

Nittany Mineralogical Society Bulletin

Nittany Mineralogical Society, Inc.

P.O. Box 10664

State College PA 16805

Editor (see page 8):

David C. Glick

March, 2014

Visit our web site: www.nittanymineral.org

March 19th meeting **opens at 6:00 p.m.:**

Geode Night

presented by Jeff Smith
"The Geode Guy"

Our March meeting will be held Wednesday the 19th in the lobby and room 116 (smaller auditorium) of Earth & Engineering Sciences Building on the west side of the Penn State campus in State College, PA. Maps are available through our web site.

6:00 to 7:10 p.m.: Purchasing & opening geodes in lobby
about 7:15 p.m.: featured program on Mexican geodes

The event has free admission and free parking, and is open to all; **parents/guardians must provide supervision of minors.** – Bring your friends and share an interesting evening.

NMS is very happy to welcome back Jeff Smith, "the Geode Guy," to present Geode Night to our club. Starting at 6:00 p.m. in the lobby, various sizes of whole geodes will be available for purchase at about \$5 and up. After you buy, Jeff will crack them open for you and you'll be the first person ever to see the crystals inside. If yours turns out to be solid, you can pick another at no charge. Jeff may also have some other geodes for sale.

The Las Choyas geode deposit was described in Jeff's extensive, illustrated article in the March-April 2010 issue of *Rocks & Minerals* magazine. This NMS Bulletin (available on our web site, www.nittanymineral.org) carried articles about geodes in the December 2011 and January 2012 issues, and *Rock & Gem* magazine's February 2012 issue included "The Hector Carrillo Family: the human story behind Mexican lapidary treasures," by Brad Cross.

At about 7:15 p.m., after the geode cracking has been completed, Jeff Smith will present a program on geodes in the smaller auditorium, room 116. He and his family have visited the geode mine in Mexico, and he has slides, good stories and video of the long trip out to the mine and then going underground to mine a few geodes themselves. It's fascinating! The program is family friendly and very interesting!

Here's Jeff's report on his recent visit: On July 15, 2013, I received an email from Jeannette Carrillo at Gem Center, USA, Inc. stating that it was "fairly safe to travel to the [Las Choyas geode] mine. If you would like to come down with your camera equipment, we would love to have you." This was welcome news, since my last trip to the mine was in November 2006, just one month before the official declaration

Continued with Jeff's photos on page 2



Our annual event for kids:

Minerals Junior Education Day April 5

Advance registration required

Please register by April 2 - \$5 per child

Spread the word!

Our annual Minerals Junior Education Day is fun and rewarding for kids and parents who attend, as well as NMS volunteers who present the event. The event will be held at a new location this year:

Central Pa. Institute of Science & Technology
540 North Harrison Rd
Pleasant Gap, PA 16823

Please **register in advance** for the approximate time (between 9:30 a.m. and 1:00 p.m.) that you will arrive (see **page 2** for registration instructions).

Students in grades 1-8 and their parents are invited to come and learn about minerals, crystals, gemstones, and fossils. At this event, kids get an empty egg carton when they check in, then go to a series of stations, each concerning a different aspect of mineral properties, rocks or fossils. They learn about the topic from a demonstration or discussion, and receive a properly labeled specimen related to the topic, so they gather a whole collection in their egg carton. The following stations are planned:

Gold panning	Fossil shells
Bedrock geology of PA	Gemstone identification
Fluorescence	and others being planned
Fossil bones	

– plus a sales table at kid-friendly prices.

PLEASE tell your friends and relatives and their kids!

We are seeking **volunteers** to help to present the stations; contact Dave Glick (see page 8). We also welcome advance donations of identified minerals, tumble-polished material, fossils, books, etc. which can be sold at child-friendly prices. As always, we are very grateful to those who provide crucial support in various ways: co-sponsors Bald Eagle Chapter of the Gold Prospectors Association of America, Junior Museum of Central Pennsylvania, and the Penn State Earth & Mineral Sciences Museum; and donors of materials including Michael and Barbara Sincak, Pen Ambler, Ruth Park, and others.

For updates, directions and maps, see
www.nittanymineral.org

Continued with

REGISTRATION INFORMATION on page 2

Geode Night

continued from page 1



of the Mexican Drug War. I made plans to return in November 2013.

