. C. BAZAKAS, The Pa. State Univ. at Ogontz. Lineament Analysis of Southeastern Pa. and N. J. in Relation to the Location of Ore Deposits. Analysis of lineaments of various scales using ERTS (now Landsat-1) and Skylab scenes. Correlation with known ore deposits, prospects, and mineral sites.

J. L. CRAFT, Pa. Geol. Survey. Evaluation of Gravel Quality Problems, Upper Allegheny River, Northwest Pa. A field and laboratory study of the gravel quality problems related to gravel terrace operation in the Upper Allegheny River. Field observation and laboratory testing show quality gravel does exist in those outwash terrace deposits, but special care has to be used during excavation to remove upper weathered material prior to plant processing. ACD: Summer 1977.

WALLACE de WITT, JR., G. E. CLAYPOOL, G. W. COLTON, THADDEUS DYMAN, A. C. HARRIS, L. D. HARRIS, J. W. HOSTERMAN, J. S. LEVANTHAL, W. J. PERRY, JR., J. B. ROEN, J. W. SCHMOKER, and L. G. WALLACE, U. S. Geol. Survey. Shale Characterization and Resource Appraisal of Devonian Black Shale in the Appalachian Basin. The U. S. G. S. Shale Characterization and Resource Appraisal Program is part of ERDA's Eastern Gas Shales Project. The U. S. G. S. effort includes projects in stratigraphy, structure, geochemistry, geophysics, paleontology, economic geology. ACD: 1981.

A. F. JACOB, U. S. Geol. Survey. Basin Analysis of Uranium-Bearing Paleozoic Rocks of Eastern United States. Reconnaissance of Paleozoic delta systems in central and southern Appalachian Basin will be completed, and a map of uranium occurrences in Paleozoic sedimentary rocks of the Appalachian Basin will be compiled. Work will then begin on the depositional systems, stratigraphy, and petrology of a selected Paleozoic delta system. ACD: 1980.

DENNIS MAHAR and A. W. ROSE, The Pa. State Univ. Geology and Geochemistry of Copper-Uranium Occurrences, Lycoming and Sullivan Cos., Pa. Copper and uranium occur in organic debris in the bottom of channels in the Catskill Formation of the area. Uranium in stream sediment of a drainage basin near Beaver Lake is a close approximation to average soils in the drainage, so that possibilities for mineralization can be semiquantitatively appraised. ACD: June 1977.

B. J. O'NEILL, JR., and Field Division, Pa. Geol. Survey. Investigations for High-Calcium Limestones in Pa. Objectives of investigation are: 1) to sample and analyze limestone units where information is lacking, incomplete, or widely scattered; 2) to map any newly discovered high-calcium unit that has a potential for commercial extraction; and 3) to synthesize the data into a publication which can be used as a guide to exploration targets. ACD: Continuous program.

B. J. O'NEILL, JR., and J. H. BARNES, Pa. Geol. Survey, and KENNETH LILES, U. S. Bur. Mines. Properties and Uses of Clays and Shales in South-Central Pa. A continuation of the series of programmed studies to evaluate the economic potential of clay-shale raw materials for ceramic and non-ceramic uses. ACD: 1979.

B. J. O'NEILL, JR., and J. H. BARNES, Pa. Geol. Survey, and KENNETH LILES, U. S. Bur. Mines. Properties and Uses of Clays and Shales in Southwestern Pa. A continuation of the series of programmed studies to evaluate the economic potential of shale-clay raw materials for ceramic and non-ceramic uses. ACD: Dec. 1977.

R. G. PIOTROWSKI and S. A. KRAJEWSKI, Pa. Geol. Survey. Stratigraphic Relations of the Devonian Organic-Rich Shales in the Subsurface of Western Pa. This project is a portion of the resource evaluation phase of ERDA's eastern shale gas project. The study will include stratigraphic cross sections, facies distribution maps, and regional structural maps for the Upper and Middle Devonian clastics in western Pa. with special emphasis on the potential gas-producing Devonian organic-rich shales. ACD: July 1978.

V. W. SKEMA and W. E. EDMUNDS, Pa. Geol. Survey. Economic Geology of the Upper Freeport Coal in Northeastern Greene Co., Pa. Relation of stratigraphy, sedimentology, depositional environment, and structure to the economic geology of the Upper Freeport coal and associated rocks in northeastern Greene Co. ACD: Dec. 1977.

R. C. SMITH, II, Pa. Geol. Survey. Trace Element Content of Sphalerite and Galena from Pa. Pure mineral concentrates of sphalerite and galena will be analyzed by atomic absorption, X-ray fluorescence, and fire assay for such elements as Mn, Fe, Co, Ni, Ga, Ag, Cd, In, Sn, and Bi. The analyses will be evaluated for by-product, pathfinder, genetic, and environmental significance. ACD: Feb. 1978.

SCOTT TREGASKIS and A. W. ROSE, The Pa. State Univ. Geology and Geochemistry of Zinc-Lead Occurrences in Morrison Cove, Bedford Co., Pa. Sphalerite and galena occur in brecciated Cambro-Ordovician carbonates along a complex thrust zone near Woodbury, Pa. Fluid inclusions indicate deposition from extremely saline brines at 120-170°C. Several pertinent methods of geochemical exploration are evaluated. ACD: Dec. 1977.

C. E. TURNER, U. S. Geol. Survey. Basin Analysis as Related to Uranium Potential in Triassic Sedimentary Rocks, Eastern United States. Complete preparation of location map for uranium occurrences in Triassic rocks, and field work in Newark-Gettysburg basin. Report writing on environmental interpretations of Stockton, Lockatong, and Brunswick Formations, and study to determine mineralogy of uranium sandstones and shales from Newark-Gettysburg basin will begin. ACD: 1977.

ENGINEERING

GEOLOGY



W. R. ADAMS, JR., NEIL DUBROVSKY, and JOHN ONEACRE, Allegheny County Works Dept. Demonstration Program of Geotechnical Services [Allegheny Co.]. Geotechnical services will include: 1) establishment of "hot line" for people affected by geologically related hazards, 2) referral to sources of technical and/or financial assistance, 3) data bank of geotechnical information accessible to the public, and 4) educational seminars. ACD: 1980.

W. R. ADAMS, JR., and E. W. VASKOV, Allegheny County Works Dept. An Improved Approach to Managing Land Use Based on Analysis of Geological Hazards in Allegheny Co. Analysis of previous landslide history in Allegheny County, preparation of model ordinances to control development in slide prone areas, and education of municipal officials of need for adoption of these ordinances. ACD: Dec. 1977.

W. E. DAVIES, G. C. OHLMACHER, J. S. POMEROY, ANNABEL OLSON, ROBERT HACKMAN, and P. J. RUANE, U. S. Geol. Survey. Strip Mine Areas in the Appalachians [Pa.-Ala.]. Inventory mapping of existing strip mines as to type and degree of reclamation on 7-1/2' quadrangles. Publication of 1:250,000 map series showing active strip mines, type of reclamation, and geologic problems of potential strippable coal. Canton sheet is now being compiled from observations incidental to landslide studies. ACD: Dec. 1978 for western Pa.

