First State Geology

Current information about Delaware's geology, hydrology, and mineral resources

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Dr. Robert R. Jordan, Director And State Geologist, Retires

Dr. Robert R. Jordan has retired after 34 years as state geologist and director of the Delaware Geological Survey (DGS). His distinguished career with the DGS spanned 45 years. During his tenure as state geologist he served under eight Delaware governors. He is currently a professor in the Department of Geology at the University of Delaware.

Dr. Jordan's work has contributed significantly to the understanding of the geology, hydrology, mineral resources, and geologic hazards of Delaware. Under his leadership, the DGS has established a reputation for providing objective scientific geologic and hydrologic information, advice, and service to the citizens of Delaware, its businesses, and its governmental agencies. He played a key role in the development of state legislation and regulations related to such topics as water resources, state boundaries, oil and gas, subaqueous lands, solid waste disposal, mineral extraction, beach preservation, and professional licensing of geologists. The fruits of these labors have literally touched hundreds of thousands of Delawareans by increasing the understanding of the importance of geology and hydrology in our everyday lives. This work has also helped ensure a sound scientific basis for economic development, management of water resources, wise land-use decisions, environmental protection, and support of Governor Ruth Ann Minner's Livable Delaware initiative.

Dr. Jordan has authored or coauthored more than 100 publications, primarily dealing with stratigraphy, sedimentary petrology, the Atlantic Coastal Plain, applied geology, and the role of geology in public policy. Dr. Jordan has also been active in leadership for many years in numerous scientific and professional organizations. He is a member of eleven societies, has held elected and appointed offices in several organizations, and has received many awards, most recently the President's Award of the Division of Environmental Geology from the American Association of Petroleum Geologists in 2001. He has served on more than thirty boards, commissions, and committees for local, state, and federal agencies, and national scientific and professional organizations.

Dr. Jordan and Dr. Johan J. Groot, who preceded Dr. Jordan as state geologist, were instrumental in establishing the Department of Geology at the University. During his career he taught at least 21 different geology courses, supervised numerous graduate students, and impacted the lives of those he taught.

Delaware General Assembly Honors Dr. Robert R. Jordan

On Thursday, February 7, 2003, the Delaware General Assembly honored retired Director of the Delaware Geological Survey and State Geologist, Robert R. Jordan, for 45 years of service to the citizens of the State of Delaware.

Dr. Jordan was presented with tributes from the Senate and House of Representatives at a meeting of the Joint Finance Committee of the General Assembly co-chaired by Senator Nancy W. Cook and Representative Joseph G. DiPinto. "In the minds of most Delawareans, both in and out of government," reads the tribute by the Senate, "the name 'Robert Jordan' is synonymous with 'Delaware Geology.'" The tribute by the House of Representatives to Dr. Jordan noted "as State Geologist under eight Delaware governors, he has played an important role in geology and hydrology awareness in Delaware."

Dr. Robert R. Jordan and DGS Interim Director John H. Talley with the Joint Finance Committee of the Delaware General Assembly.

Front, from left to right: JFC Co-Chair Rep. Joseph G. DiPinto, DGS Interim Director John H. Talley, Dr. Robert R. Jordan, JFC Co-Chair Nancy W. Cook.
Middle: Rep. David H. Ennis, Sen. James T. Vaughn, Sen. Catherine A. Cloutier, Controller General Russel T. Larson, Sen. Margaret Rose Henry.
Back: Sen. Charles L. Copeland, Rep. William I. Houghton, Rep. Gerald A. Buckworth, Sen. George H. Bunting, Jr., and Rep. Dennis P. Williams.

John H. Talley Named Interim Director and State Geologist

John H. Talley, associate director of the Delaware Geological Survey at the University of Delaware for the last 11 years, has been named interim director of the Survey and state geologist until a permanent appointment is made, University of Delaware Provost Dan Rich has announced. "John Talley has worked with Dr. Jordan for nearly three decades, and he will do an outstanding job in providing continuity of leadership for the important work of the Delaware Geological Survey," Rich said.