In 2008, Gem Center suspended underground mining activities due to moderate earthquake activity centered in Chihuahua. At that time, they had been mining between 90 and 125 feet beneath the desert floor. In order to maintain production, Gem Center purchased excavation equipment to



begin strip mining along a portion of the deposit outcrop. This decision has been successful and productive. To date, an area approximately 300 feet long

has been mined along strike of the deposit, and the resulting high wall measures about 20 feet. The excavation has also exposed the classic room and pillar mining technique that has been employed underground since the 1960's.

In the summer of 2013, since seismic activity had subsided, two new shafts were sunk down dip to probe the depths of the deposit. The geode-bearing zone was encountered at 150 feet and 210 feet below the surface. The two shafts have been connected with a tunnel and they have been mining along strike. Potentially, the geode zone could be mined down to 600 feet below the desert floor, where the regional water table would be encountered.

Like my last few trips, I was lowered down the 150-foot shaft like a bucket into a well, as I carried my hammer and camera equipment. I was able to shoot videotape and still



photos of mining activity, and oh yes, I mined my own geode, which contained amethyst! ✨

Junior Education Day *Continued from p. 1*

Register in advance, starting March 17, by April 2: BY E-MAIL

Please register by e-mail if possible, as described on the web site www.nittanymineral.org - that's the easy way for us to get your information correctly. We will have a **PayPal** payment option there.

OR BY TELEPHONE

Call (814) 234-4532 (leave a message if no answer) to reserve a starting time slot of your choice at the event (each half-hour from 9:30 a.m. to 1:00 p.m. on April 5, so that we can spread the crowd out through the day). You will be asked for names and addresses of the students so that checking in on-site will go quickly (we will also enter them in our door prize drawing and send them an announcement next year).

THEN send \$5.00 per student (check payable to "Nittany Mineral. Soc.," or simply NMS) to:

E. Bingham

145 Goddard Cir.

Penna. Furnace PA 16865-9729

Registration is limited so that we may provide a collection of specimens for each student. Parents come along for free, but don't get the specimens.

For updates, directions and maps, see www.nittanymineral.org

PUBLICITY NOTE: We appreciate your helping us publicize this event - **PLEASE** be sure to include "advance registration required" and our web site, www.nittanymineral.org Thank you! ✨

OTHER EVENTS FOR STUDENTS

Exploration-U State College 2104: March 25, 6-8 p.m.

<http://science.psu.edu/outreach/exploration-u>

A free event for the general public, at the South State College High School Cafeteria. SCASD teachers and students, Penn State faculty and students, and other groups showcase science, technology, engineering, and math (STEM) topics with hands-on activities for families and children.

EMEX: Penn State Earth & Mineral Sciences Exposition Saturday March 29

Sign up: <http://www.ems.psu.edu/emex>

Annual Open House. All high school students, current Penn State students, and transfer students who are considering an EMS major are invited to attend. Discussions, College tours, demonstrations, and speakers.

MEETING PROGRAMS COMING UP

Apr. 16: Rock Spheres: Discovery Cubed, by Jim Garthe

October 15: Charles R. Knight- Art and Geology, by Dr. Charles E. Miller, Jr. Rhoda Knight Kalt will be giving the introduction.

2014 EFMLS CONVENTION
PHILADELPHIA - MARCH 28-30
 from the March EFMLS Newsletter
 by Karenne Snow, Convention Chair

There's still time to sign up! Join us March 28 - 30 in Plymouth Meeting PA for an outstanding two-club show and an opportunity to learn about and enjoy your Eastern Federation of Mineralogical and Lapidary Societies.

The Philadelphia Mineralogical Society and the Delaware Valley Paleontological Society invite you to Mineral Treasures + Fossil Fair - an annual tradition that celebrates natural history. The show features fossil and mineral specimen dealers, scientific lectures, a display from Philadelphia's Academy of Natural Sciences, fossil and mineral exhibits and demonstrations by the Leidy Microscopical Society.

The EFMLS holds a superb auction at the show and celebrates its annual convention with an informal gathering of clubs, an annual meeting, and an awards banquet at the convention's hotel site.

We are gathering at the DoubleTree Suites Hotel, a beautiful and comfortable place with an incomparable breakfast and dinner buffet menu. (If you book a room online, use the code "MIN" to get your convention rate.)