S. S. HARRISON, Allegheny Coll. Effects of Oxidation/Reduction on the Physical Properties of Fine-Grained Glaciolacustrine Sediments [Crawford Co.]. Fine-grained glaciolacustrine sediments exposed in Woodcock Creek valley exhibit sharp oxidation/reduction boundaries, as evidenced by a change from brown to gray color. Preliminary examination suggests that the physical properties of these sediments is greatly affected by the oxidation state. Further tests will involve determination of Atterberg limits. ACD: Mar. 1978.

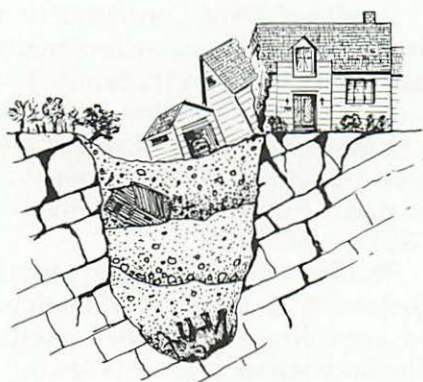
S. S. HARRISON, Allegheny Coll. Relationship of Atterberg Limits of Fine-Grained Glaciolacustrine Sediments to State of Oxidation. Field examination of oxidized and unoxidized fine-grained glaciolacustrine sediments suggests that the unoxidized sediments are generally more plastic and less stable. A detailed lab study is being conducted to test this observation. ACD: June 1978.

G. L. MERRITT, Pa. Dept. Environ. Resources, and W. A. DUVEL, JR., and R. J. McLAREN, Michael Baker, Jr., Inc. Feasibility Study: The Use of FGD Scrubber Sludges and Fly Ash to Abate Drainage Emanating from Abandoned Deep Mines and to Prevent Mine Subsidence [western Pa.]. ACD: Apr. 1978.

J. S. POMEROY, W. E. DAVIES, ANNABEL OLSON, ROBERT HACKMAN, P. J. RUANE and G. C. OHLMACHER, U. S. Geol. Survey. Landslide Studies [coalfields of Appalachians, Pa.-Ala.]. Inventory mapping of slope stability conditions on 7-1/2' quadrangles. Publication of 1:250,000 maps of slope stability. Canton sheet ready for publication in October 1977; Pittsburgh and Clarksburg sheets ready at end of 1977. ACD: Dec. 1978 for western Pa.

J. B. URBAN, W. J. GBUREK, JAMES HOOVER, and WALTER HEALD, U. S. Dept. Agric. Storm Water Detention and Ground-Water Recharge Using Porous Asphalt [SE Pa.]. A research site containing three 150' x 150' plots is being constructed. The plots are porous asphalt, conventional asphalt, and grass. Runoff, soil moisture, ground water, and meteorological and water quality measurements are used to monitor hydrologic effects and validate design criteria. ACD: 1982.

J. P. WILSHUSEN, Pa. Geol. Survey. Geologic Hazards in Pa. A descriptive report illustrated with maps, photographs, and sketches outlining the occurrence of geologic hazards in Pa. Natural geologic hazards in this state are 1) landslides and related phenomena, 2) sinkholes and solution phenomena, and 3) earthquakes. Each is discussed as a naturally occurring hazard and then in relation to the activities of man. ACD: July 1977.



ENVIRONMENTAL GEOLOGY

R. B. FINKELMAN, U. S. Geol. Survey. Release of Toxic Trace Elements from a Burning Bituminous Culm Bank [Mather, Pa.]. ACD: June 1977.

N. K. FLINT and DARL ROSENQUEST, Univ. of Pitt. Geologic hazard mapping in Squaw Run Area Watershed, Allegheny Co. Field mapping of both historic and prehistoric landslides at a scale of 1 in.=

200 ft. will begin in May 1977 as part of a comprehensive study of this watershed. The area lies mostly in O'Hara Twp. and Fox Chapel Boro. ACD: 1978.

S. S. HARRISON and DAN DOYLE, Allegheny Coll. Effects of Road Salt on the Salinity of Mill Run [Crawford Co.]. Mill Run, which passes through the center of Meadville, receives the discharge of many of the city's storm sewers. The chloride concentration in the stream exceeded 2000 mg/l during a thaw. This is equivalent to over 1-1/2 tons per day with a stream discharge of 12 cfs. ACD: Completed.

P. M. HUNTER and R. R. PARIZEK, The Pa. State Univ. The Environmental Geology of the Pine Grove Mills-Stormstown Area, Central Pa., with Emphasis on the Bedrock Geology and Ground-Water Resources. ACD: Mar. 1977.

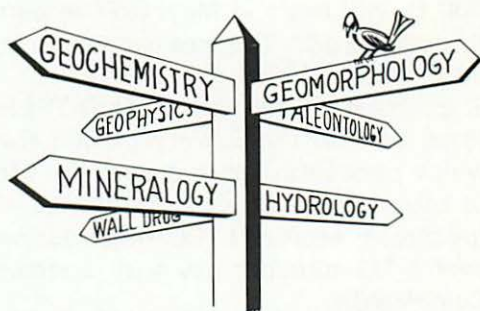
M. M. MARTIN and R. R. PARIZEK, The Pa. State Univ. Prediction of Acid-Mine Drainage Quality [western Pa.]. Field work is presently being started with the objective to relate acid-mine drainage quality to age and type of mine restoration and the chemical and petrographic characteristics of the coal overburden. ACD: Aug. 1978.

R. R. PARIZEK, E. G. WILLIAMS, and R. J. HORNBERGER, The Pa. State Univ. Delineation of Acid Mine Drainage Potential of Coal-Bearing Strata of the Pottsville and Allegheny Groups in Western Pa. A regional data base consisting of water quality parameters, coal-mining patterns, and geologic factors is being assembled. Computer mapping techniques are being employed in the analysis and graphic display of the data. ACD: Mar. 1978.

H. A. TOURTELOT, U. S. Geol. Survey. Pollution Studies [Pa. subunit — metropolitan Pittsburgh, the city of Washington and environs; and Keystone power plant, Shelocta]. Relatively large amounts of arsenic, copper, mercury, tin, and zinc in surficial materials are consistently associated with the areas of most intense commercial and technological activities within the cities, compared to amounts in the surrounding countryside. Work on the Keystone power plant awaits completion of analyses of plant samples. ACD: 1978.

J. P. WILSHUSEN, Pa. Geol. Survey, and M. E. HORNE, Consultant. Greater York Area Environmental Geology. A compilation of geologic information pertinent to the development and environmental protection of the greater York area, composed predominantly of maps with interpretive legends discussing geology, water resources, mineral resources, and engineering characteristics of bedrock and soils. ACD: Nov. 1977.