A 1969 graduate of UD in geology, Talley earned his master's degree in geology at Franklin and Marshall College. After serving as an engineering geologist with a soil and foundation consulting firm, he joined the Delaware Geological Survey as a project geologist in 1972. He became associate scientist in 1974, scientist/hydrogeologist in 1980, senior scientist/hydrogeologist in 1986, associate director for hydrology and geophysics in 1992, and associate director in 1996.

Talley is the author or coauthor of more than 50 publications and reports pertaining primarily to the applied geology, hydrology and geologic hazards in the Atlantic Coastal Plain and Piedmont. He has served on dozens of boards, committees, and task forces for state, federal, county, and municipal agencies, the university, and professional organizations. He has served as both a member and chairperson of the Delaware Board of Professional Geologists. A licensed professional geologist in Delaware and Pennsylvania, he is also a certified professional geologist of the American Institute of Professional Geologists, which he currently serves as chairman of the National Affairs Committee and vice president of the Capitol Section.

Fun Facts on First State Fossils

By P. P. McLaughlin, Jr.

The Delaware Geological Survey is in the process of creating a series of web pages on Delaware fossils designed with students and hobbyists in mind. The first of these projects to be completed is our new "Cretaceous Fossils of Delaware" web site, available at www.udel.edu/dgs under Paleontology.

The Cretaceous Period is the last period in the Mesozoic Era, a time in earth history commonly called "The Age of the Reptiles." This period lasted from approximately 144 to 65 million years ago. During the Early Cretaceous, Delaware was primarily an area of rivers, swamps, and dry land. During the Late Cretaceous, the sea covered most of Delaware, and deposits that accumulated contain the remains of marine life.

This web site provides a look at these interesting fossil remains. Each group of fossils is briefly described and supplemented by pictures and drawings of some of the more common Cretaceous species illustrated in previous DGS reports. It also provides a checklist of Delaware Cretaceous fossils as well as maps of collecting sites and the geology of the area.

DGS Senior Scientist Pete McLaughlin designed the web site, and UD student interns Andrea Wedo and Mark Neimeister created the pages. Neimeister has also nearly completed a web site describing the remarkable 18-million-year-old fossils from the Pollack Farm site near Cheswold, Delaware. The Pollack Farm fossils represent one of the richest finds of fossils from the Miocene Epoch in eastern North America, a time when rhinos roamed a palm-studded Delaware landscape and manatees swam in the seas.

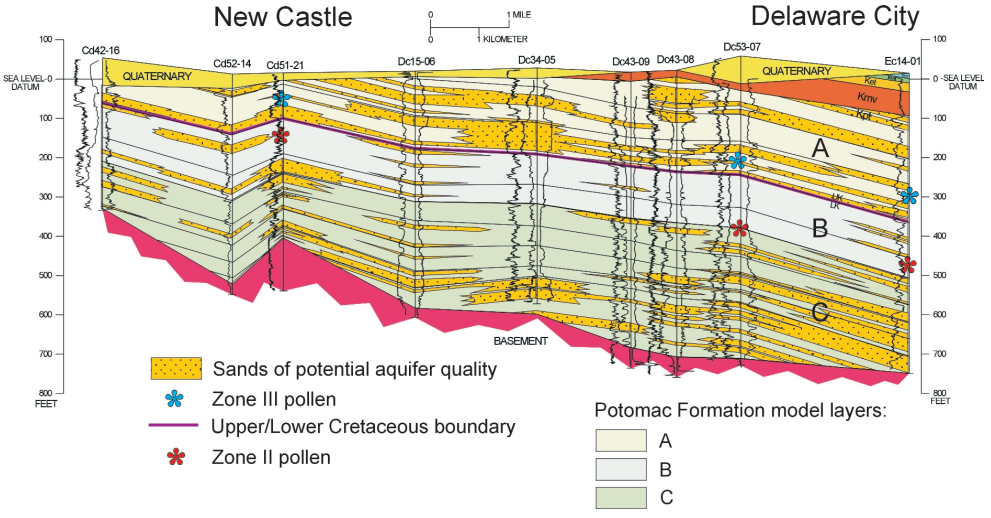
Whether you are interested in collecting, or just want to learn about Delaware's fossils, we hope our web visitors find these new web pages both interesting and educational.