Take part in the field trips that our clubs are sponsoring! We are excited to show you a classic Victorian-style natural history museum, the Wagner Free Institute of Science, and we hope you'll join us on an excursion to the Wissahickon Creek of Fairmount Park to learn about the classic metamorphic geology of the Philadelphia area.

Come early or stay late! Plymouth Meeting is just outside Philadelphia so you can get your history fix by visiting the Constitution Center and Independence Park in the city or touring Valley Forge Monument, not far from our venue. Science and art have honored places in the Philadelphia area, from the Philadelphia Art Museum to Audubon's home in Mill Grove and from the Franklin Institute to the Morris Arboretum. You'll be near West Chester, Wayne and Devon and may find much to interest you outside Philadelphia.

Give us a call for more information or if you would like to register. We hope to accommodate everyone! We are looking forward to welcoming you to our communities, to our show, and to the fun of a convention.

Show: LuLu Shriners Temple
 5140 Butler Pike, Plymouth Meeting, PA

Convention: DoubleTree Suites Hotel
 640 Fountain Rd; Plymouth Meeting, PA Ph. 610-834-8300

Registration Forms and Contact Information:
amfed.org/efmls/convention

Directions to Lu Lu Shriners Temple
From the PA Turnpike (I-276):

Take Norristown exit 333. After tollbooth follow signs for Plymouth Rd. Turn right at bottom of ramp onto Plymouth

Rd. Continue to the traffic light. Turn left at the light onto Butler Pike and proceed 3/10th mile, bearing left where the road forks to a stop sign. Proceed through the stop sign, bearing right, for 5/10th mile, passing beneath the Turnpike, to Lu Lu Shriners Masonic Temple which will be on the right.

From the Blue Route (I-476):

Take exit 20. Follow signs for Plymouth Rd, bearing left. At the bottom of the ramp turn right onto Plymouth Rd. Continue to the traffic light. Turn left at the light onto Butler Pike and proceed 3/10th mile, bearing left where the road forks to a stop sign. Proceed through the stop sign, bearing right, for 5/10th mile, passing beneath the Turnpike, to Lu Lu Shriners Temple which will be on the right.

NEWS FROM THE FEDERATIONS

Nittany Mineralogical Society, Inc., is a member of EFMLS, the Eastern Federation of Mineralogical and Lapidary Societies, and therefore an affiliate of AFMS, the American Federation of Mineralogical Societies. We present brief summaries here in order to encourage readers to see the entire newsletters.

The **EFMLS Newsletter** is available through the link on our web site www.nittanymineral.org, or remind Dave Glick to bring a printed copy to a meeting for you to see. In the March issue, President Hazel Remaley announces that the 2014 AFMS Honorary Scholarship Recipient from the Eastern Federation is (friend of NMS, from just down the road) Dr. Ryan Mathur, Professor and Chair of Geology at Juniata College, Huntington, PA. He will select two graduate students to receive scholarships from AFMS. The EFMLS convention is at the end of March at Plymouth Meeting, PA, outside Philadelphia (see the article reprinted at left). It will include a fundraising auction for the Eastern Foundation Fund. Ellery Borow writes about safety-related files which clubs should maintain. Darryl Powell urges us and our youth members, to write and publish illustrated mineral books; it's quite feasible using our computers. Historian Andy Celmer writes about responsible rockhounds who can make contributions to science, and other types. Spring Wildacres registration will close on April 1, unless it's full earlier. It's not too early to think about the fall session.

The **AFMS Newsletter** is available by the same methods. The March issue has updates on the AFMS Endowment Drawing. The Juniors column notes that Darryl Powell has a new 48-page *Diamond Dan's Mineralogical Dictionary for Mineral Collectors*, great for kids. The conservation & legislation article covers rules for collecting on US Forest Service lands. "What Does the AFMS do for You and Your Club?" is answered by Editor Carolyn Weinberger. Several Club Rockhounds of the Year are introduced.

Please see the web sites for the complete Newsletters. There's a lot there!
 - Editor

HISTORY AND GEOLOGY OF BAKER CAVERNS

by Dr. Charles E. Miller, Jr.
Geologist

Introduction

The Chambersburg (PA) area of the Cumberland Valley is rich in caves with at least 50 within 30 miles described in the literature. Most are small and poorly decorated, even by Pennsylvania standards. However, one of them, Baker Caverns at Williamson, was commercialized for 22 years. This cave has 3000 feet (914.4 m) of surveyed passages, is Franklin County's longest cave, and one of Pennsylvania's longest.