GENERAL GEOLOGY



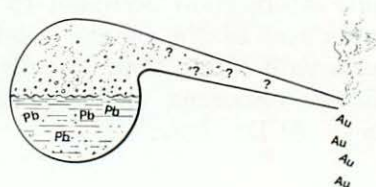
T. A. HEFFNER, Syracuse Univ. Quantitative Analysis of the Coatesville Pegmatite and Pyrrhotite Localities [Chester Co.]. Multivariate statistics, edge enhancement, and other geomathematical techniques are employed to map a mostly covered area. The data base includes magnetic intensity, gamma-ray spectra, and soil composition. ACD: June 1977.

A. R. GEYER, Pa. Geol. Survey, and W. H. BOLLES, Pa. Dept. Educ. Outstanding Geologic-Scenic Features of Pa. Outstanding geologic-scenic features cataloged are those with values of such distinctive quality as to be of county, state, or national significance. About half of the 165 identified have been photographed and investigated. ACD: Dec. 1977.

S. G. KHOURY, J. WALLACH, and J. E. TILLMAN, Dames & Moore. Detailed mapping in southern Lancaster Co. led to the reclassification of the Glenarm as a supergroup which comprises, in addition to the Setters and Cockeysville Formations, the formations and members of the Wissahickon Group. Mapping lithologies according to these newly developed subdivisions resulted in the definition of a previously unrecognized major fold, the Drumore fold. It is the outline of the Drumore fold and not the Peach Bottom fold that is expressed on remote sensing imagery. ACD: Completed.

J. P. WILSHUSEN and S. I. ROOT, Pa. Geol. Survey. Geology of the Appalachian Trail in Pennsylvania [SE Pa.]. A general geologic description of individual, prominent features of geologic origin on and near the Appalachian Trail in Pa.; illustrated with maps, sketches, and photographs.

GEOCHEMISTRY



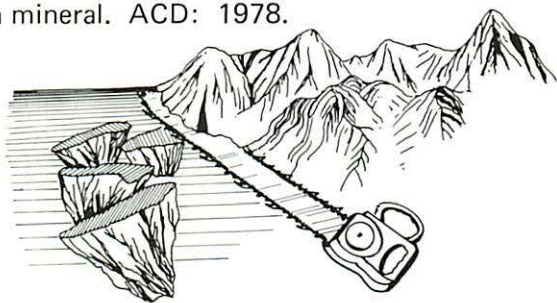
M. L. CRAWFORD, Bryn Mawr Coll., and M. E. WAGNER and J. P. HANDY, Univ. of Pa. Chemical and Mineralogical Study of Metaigneous Rocks, Pa. and Md. Piedmont. This project involves a detailed chemical and mineralogical study of several different groups of mafic metaigneous rocks of the Piedmont in an attempt to determine whether the different groups are related to each other in age and/or tectonic setting. ACD: 1979.

A. W. ROSE and L. A. KORNER, The Pa. State Univ. Radon in Ground Waters as a Guide to Uranium Ores [NE Pa.]. High contents of radon occur in ground waters near areas of uranium occurrences. Near Jim Thorpe, radon is a better guide than uranium in ground waters. ACD: June 1977.

A. W. ROSE and SIMON PIRC, The Pa. State Univ. Geochemical controls of uranium in Devonian sedimentary rocks of eastern Pa. Relations of U to major and minor elements in sandstones and shales of the Upper Catskill are being studied in order to identify anomalously high or low stratigraphic zones or regions which can then be related to origin of uranium deposits, and used as guides to favorable areas. ACD: 1978.

H. A. TOURTELOT, U. S. Geol. Survey. Lithium in High-Alumina Materials [Pa. subunit]. Underclays in western Pa. contain as much as 300 ppm lithium, and flint clays in central Pa. contain as much as 2000 ppm lithium. The lithium may be incorporated in the kaolinite structure of the underclays and some flint clays, but it seems possible that the lithium in the highly enriched flint clays is contained in a hitherto unrecognized lithium mineral. ACD: 1978.

GEOMORPHOLOGY

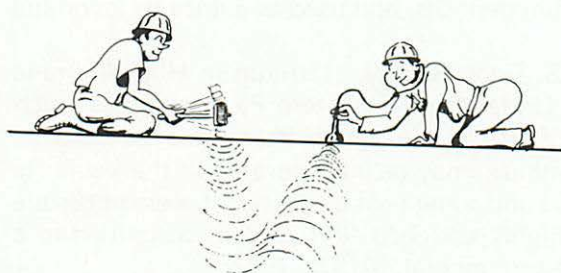


S. S. HARRISON, RON MOROSKY, and MIKE McSTRAW, Allegheny Coll. Relationship of Channel Morphology and Geometry to Lithology of Channel Sediments [Elk Creek, Erie Co.]. The upper reaches of Elk Creek cut through drift; the lower reaches are incised in bedrock. Channel morphology and geometry, measured in the field and on air photos, will be compared in these two reaches. ACD: June 1978.

S. S. HARRISON and JASON COX, Allegheny Coll. Relationship of Stream Segment Orientation to Fracture Traces [Crawford Co.]. A quantitative assessment of the relationship between the orientation of stream segments and fracture traces is being made. Separate tabulation will be made of first, second, third, and fourth order streams. ACD: June 1977.

W. B. WHITE, The Pa. State Univ. Caves of Pa. The object is to compile a complete catalog of the known caves of Pa. Compilation of the caves in the Valley and Ridge portion of the state is now underway. ACD: 1980.

W. B. WHITE and E. L. WHITE, The Pa. State Univ. Geomorphology of the Appalachian Karst [Pa. to Ala.]. The objective is a detailed study of karst landforms in the entire Appalachian chain, including quantitative landform analysis and detailed descriptions of specific areas of interest. Work is currently underway on the landforms and drainage of the carbonate valleys of central Pa. ACD: 1984.



GEOPHYSICS

D. L. CAMPBELL, U. S. Geol. Survey. Geophysical Studies Relating to Uranium Deposits in Crystalline Terranes. Analysis and report writing of data from electrical resistivity soundings in the Gettysburg Triassic basin will be completed. ACD: 1979.

J. R. KUSIAK and P. M. LAVIN, The Pa. State Univ. A Gravity and Magnetic Interpretation of the Structure and Deformational History of the Jacksonwald Syncline, Berks Co., Pa. Magnetic modelling, accounting for the remanent magnetization, indicates that the Jacksonwald still was emplaced horizontally and subsequently folded and tilted. ACD: May 1977.

C. K. SCHARNBERGER, Millersville State Coll. Detailed Magnetic Survey of the Martic Contact [southern Lancaster Co.]. ACD: Late 1978 or early 1979.