Subsurface Mapping Provides New Insights into Ground-Water Resources of the Potomac Formation

By R.N. Benson and P.P. McLaughlin, Jr.

As part of our continuing investigation of the ground-water resources of the Potomac Formation in New Castle County, DGS Senior Scientist Richard Benson has recently completed a series of maps of subsurface geology that yield new insights into the distribution of water-bearing aquifer sands of the area. The Potomac Formation was deposited between approximately 125 and 95 million years ago by a complex of rivers and flood plains in a coastal plain setting. The area was affected by a tropical to subtropical climate, apparently with contrasting dry seasons and wet seasons. These conditions left a series of sedimentary deposits dominated by muddy flood plain sediments and ancient soils, but with a number of sandy intervals laid down by river currents. The sand intervals are important sources of ground water today but are discontinuous and variable in their ability to transmit water. Ongoing studies at the DGS are examining the connections between these aquifer sands in three dimensions to better understand the underground pathways for ground-water flow.

The Potomac Formation is the largest source of ground water in New Castle County, supplying approximately 24 million gallons of water per day for public, domestic, industrial, and agricultural use. Understanding this resource is a critical issue in government planning, as outlined in Governor Minner's recent report, "2020 On Tap: Ensuring Delaware's Fresh Water Supply." A DGS project team is assisting the U.S. Army Corps of Engineers in using our new findings to effectively address critical geological issues in the ground-water modeling project the Corps is currently conducting for the Delaware Department of Natural Resources and Environmental Control. We have recently established a new approach to correlation of aquifer units in the Potomac Formation, as described in the Winter 2002 issue of *First State Geology*. Three layers recognized within the Potomac Formation, designated A, B, and C, have been defined by the DGS and are used as ground-water model layers in



the Corps of Engineer's study. The distribution of potential aquifer sands within each of the three layers indicates that the upper (A) and lower (C) layers have higher percentages of aquifer-quality sand bodies than the muddier middle (B) layer. The cross section between New Castle and Delaware City shown here illustrates the greater degree of connection between the sand bodies within layers A and C than between those in layer B, and thus better ground-water flow within these intervals.

On the basis of the correlation of these layers around northern and central New Castle County and neighboring areas of New Jersey and Maryland, Benson has produced new, more accurate maps of the depth to each of these layers, from which their thickness and distribution can be determined. The maps will be the basis for construction of the geologic model to be used by the Corps of Engineers in their ground-water modeling study. In addition, cross sections and maps made during this project will be combined with others to produce a geologic map of Delaware, a DGS STATEMAP project undertaken as part of the National Cooperative Geologic Mapping Program, a cooperative effort of the Association of American State Geologists and the U.S. Geological Survey.

Geologic Map of Lewes and Cape Henlopen Quadrangles

By K.W. Ramsey

A new geologic map of the Lewes and Cape Henlopen quadrangles has been completed by Kelvin W. Ramsey. The map covers the area from just west of Lewes, north of Rehoboth, and all of Cape Henlopen, and shows the geologic units found at the land surface, and the distribution of offshore bottom sediments. These units include coastal and bay bottom sediments deposited when sea level was higher than present (Lynch Heights and Scotts Corners formations) as well as the recent dune, marsh, and spit deposits of Cape Henlopen. The map also shows historical shorelines of Cape Henlopen that document its growth northward during the last 100 years.

Geologic maps have applications within the state's economy and are used for, but not limited to, land use planning, identifying and managing surface and ground-water resources, resource exploration (sand and gravel), engineering applications, hazard identification, emergency planning, response, and recovery, and environmental protection.