Figure 1. Discovery opening of Baker Caverns, circa 1830.

speleothems (secondary mineral deposits), particularly sodastraws, while cave walls were marked with carbon soot from candles (M. R. Burgan, Jr., personal comm., 2-22-91).

In 1931, M.L. Burgan came to Franklin County in search of caverns to develop and operate. Previously, he was tour guide in other caves, including Crystal Grottoes at Boonesboro, Maryland (M.R. Burgan, Jr.; personal communication; 2-22-91). Burgan learned of Williamson caves and, in 1932, leased rights from the J. Baker Limestone Company of York that quarried on site. The lease was for 99 years to all caves in a 1500-acre tract (Public Opinion, 9-4-54). Work on exploring and opening the caverns began at the beginning of the year and on July 3 Burgan and O.G. Edwards held the formal opening (Public Opinion, 1932). At this time, the name became Baker Caverns. A small two-story building (Figure 2) was erected over the cave opening. Later additions transformed the building into the one seen



Figure 2. Original building over entrance to Baker Caverns.

History

Baker Caverns were discovered in 1830 either when a sinkhole collapsed beneath a horse belonging to Samuel Myers, farm tenant (Martin Burgan, personal communication, 2-22-91; Public Opinion, 1932, pp. 1, 4) or when John Coffey, land-owner, blasted rocks (undated Baker Caverns press release). The cave was known variously as John Coffey Cave, Coffey Cave, and Williamson Cave (Public Opinion, 1930, p. 7). The original cave opening (Figure 1), located 30 feet from Route 995, was 2-2.5 feet wide. Dates cavers left behind indicate earliest, documented exploration was in 1836. Between 1836 and formal opening in 1932, Mercersburg Academy students explored the caverns. Early explorations vandalized



Figure 3. Building over entrance to Baker Caverns after additions.

today (Figure 3). In 1942 and 1943, Burgan bought the 155-acre farm on which Baker Caverns is located for \$6,200. He then canceled the lease previously held.

Preparing the cave for tourists included constructing walkways, stairs, and installing lighting. Walkways were initially crushed stone (Stone, 1932, p. 77) and later covered with cement. Because cement was carried in five-gallon buckets, progress was slow with only 20 feet or so cemented per day (Martin Burgan, Jr.; personal communication; 2-22-91). Cave lighting used daylight globes that gave a bluish tint designed to illuminate like natural light. No colored lights were used (Public Opinion, 1932).

Common to most commercial caves are exaggerated claims and Baker Caverns were no different. Tours were said to be about 5000 feet when, actually, they were significantly less. A 1942 Baker Caverns tour was advertised as "one hour, one mile" (Petrie, 1942, pp. 61-62). The "5000 feet" and "one mile" claims are surprising because the cave's total length of surveyed passages is 3000 feet and that total was not determined until after the cave had closed. Even if claims included retracing part of the route, Stone (1953) reports: "the route traversed, including steps retraced, is about 250 yards (750 feet or 0.14 miles) and is easily covered in 40 minutes. Smeltzer (1964) reports a tour length of 1160 feet (0.22 miles). The Record Herald (date unknown) reported that an average tour was an hour and fifteen minutes.

Baker Caverns advertising used billboards, some as far away as Bedford and Gettysburg (M.R. Burgan, Jr.; personal communication; 2-22-91) and brochures. In those years Pennsylvania's commercial cave owners reciprocally displayed brochures of each other's caves.