C. K. SCHARNBERGER, Millersville State Coll., and SHELTON ALEXANDER, The Pa. State Univ. Pennsylvania Seismic Network [Pa.-Md.-Del.-N.J.]. The Millersville seismic station has received an

official designation from the U.S.G.S. (MVL) and has recorded several small N.J. earthquakes and explosions in quarries as far away as Bellefonte, Pa. ACD: Ongoing.

ROB VAN DER VOO and DOYLE WATTS, Univ. of Mich. Lower Paleozoic Magnetism of North America. This is part of a continuing project in which we are investigating the characteristic magnetic directions of lower Paleozoic sedimentary units of North America. In Pennsylvania, we are concentrating our efforts on the Waynesboro Formation. ACD: Aug. 1978.

K. W. VOLK, P. M. LAVIN, and A. W. ROSE, The Pa. State Univ. Late Triassic-Jurassic Deformation of the Gettysburg and Western Newark Basins of Southeastern Pa. Variations of the remanent magnetism of Mesozoic intrusives show that intrusion of York Haven-type diabase was followed by regional tilting (10° NW), intrusion of Rossville-type diabase, continued regional tilting (15° NW) and folding confined to the basins. ACD: May 1977.

ISIDORE ZEITZ, U. S. Geol. Survey. Regional Aeromagnetic Studies of United States. The Pennsylvania aeromagnetic map is being prepared for publication. ACD: 1978.



GLACIAL GEOLOGY

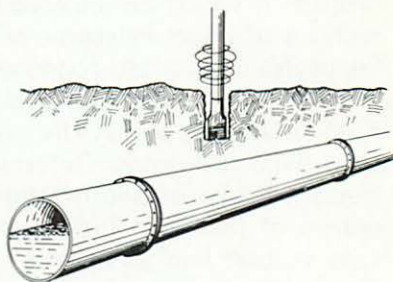
G. H. CROWL, Ohio Wesleyan Univ. The Wisconsin Glacial Border in Pa. [Potter, Tioga, and Lycoming Cos.]. The border has been mapped from Ceres on the N. Y. State line southeast to Pine Creek gorge; the area from here to Trout Run remains to be completed. The age, early or late Wisconsin, is uncertain. ACD: 1978.

S. S. HARRISON and CHUCK BRAYMER, Allegheny Coll. Environment of Deposition of Kame-Like Deposits [Crawford Co.]. Primary sedimentation structures and syn- and post-depositional structural features will be studied in kame-like deposits near Conneaut Lake. A detailed reconstruction of the environment of deposition will be attempted. ACD: June 1978.

FRANK NEHER and E. B. EVENSON, Lehigh Univ., and W. D. SEVON, Pa. Geol. Survey. A Quantitative Differentiation of the Glacial Drift of Northeastern Pa. Investigation of the three distinct

drift sheets (Illinoian, Altonian, Woodfordian) with respect to degree of weathering as an indicator of relative age. Quantifiable parameters include: 1) depth and character of soil profile development, 2) the clay mineral alteration sequence of each unit, 3) amorphous iron, and 4) the weathering and alteration of the heavy mineral suite.

HYDROLOGY



E. D. HESS, Pa. Geol. Survey. Water Well Inventory [Pa.]. Identification of lithologic units, positioning of wells by coordinates, and analysis of rock units as potential aquifers. ACD: Ongoing.

L. J. MCGREEVY and R. A. SLOTO, U. S. Geol. Survey. Ground-Water Resources of Chester Co., Pa. A general ground-water resource evaluation has been completed. Work is continuing to develop the capability of estimating effects of altering the hydrologic system. ACD: July 1978.

S. I. ROOT, Pa. Geol. Survey, and A. E. BECHER and W. WETERHILL, U. S. Geol. Survey. Geology and Ground-Water Resources of the Great Valley, Cumberland Co. ACD: 1977.

S. I. ROOT and L. E. TAYLOR, Pa. Geol. Survey, and A. E. BECHER, U. S. Geol. Survey. Geology and Ground-Water Resources of the Great Valley, Franklin Co. ACD: 1978.

REGINAL SPILLER and R. R. PARIZEK, The Pa. State Univ. Statistical Analysis of Well Yields as Related to Fracture Traces. ACD: June 1978.

E. L. WHITE and W. B. WHITE, The Pa. State Univ. Hydrology of Carbonate Rock Basins [central and eastern Pa.]. The objective is the interpretation of ground-water and surface-water flow in basins underlain by carbonate rocks. This includes ground-water recharge and discharge, flood flow behavior, and sustained flow. ACD: Indefinite.

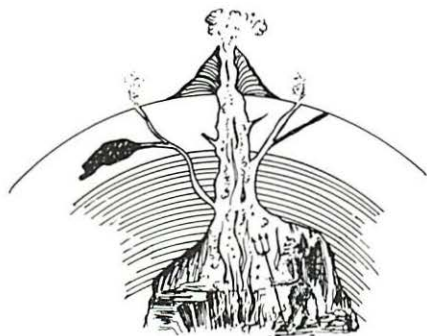
D. A. STEFFY and H. W. RAUCH, W. Va. Univ. The Effect of Photo-Lineaments and Structural Geologic Variables on Water-Well Yield in the Carbonates of Conestoga Valley, Lancaster Co., Pa. Project based on raw data from Meisler and Becher (1973) and on photo-

lineaments mapped by Steffy. Only those carbonate aquifers displaying high contents of insoluble impurities exhibit an effect of photo-lineaments on the yields of nearby wells. High well yields were found for wells in areas of high bedding dip and high cleavage dip, and for wells close to faults and in limestone beds. ACD: May 1977.

IGNEOUS AND

METAMORPHIC

PETROLOGY



F. E. DEMMON, III, and W. A. CRAWFORD, Bryn Mawr Coll. Investigations of the Origins and Metamorphic History of Precambrian Gneisses in the Downingtown 7-1/2' Quad., SE Pa. Gneisses of the Honey Brook Uplands in the Downingtown 7-1/2' quad. are being remapped and current terminology applied to them. Petrographic and geochemical techniques are being used to determine their geologic history and pre-metamorphic parents. ACD: May 1977.

A. A. DRAKE, JR., and R. I. TILLING, U. S. Geol. Survey. Petrochemistry and Radiogenic Heat Producing Minerals of Reading Prong Rocks [Pa.-N. J.-N. Y.]. Collecting will be done in northeasternmost N. J., eastern N. Y., and Little South Mountain, Pa. Preliminary work suggests that hornblende-granite-alaskite suite has high heat productivity values and that sodic metasedimentary-metavolcanic rocks have unusual Th/U ratios. ACD: 1981.

W. F. THOMANN and W. A. CRAWFORD, Bryn Mawr Coll. Igneous and Metamorphic Petrology of the Honey Brook Uplands [Elverson, Pottstown, and Phoenixville 7-1/2' quads., SE Pa.]. Granulite facies metamorphism was followed by incomplete amphibolite facies metamorphism. Two major suites of rocks are: 1) granulite gneisses (meta-plutonic rocks), 2) hornblende granulites, felsic amphibolite gneisses (metavolcanics), and graphitic granulite gneisses (metasediments). ACD: May 1977.