Geologic Map No. 12 will soon be available as a down-loadable file from the DGS website at www.udel.edu/dgs under Publications. Printed copies may be obtained by calling the DGS at (302) 831-2833 or via email at delgeosurvey@udel.edu. Partial support of the mapping research was provided by a grant from the STATEMAP component of the National Cooperative Geologic Mapping Program.

Delaware GIS 2003 Conference

By W. S. Schenck

First Place, K-3: Taylesha Steward, Third Grade Teacher: Brandi Townsend of Brittingham Elementary

"A Vision for Tomorrow" was the theme for this year's Delaware GIS conference held April 29th at the University of Delaware. Governor Ruth Ann Minner delivered opening remarks and presented Judith A. Purcell, of Benjamin Banneker Elementary School in Milford, the Delaware Geographic Data Committee 2003 GIS in Education Award. Governor Minner then officially released newly acquired 1:2,400-scale digital orthophotography for the state. These orthophotographs will soon be available via the Internet through the Delaware DataMIL and DNREC's Internet Mapping Services website.

University of Delaware President David P. Roselle welcomed everyone to the University, and Jack Dangermond, CEO, Earth Systems Resource Institute (ESRI), delivered the opening keynote address. Mr. Dangermond praised Delaware's efforts for assembling the state's Spatial Data Framework Layers and serving them through the DataMIL map service.

This year's conference was the biggest, most successful Delaware GIS conference thus far. We had great participation from K-12 schools through our "What Does Geography Mean to Me" poster contest. Over 100 posters were submitted, and conference attendees voted for first, second, and third place winners. First place winners received a geographic game for their classroom, and all the winners received a certificate.

Mineral and Book Collections: Legacy of Roland E. Bounds

By C. T. Smith

Roland Bounds, former senior research technician with the Delaware Geological Survey, was a nationally known and respected collector of minerals and science fictions books. We would like to celebrate the preservation of the work that Roland truly enjoyed.

Prior to Roland's unexpected passing, he had been in contact with the curator of the Delaware Museum of Natural History. The museum was interested in further developing a mineral showcase as one of its display collections. Roland left a note stating that he would like his personal mineral collection displayed and enjoyed by visitors to the museum. His collection is now on display at the museum. For information on hours of display, please visit the museum's web site at www.delmnh.org.

A noted rare book dealer worked with Roland's estate, and his entire science fiction collection (nearly 15,000 items) was acquired by the Special Collections Department of the University of Delaware library. The spectacular collection had previously been featured in the library's 1991 exhibition, "Delaware Collects." Roland was particularly proud of his holdings of scarce vintage paperbacks and pulp magazines from the 1940s through the 1960s. The library is currently engaged in processing and cataloging the collection.

Publications

Recent DGS Publications

Geologic Maps

No. 12, Geologic map of the Lewes and Cape Henlopen quadrangles, Delaware: Kelvin W. Ramsey, 1:24,000.

Hydrologic Maps

No. 11, Ground-water recharge potential, Kent County, Delaware: A. Scott Andres, 1:100,000.

No. 12, Ground-water recharge potential, Sussex County, Delaware: A. Scott Andres, 1:100,000.

Other Publications by DGS Staff

Kenneth G. Miller, **Peter P. McLaughlin, Jr.,** James V. Browning, **Richard N. Benson,** Peter J. Sugarman, **Kelvin W. Ramsey,** J. Hernandez, **Stefanie J. Baxter,** M. D. Feigenson, D. H. Monteverde, B. S. Cramer, J. Uptegrove, M. E. Katz, **Thomas E. McKenna, Scott A. Strohmeier**, S. J. Pekar, G. Cobbs II, G. Cobbs III, M.-P. Aubry, S. Curtin, Chapter 3: Bethany Beach Site Report, *in* Proceedings of the Ocean Drilling Program, Initial Reports, Volume 174AX supplement, p. 1-84.