During the opening summer (1932), admission was 50 cents for adults. In 1942 it was 55 cents for adults and 25 cents for children (Petrie, 1942, pp. 61-62). To facilitate tourists, soft drinks set in tubs of cracked ice were sold. A gift shop, hotel, parking area, and picnic grounds were provided. The picnic area was on the other side of Route 995, directly across from the gift shop. A small metal gate provides access to the former picnic grounds, now overgrown. There, picnic tables, trees, and rose bushes provided a relaxing setting for tourists. One picnic table was an old grist mill wheel now located on the Williamson Community Center grounds (Joseph A. Budd, personal communication; 1-20-91). Gift shop souvenirs ranged from postcards, salt and pepper shakers, to pennants—emblazoned with the "Baker Caverns" logo. Some souvenirs were made in the gift shop, such as the piano/flower pot planters and ashtrays. These were made from local cedar trees. Today, most cedar trees near Baker Caverns are secondary growth. Other souvenirs included coin/pocket purses as well as turquoise bracelets and other jewelry. While most souvenirs were of local origin, one—Roseville Pottery—was imported from Gainesville, Ohio. Joseph A. Budd, Sr. of Williamson and Martin Burgan (grandson of the original Baker Caverns operator) of Chambersburg, both former tour guides at the caverns, have

excellent collections of historical postcards and other memorabilia. When the caverns closed in 1954, Mr. and Mrs. Burgan dumped souvenirs, brochures, and bumper stickers into the nearby limestone quarry located on the opposite side of Route 995 (M. Burgan, Jr.; personal communication; 2-22-91). Today, those would be collectors' items. At the same time, the gift shop was converted to living quarters.

During early years of operation, Martin Burgan, Jr. (grandson of M.L. Burgan) was too young to be tour guide. Instead he was a trailer—one whose job it was to trail at the end of a tour group, to keep the group generally bunched together, and to switch off lights behind them. The goal was to turn off one string of lights between groups. When not serving as a trailer, during tours Burgan put "Baker Caverns" bumper stickers on cars in the parking lot (personal communication; 2-22-91). One day in 1951 or 1952, Martin Burgan's parents asked him to skip school (James Buchanan High School) because he was needed to lead cave tours. One tour group to arrive that day included Martin's classmates (Mrs. Martin Burgan, Jr., personal communication; 3-1-91).

From 1952 until 1959 Bethlehem Steel Company purchased 35 land parcels in the Williamson area to increase its limestone reserves, despite denials it had plans to quarry in the area (Public Opinion, 2-3-55, p. 1). When the caverns closed in 1954, acreage that included the caverns became part of 3,185.18 acres Bethlehem purchased. The caverns, along with 155 acres of land, were sold to the steel company for \$65,000 (Public Opinion, 1954b). The January 21, 1953 edition of Public Opinion gives a chronology of the Williamson land purchases. From its closing until end of 1988, Baker Caverns were generally off limits to spelunkers. Only on a limited basis, requiring special permission, were groups permitted to tour the caverns. In 1988 the steel company sold all of its acquired acreage to a consortium of 10 farmers and Valley Quarries, Inc. (Hector Arechiga, Bethlehem Steel Company; personal communication; 2-20-91). The sale is recorded in Franklin County, PA. Deed Book, Volume 288-D. The pages are stamped Volume 1037, pages 246 to 249 (Roman Barvinchack; personal communication; 1-11-91). Since the sale, Lee and Dean Meyers of Williamson own Baker Caverns.

Baker Caverns were closed on Labor Day, 1954. Cessation of operations was due to two factors: (1) M.L. Burgan was having health problems, and (2) Bethlehem Steel's massive land purchases isolated Burgan property. Years of speculation about secret drilling and land purchasing in the Williamson area preceded the closing. Speculation included possible underground storage, quarrying high-grade limestone for fluxing steel, mining cobalt, mining magnetite, and government construction of a second underground Pentagon. The theories of possible cobalt and magnetite mining are interesting. No deposits of either mineral are known in the local area.

A potentially scientifically valuable discovery in Baker Caverns occurred when charcoal was found embedded under

2.5 inches of travertine (Mercersburg Journal, date unknown). The significance of charcoal is that it can be age dated using the radioactive isotope C¹⁴. It is not known if this discovery was authentic or an advertising gimmick. The disposition of the charcoal is unknown.

Baker Caverns' history draws from many sources, including newspapers. These provide information not always reported in other sources. However, they can also include inaccurate information, particularly when explaining geology. For example, one article described the effort to develop Baker Caverns in the following way: "Only those who visited the caverns in the first stage of their development can appreciate the scope of the undertaking. It meant tunnels through solid rock, paths hewn in walls of granite, detours around insurmountable barriers of stone" (The Record Herald, undated). There is no granite in the Cumberland Valley. In addition, newspaper articles sometimes describe cave formations in ways of little or no interest to a geologist. For example, they reference formations resembling common objects, animals, or people. In referring to Baker Caverns: "Canopies, tents, the head of an elephant with circus trappings, an old bake oven, faces, the huge jaw of an alligator, shields, leather hangings with fringes, water falls, flowers, etc. can all be seen" (The Record Herald, undated).