MINERALOGY

J. H. BARNES, Pa. Geol. Survey, and W. F. DOWNEY, JR., Juniata Coll. Mineralogy Associated with Burning Anthracite Deposits [Luzerne, Schuylkill, N. Dauphin Cos.]. Study of minerals forming from sublimation of gases produced by subsurface fires in anthracite mines and culm banks. ACD: 1977.

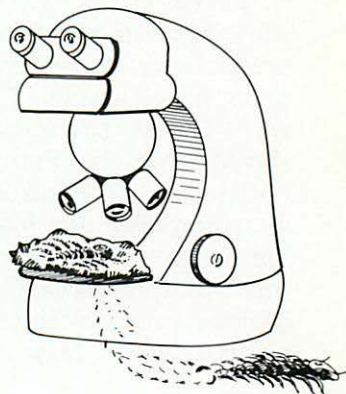
AUBREY CAMERON, Lehigh Univ. Fluid Inclusion Studies of Vein Minerals in the Jacksonburg Formation, Lehigh and Northampton Cos., Pa. ACD: Oct. 1977.

R. D. FINKELMAN, U. S. Geol. Survey, and P. A. ESTEP-BARNES, U. S. ERDA. Nickeloan Pyroaurite from the Cedar Hill Quarry, Lancaster Co., Pa. ACD: May 1977.

D. R. SIMPSON, Lehigh Univ. Dolomitization and Authigenic Minerals in the Beekmantown and Jacksonburg Formations [eastern Pa.]. ACD: 1979.

R. C. SMITH, II, M. L. ANNE, and others, Friends of Mineralogy. The Mineralogy of Pennsylvania, 1966-1975. Sixty species new to the state are described in detail with physical properties, chemistry, and precise location supplemented by crystal drawings, geologic maps, and mineral photographs. ACD: July 1977.

PALEONTOLOGY



T. M. BERG, Pa. Geol. Survey, and R. E. THOMS, Portland State Univ. Comparison of Burrows of the Devonian Bivalve *Archanodon* with Those of the Holocene Bivalve *Margaritifera*, and the Stratigraphic Implications of These Particular Trace Fossils. Burrows of *Archanodon* have been found at the base of the Catskill Formation in Pennsylvania from the Delaware Valley to Tioga Co., and in the Green Pond syncline of N. Y. and N. J. Laboratory analyses of burrowing behavior of *Margaritifera* have been continued to establish its validity as an analog to *Archanodon*. ACD: Early 1978.

P. A. DICKSON, H. B. ROLLINS, and J. D. DONAHUE, Univ. of Pitt. Paleontology and Paleoecology of Upper Carboniferous/Lower Permian Nonmarine Section in Pa., W. Va., and Ohio. Research has principally focused on the systematic description and distribution of nonmarine Bivalvia in the Appalachian coal field region. Emphasis is upon the stratigraphic utility and population dynamics of evolving populations in changing environments. ACD: 1977.

W. F. KLOSE II, Paleontological Research Inst. Curation of the Unger Collection of Fossil Plants and Insects, Reading Public Museum. Curation of Buck Mt. No. 5 specimens and fossil insects. Phase I, additional 7000 specimens. ACD: Phase I, 1978. Curation of the Everhart Museum Fossil Plant Collection, Scranton, Pa. ACD: Dec. 1977.

W. F. KLOSE II, Paleontological Research Inst. Cones and Megaspores of *Lepidocarpon* from Pa. [NE Pa.]. Materials for the study collected and curated. Review of specimens (types) at the USNM completed. ACD: 1977.

W. F. KLOSE II and DONALD BADMAN, Paleontological Research Inst.

1. Additions to the Coal Fauna (Allegheny) of Pennsylvania [NE Pa.]. Specimens of crustaceans, insects, and medusa found in the past few years will be treated. ACD: 1978.

2. The Flora of the Baltimore Coal (Allegheny) [Wilkes-Barre]. ACD: 1979.

3. The Flora of the Clark Coal, Carbondale, Pa. ACD: 1977.

4. The Flora of the Sugarnotch 2 Vein. ACD: 1978.

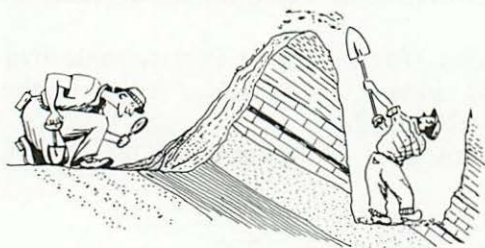
5. The Flora and Fauna of the Buck Mountain 5 Coal [Southern Anthracite basin]. A study of fossil plants, insects, and crustacea from the Buck Mt. 5 coal (basal Allegheny Series) in the Southern Anthracite basin in the Klose, Badman, William Penn Memorial Museum, USNM, and Reading Public Museum (Unger Collection) collections. ACD: 1980.

JANICE MERRIAM and I. H. TESMER, SUNY at Buffalo, Canada-way Palynology of Erie County (Pa.), and Chautauqua and Cattaraugus Cos. (N.Y.). Field samples have been collected and processed and identification is underway. It is hoped that various horizons can be discovered and that a sequence can be established for correlation purposes. ACD: 1978.

H. W. PFEFFERKORN and M. S. SCHEIHING, Univ. of Pa. Variability in Species of *Alethopteris* from the lower Llewellyn Formation (Pennsylvanian) near St. Clair, Pa. The large number of specimens of *Alethopteris*, available from a bed of only 30 cm thickness, allows evaluation of the variability of the species present. The variability is greater and the number of species smaller than anticipated from reports in the literature. ACD: May 1978.

J. E. REPETSKI, M. E. TAYLOR, E. L. YOCHELSON and R. B. NEUMAN, U. S. Geol. Survey. Lower Paleozoic Stratigraphy and Paleontology of East-Central Pa. [chiefly Berks and Lehigh Cos.]. Project will study stratigraphy, bio-stratigraphy, and depositional environments of lower Paleozoic rocks in Hamburg Klippe and adjacent terranes. Work is in collaboration with A. A. Drake's project: Central Appalachian Tectonic History. ACD: Sept. 1981.

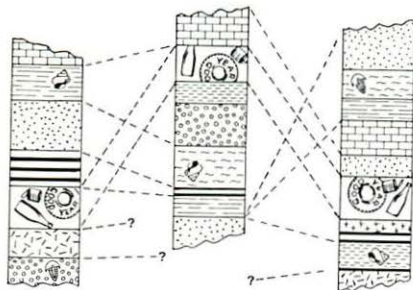
H. B. ROLLINS and J. D. DONAHUE, Univ. of Pitt. Trophic Analysis, Cyclicality, Evolutionary Rates of Conemaugh Communities [Appalachian Basin]. Reconstruction of Conemaugh marine communities with reconstruction of trophic structure. Study of evolutionary rates, inter- and intraspecific competition, character displacement, and competitive exclusion. ACD: Continuing.