Kenneth G. Miller, James V. Browning, P. J. Sugarman, **Peter P. McLaughlin, Jr.,** M. A. Kominz, R. K. Olsson, J. D. Wright, B. S. Cramer, S. J. Pekar, and W. Van Sickel, 174AX leg summary: sequences, sea level, tectonics, and aquifer resources: Coastal Plain drilling, *in* Proceedings of the Ocean Drilling Program, Initial Reports, Volume 174AX, p. 1-38.

Peter P. McLaughlin, Jr., Field trip report: 2002 AASP/TMS/NAMS Post-Conference Field Trip, "The Cretaceous of the Isle of Wight," September 13-15, 2002, AASP Newsletter, v. 35, no. 4, p. 5-6.

Staff Notes

Presentations

A. Scott Andres, "Surface Water Loadings and Ground-Water/Surface-Water Interactions in the Inland Bays Watershed," Delaware Inland Bays Estuary Program, Scientific and Technical Advisory Committee meeting, January 24.

Todd A. Keyser, "What a Geologist Does," first and second grade classes, Mill Road School, May 30.

Thomas E. McKenna, "Geologists, Rocks, and Minerals," West Park Place Elementary School, Newark, March 27.

Peter P. McLaughlin, Jr., "Life of Delaware's Ancient Land and Seas," and "The Hidden Geology of Southern New Castle County and Delaware's Ground-Water Resources," teacher development workshop, Gunning Bedford Middle School, February 14.

Peter P. McLaughlin, Jr., presented a paper entitled "The Application of Sequence Stratigraphy to Aquifer Geology Problems in the Middle Atlantic Coastal Plain, United States: Leveraging Petroleum Geoscience Learnings to Public-Needs Issues," at the annual academia-industry collaboration conference of the Petroleum Group of the Geological Society, April 15-16. The paper was coauthored by Peter J. Sugarman of the New Jersey Geological Survey, **Richard N. Benson** and **Thomas E. Mckenna**, and Kenneth G. Miller and James V. Browning of Rutgers University. **Peter P. McLaughlin, Jr**., also chaired the afternoon session on April 15.

William S. Schenck led a field trip for instructors of the Brandywine Valley Association from Brandywine Creek State Park to "The Rocks" at Fort Christina Park in Wilmington; "Rocks and Minerals," Shields Elementary School, Lewes, January 23; demonstrated Delaware DataMIL for a congressional briefing at the University Consortium on Geographic Information Systems, Washington, D.C., February 12.

John H. Talley, "Water Supply Development Northern New Castle County, Meeting the Water Needs of 2020," Dover Capital City Rotary Club, April 17; "Delaware Environmental Observation System (DEOS)," David R. Legates, Daniel J. Leathers, Tracy L. DeLiberty, and Geoff E. Quelch, University of Delaware, and **John H. Talley**, Delaware GIS 2003, April 29.

Lillian T. Wang, "Delaware Inland Bays Shoreline Extraction Using Landsat 7 Satellite Imagery," Delaware GIS 2003, April 29.

Service and Awards

Congratulations to **Kelvin W. Ramsey** for 15 years of service, to **Thomas E. McKenna** for 5 years of service at the Delaware Geological Survey, and to **Lillian T. Wang** for promotion to GIS Specialist/Cartographer.

A. Scott Andres, Shue-Medill Middle School science fair judge, Newark, February 6.

Robert R. Jordan received proclamations from the Delaware General Assembly, and resolutions of appreciation from the Outer Continental Shelf Policy Committee of the U. S. Minerals Management Service and the Delaware River Master Advisory Committee.

Peter P. McLaughlin, Jr., was elected president of the North American Micropaleontological Section of the Society for Sedimentary Geology. The section promotes application, research, and education in the study of microfossils through sponsorship of conferences, organization of technical sessions at national scientific meetings, dissemination of news by the section's newsletter and website, and support of student research through grants and scholarships.

William S. Schenck was appointed to the Delaware Board of Professional Geologists by Governor Ruth Ann Minner and serves as president of the board.

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