Geology

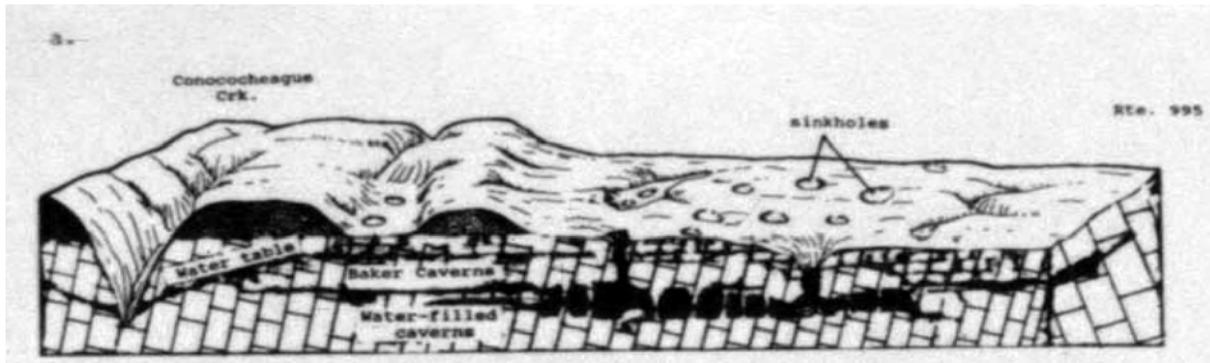
Smeltzer (1964) gives the most complete description of Baker Caverns, including a revised cave map. That map shows 3000 feet of surveyed passages whereas Stone's

(1932) map shows 675 feet of passage. Smeltzer (1964) also gives speleothem descriptions, room and passage dimensions, and general geologic observations.

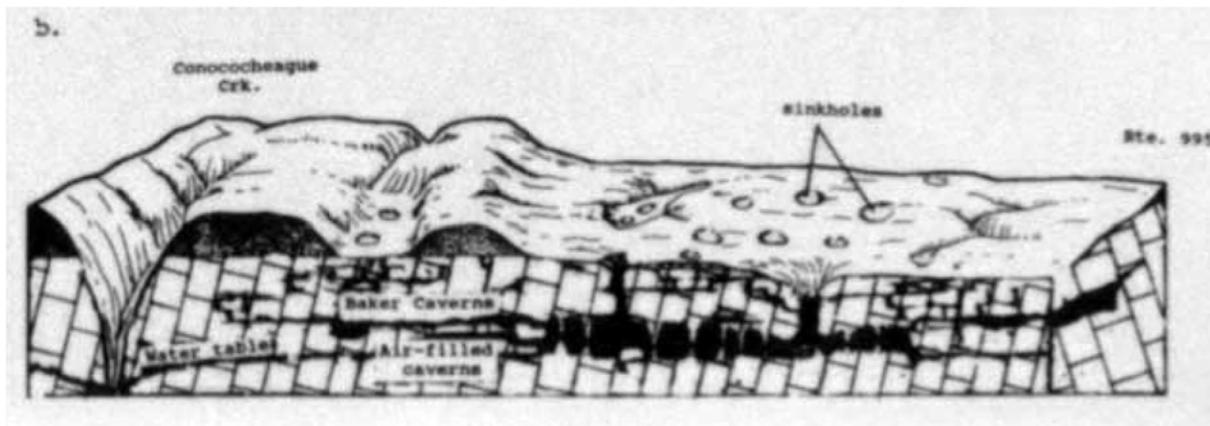
Formation of Baker Caverns is related to its geomorphic history and geomorphic setting. Cumberland Valley caves are age correlative with the Harrisburg Peneplain or erosion surface. At Baker Caverns, that surface forms the upland of the Conococheague Creek's west bank (Smeltzer, 1964). Cosmogenic isotope dating indicates dissection (cutting of valleys) of the Harrisburg erosion surface began 3.5 million years ago. Caves in the Great Valley all presumably formed over the past three million years – Pliocene to Pleistocene (White, 2007; White, 2009; White, personal communication, 10-1-12).