SEDIMENTOLOGY

J. D. DONAHUE and J. M. ADOVASIO, Univ. of Pitt., and J. D. GUNN, Univ. of Texas at San Antonio, and ROBERT STUCKENRATH, Smithsonian Inst. Meadowcroft Rock Shelter [Avella, Washington Co.]. Excavation of paleo-indian site presently dated back to 16,000 B. P. by C-14 examination of sediments within colluvial pile at base of rock shelter. Attempt to reconstruct paleoclimate. ACD: 1978.

STRATIGRAPHY



PING-FAN CHEN, W. Va. Geol. Survey. Lower Paleozoic Stratigraphy of Central Appalachians. ACD: Completed.

J. M. DENNISON, Univ. of N. C. Purcell Member Marker Horizon and Its Correlated Carbonate Equivalents within Marcellus and Millboro Shales of Appalachian Basin Devonian.

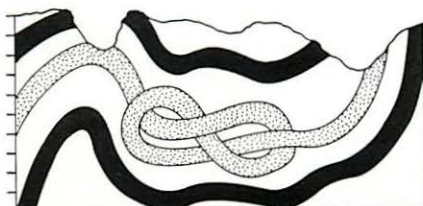
J. M. DENNISON and DANIEL TEXTORIS, Univ. of N. C. Summary of Tioga Bentonite Marker Horizon in Appalachian Basin Devonian Shale (U. S. ERDA contract). ACD: Late 1977.

W. E. EDMUNDS, Pa. Geol. Survey. Carboniferous of Pa. — Chapter in U. S. G. S. Professional Paper on Carboniferous of U. S. A 25-30 page summary of the stratigraphy, sedimentology, and economic geology of the Mississippian and Pennsylvanian of Pennsylvania. ACD: Fall 1977.

LOUIS HEYMAN, Pa. Geol. Survey. The Ridgeley Formation in the Subsurface of Pa. The subsurface Ridgeley Formation is defined by geophysical log markers. Delineation of the unit, a subsurface section showing lithic variations in the unit, and maps showing the extent and thickness of the unit and percent sandstone are planned. ACD: 1977-1978.

V. A. SCHMIDT, J. D. DONAHUE, and H. B. ROLLINS, Univ. of Pitt. Magnetostratigraphy of Carboniferous Sediments in the Appalachian Basin [SW Pa.]. Preliminary sampling and magnetic analysis within the Conemaugh Formation indicates that obtaining a complete reversal magnetostratigraphy of Carboniferous sediments in the Appalachian Basin is feasible. We have begun a comprehensive project with this goal.

STRUCTURAL GEOLOGY



J. M. DENNISON, Univ. of N. C. Effect of Late Precambrian Lineaments on Paleozoic Deposition and Subsequent Deformation of Appalachian Basin. Lineament in Pa. approximately along 40th parallel affected structural development and sedimentary tectonics in Late Precambrian, Ordovician, Permian, and Triassic. (Abstract of paper published in Geol. Soc. of America, Abstr. with Programs, v. 9, no. 3, p. 254-255.) ACD: 1978.

A. A. DRAKE, JR., PETER LYTTLE, MICHAEL TAYLOR, and J. E. REPETSKI, U. S. Geol. Survey. Central Appalachian Tectonic History [generally in area between Lehigh and Schuylkill Rivers]. A study of the evolution of the central Appalachians, particularly the role played by each of the major orogenies, their interrelations, and possible plate models. Structural studies will be supported by basin analysis and conodont studies. (Uncompleted work of Allentown quadrangle and vicinity project will be incorporated in this project.) ACD: Oct. 1981.

LOUIS HEYMAN, Pa. Geol. Survey. Subsurface Structure of the Plateau Region of North-Central and Western Pa. A map of subsurface structure on the top of the Ridgeley Formation, the base of the Mandata Shale, and the top of the Salina D unit, each where appropriate, is being compiled. ACD: 1978.

S. I. ROOT and D. M. HOSKINS, Pa. Geol. Survey. N 40° Latitude Fault System, Pa. ACD: 1977.

S. I. ROOT and D. B. MacLACHLAN, Pa. Geol. Survey. The Western Limit of Taconic Allochthons in Pa.

D. J. TEARPOCK and R. E. BISCHKE, Temple Univ. Structural Analysis of the Wissahickon Formation Along the Northern Section of the Wissahickon Creek Valley, Phila., Pa. This current research involving both the mesoscopic and microscopic analysis of the Wissahickon Formation reveals a complex polyphase deformational history consisting of three episodes of fold generation. This region appears quite similar to that seen in most thrust belts throughout the world. ACD: May 1977.

FIELD CONFERENCE IN NORTHERN NEW JERSEY

The annual Field Conference of Pennsylvania Geologists will examine Cambro-Ordovician stratigraphy and environmental geology of Northern New Jersey on October 6-8. New Jersey Department of Environmental Protection will serve as hosts and guides. Headquarters will be at Holiday Inn, East Stroudsburg, Pa. For anyone not on the conference mailing list, further details are available from Dr. Donald Hoskins, Pennsylvania Geological Survey.

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Continued from page 1


Always willing to serve, and interested in keeping abreast of current developments and new procedures, Bill has generously given of his time to serve on local, state and national committees, symposia, field trips, and short courses. He has served on committees of the American Association of Petroleum Geologists, the Interstate Oil Compact Commission, Ohio River Sanitary Commission, the American Petroleum Institute, the U. S. Bureau of Mines, the Southwestern Pennsylvania Oil and Gas Association, as well as officerships in the Northern Appalachian Geological Society, Pittsburgh Geological Society, and Middle District Oil Producers Association. Bill has had over 100 articles published in the major national oil and gas journals, and has presented well over twice that number of talks to professional societies in and out of state.

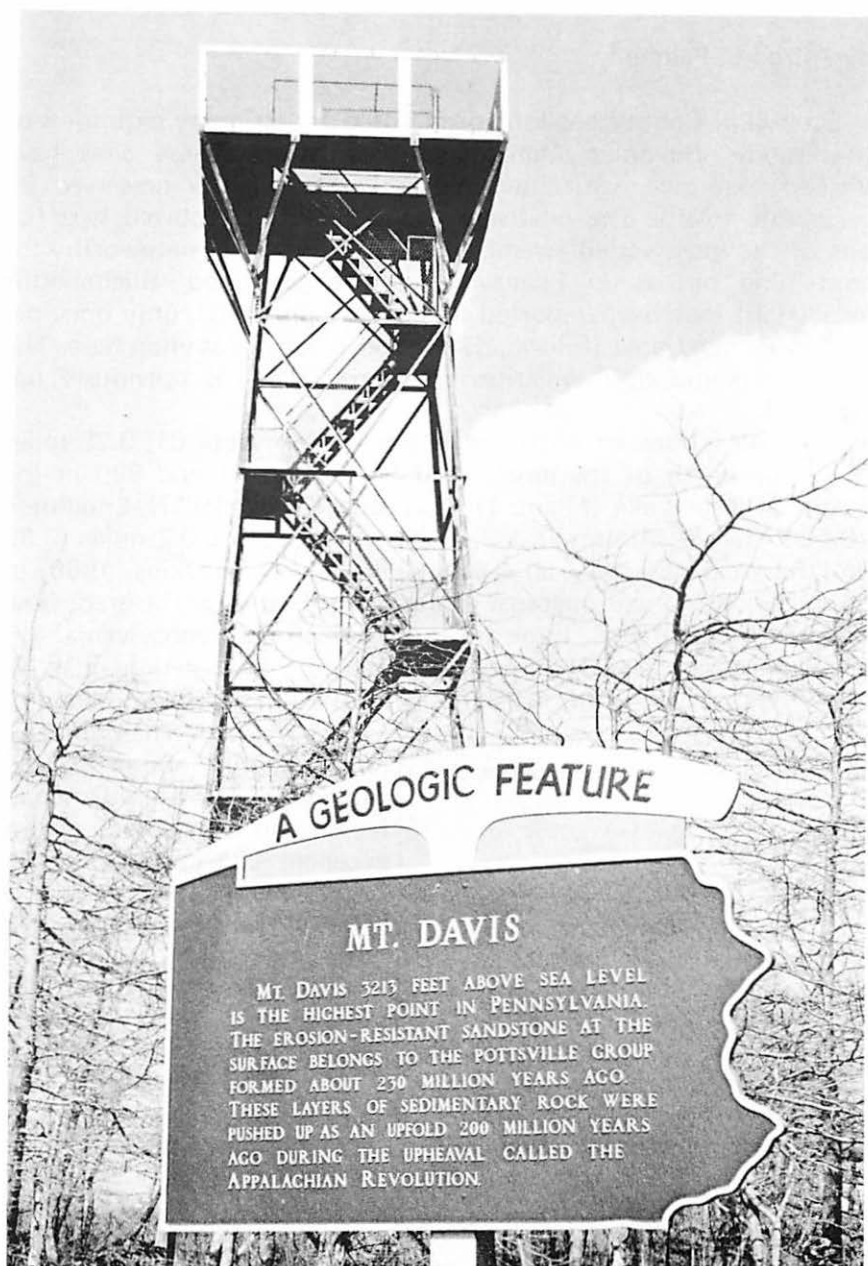
Bill Lytle's services to the public and the community have not been limited to his professional geological activities. He maintained his active status in the U. S. Army Reserves until his retirement from that service a few years ago as a full Colonel. He has been active in scouting in his home town of Butler, as well as helping to organize the National Scout Jamborees held in Pennsylvania. Bill has been an Elder in the Presbyterian Church since 1950 and has served the Butler Township School Board in a number of capacities.

Bill Lytle is a devoted family man. Married to Virginia Heath, a most charming lady and gifted writer and poet, they have four talented children, two sons in the arts, a meteorologist daughter, and a daughter college bound.

The Pennsylvania Geological Survey has been privileged to have Bill Lytle on its staff and the Commonwealth is the everlasting beneficiary of his outstanding services. To Bill Lytle, as a colleague and friend, we extend our deepest appreciation and heartiest wishes for a healthy and happy retirement.

Arthur G. Socolow

Mt. Davis (Somerset County) designed and authored by the Pennsylvania Geological Survey and erected by the Bureau of Parks. 



A GEOLOGIC FEATURE

MT. DAVIS

MT. DAVIS 3213 FEET ABOVE SEA LEVEL IS THE HIGHEST POINT IN PENNSYLVANIA. THE EROSION-RESISTANT SANDSTONE AT THE SURFACE BELONGS TO THE POTTSVILLE GROUP FORMED ABOUT 230 MILLION YEARS AGO. THESE LAYERS OF SEDIMENTARY ROCK WERE PUSHED UP AS AN UPFOLD 200 MILLION YEARS AGO DURING THE UPHEAVAL CALLED THE APPALACHIAN REVOLUTION.

Rare Fossils in Schuylkill County

by Alfred C. Palmer¹

Schuylkill County has long been noted for its many exposures of the Middle Devonian Mahantango Formation. These sites have yielded extensive, varied assemblages of excellently preserved invertebrate fossils. The relatively new borrow pit reported here has one of the most varied assemblages and is especially noteworthy for containing rarities in Pennsylvania. The gastropod, *Buchanopsis leda* (Hall), has been reported found, well preserved, only once before in Pennsylvania (Ellison, 1965) and is fairly common here. The simple ammonoid, *Agoniatites vanuxemi* (Hall), is previously unreported.

The site is located on the west side of Pa. Route 61, 0.25 miles (0.4 km) north of the junction of Pa. Routes 61 and 895 in the village of Deer Lake (Figure 1). (Latitude 40° 37' 19" N, Longitude 76° 03' 37" W, Auburn 7 1/2 - minute Quad.) It is 0.2 miles (0.32 km) north of Locality 50 - Schuylkill County (Hoskins, 1969, p. 94). It is owned and operated as a source of non-specific-grade base material by George R. Lynn Inc. of Port Carbon, Pennsylvania. Mr. Lynn welcomes small numbers of collectors at any time that his heavy equipment is not operating in the pit, but assumes no liability

for their safety. The company removes only about 10,000 cubic yards of material annually, so the site should afford excellent collecting for many years.

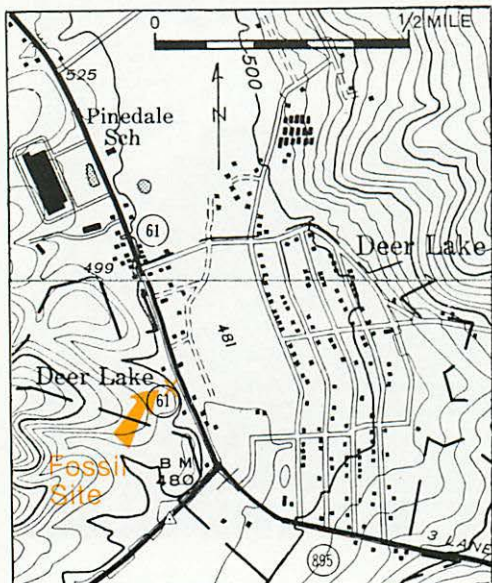


Fig. 1 Location of Schuylkill County rare fossils.

¹Rose Tree Media School District, Media Pa. 19063

Fossils are distributed throughout the layers and lenses of gray, calcareous, silty shale characteristic of the Mahantango Formation in this area. Most specimens occur as internal molds and lack detail, but the more dense rock yields exquisitely preserved external detail and some original shell material. The best collecting at present seems to be toward the center of the western edge of the pit. It is here that gastropods and cephalopods are more numerous. A concentration of large pelecypods and brachiopods occurs in the southeastern portion of the pit. Small brachiopods, gastropods and trilobite fragments are concentrated together in pockets throughout the pit.

The fauna at the Lynn site, dominated by infaunal deposit feeders, is quite similar to that found nearby at the classic "Deer Lake" site (Hoskins, 1969). It is distinct in containing large numbers of gastropods and cephalopods. It is tempting to speculate that the Lynn site represents a shallow, lagoonal microhabitat along the Devonian shoreline, which was conducive to the quiet activities of mobile deposit feeders, moulting trilobites and their mutual predators. Quite possibly it might also represent a point of accumulation of pelagic debris.

On three collecting trips the author removed over one hundred fifty identifiable specimens. The forms identified and the number of examples of each are listed below:

BRACHIOPODS		GASTROPODS	
"Chonetes"	10	<i>Bembexia sulcomarginata</i> (Conrad)	8
<i>Devonochonetes</i>	3	<i>Buchanopsis leda</i> (Hall) (Fig. 2)	8
<i>Lingula ligea</i> (Hall)	3	<i>Cyclonema</i>	9
<i>Mucrospirifer mucronatus</i> (Conrad)	6	<i>Tropododiscus</i>	15
<i>Orbiculoidea doria</i> (Hall)	1	Unidentified bellerophontids (molds)	
<i>Protoleptostrophia perplana</i> (Conrad)	3		
<i>Spinocyrtia granulosa</i> (Conrad)	3	CEPHALOPODS	
<i>Tropodoleptus carinatus</i> (Conrad)	6	<i>Agoniatites vanuxemi</i> (Hall) Fig. 3)	1
		<i>Michelinoceras</i>	15
		Unidentified ammonoids	4
PELECYPODS		TRILOBITES	
<i>Cypricardella bellastrata</i> (Conrad)	2	<i>Greenops</i> (<i>Greenops</i>) <i>boothi</i> var.	
<i>Goniophora hamiltonensis</i> (Hall)	2	<i>calliteles</i> (Green)	1
<i>Grammysia</i>	2	<i>Trimerus</i> (<i>Dipleura</i>) <i>dekayi</i> (Green)	6
<i>Leiopteria</i>	12		
<i>Modiomorpha concentrica</i> (Conrad)	4	PLANTS	
<i>Nucula varicosa</i> (Hall)	16	Fragments (<i>Calamites</i>)	
<i>Nuculana diversa</i> (Hall)	9		
<i>Nuculites triqueter</i> (Conrad)	2		
<i>Orthonota undulata</i> (Conrad)	6		

Most of the specimens are illustrated in Ellison (1965) and Hoskins (1969). The individual specimens from which identifications were made have been donated to the Pennsylvania Geologic Survey and are available for study in the Paleontological Reference Collection.

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Fig. 2 *Buchanopsis leda* (Hall). Original specimen is 3.5 cm across. (Photo by Mariana Palmer)

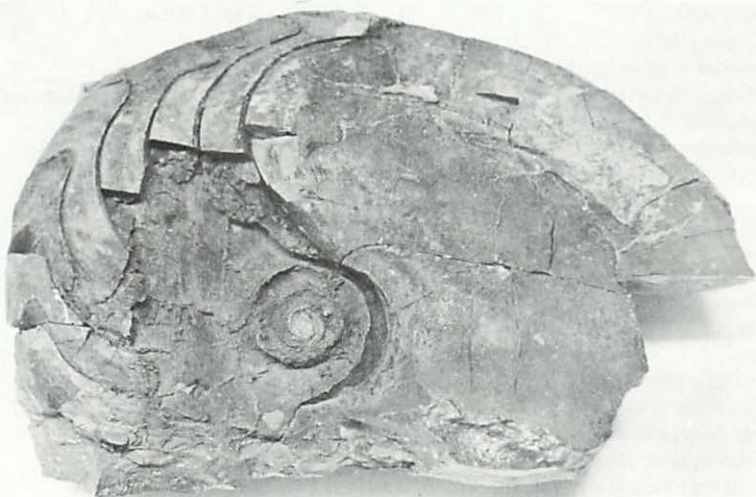


Fig. 3 *Agoniatites vanuxemi* (Hall). Original specimen is 15 cm at greatest diameter. (Photo by Mariana Palmer)



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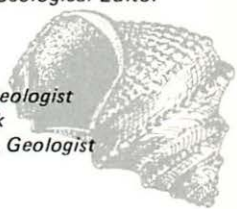
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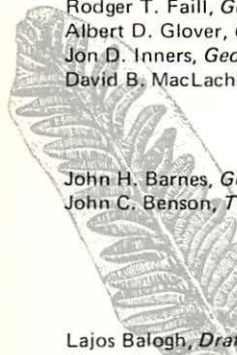
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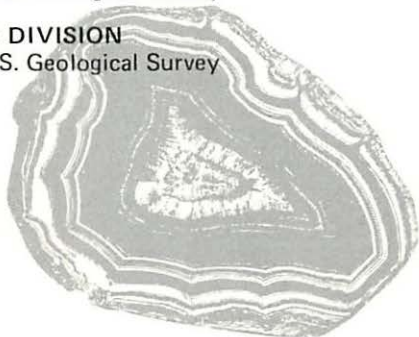

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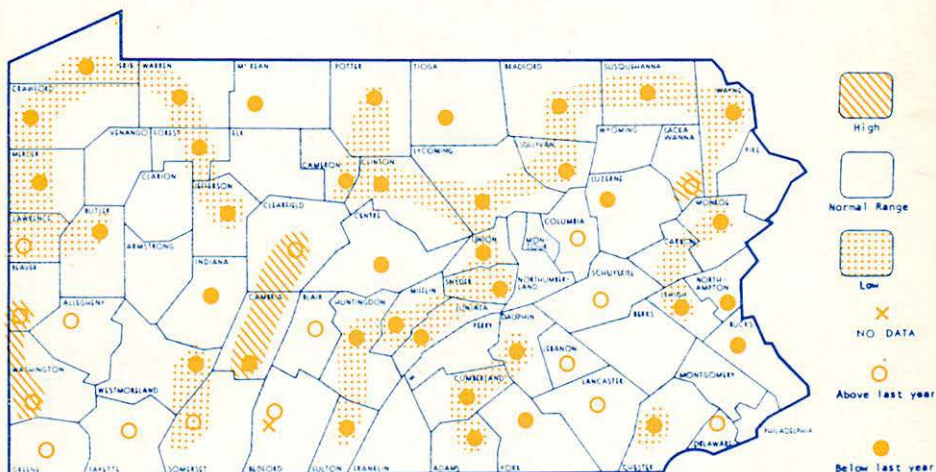
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