Conococheague Creek is a major Cumberland Valley stream, flowing south to the Potomac River. It displays incised or entrenched meanders along part of its course. Such meanders indicate change in stream dynamics. Where lateral erosion dominates, meander belts form in stream segments. In contrast, incised or entrenched meanders, as at Williamson, reflect stream rejuvenation. A rejuvenated stream erodes its channel deeper and transports its bed load. Conococheague Creek was incised during and after a change in the base level of the Potomac River during the Pleistocene (Wallace, 1980).

At Williamson, Conococheague Creek is within 250 feet of the northeastern end of Baker Caverns. As the creek erodes deeper, it lowers the local water table (Figure 4), controlling



Figures 4a, 4b: Baker Caverns in the phreatic (below the water table) and vadose (above the water table) zones.



cave development. Initial cave development is in the phreatic zone along bedding planes and joints (Figure 4a). After rejuvenation, the creek erodes deeper, causing the local water table to lower (Figure 4b). Cave development continues in the vadose zone with speleothem deposition being the major activity.

Additional Baker Caverns images are in the Mid-Atlantic Karst Conservancy library.

References Cited

Anonymous, 1930, Several caves in this county are of interest, Public Opinion, September 23, 1930, pp. 1, 7.

Anonymous, 1932, Many striking formations in Baker Caverns, Public Opinion, July 21, 1932, pp. 1, 4.

Anonymous, 1954a, Attorney adds 3 more farms to land string, Public Opinion, February 1, 1954; v. 84, no. 165, p. 1.

Anonymous, 1954b, Attorney to buy Borgan farm in Peters Township, Public Opinion, June 15, 1954, v. 84, no. 279, p. 1.

Anonymous, 1954c, Baker Caverns, open to public 22 years, will close this fall, Public Opinion, September 4, 1954, pp. 1, 5.

Anonymous, 1955, Bethlehem company does not plan quarry in area, Public Opinion, v. 85, no. 167; February 3, 1955; p. 1.

Cloos, E., 1951, History and geography of Washington County, In: The Physical Features of Washington County, Maryland Department of Geology, Mines and Water Resources, pp. 9-10.

Franz, R. and Slifer, D., 1971, Caves of Maryland, Educational Series No. 3, Maryland Geological Survey, pp. 21-22.

Petrie, J.S., 1942, Commercial Caves, NSS Bulletin, Number 4, pp. 61-62.

Smeltzer, B.L., 1964, Caves of the southern Cumberland Valley, Mid-Appalachian Region (NSS) Bull. 6, no. 6, pp. 9-10, 13, 15, 28, 55, 60-63.

Stone, R.W., 1932, Pennsylvania Caves, Bull. G3, PA. Topographic and Geologic Survey, 4th Series, pp. 55-56, 75-77.

Stone, R. W., 1953, Caves of Pennsylvania, The American Caver, Bull. 15, December, pp. 40-41.

Stose, G.W., 1909, Mercersburg-Chambersburg Folio: U.S. Geol. Surv. Atlas of U.S., Folio 170, p. 17.

Wallace, R.T., 1980, Incised meanders of Conococheague Creek: Univ. of Maryland, unpublished senior thesis, 30 p.

White, W. B., 2007, Cave sediments and paleoclimate, Journ. of Cave and Karst Studies, v. 69, no. 1, pp. 76-93.

White, W. B., 2009, The evolution of Appalachian fluviokarst: competition between stream erosion, cave development, surface denudation, and tectonic uplift, Journ. of Cave and Karst Studies, v. 71, no. 3, pp. 159-167. *

Geo-Sudoku

by David Glick

This puzzle contains the letters ACEHIPRTW, and one row or column includes a term for below the water table. Each block of 9 squares, each row, and each column must contain each of the nine letters exactly once. The solution is on page 8.

T		W	I			E		P
					A	R	W	C
	R	E					T	
H	I			P			E	
	E				W		P	
W	A	P			E	C		R
	H				T		C	W
					P		R	
E	W						H	

20 Years Ago in NMS

In March 1994, NMS's second meeting featured a program by Dr. Frank Aplan, Penn State Professor of Mineral Processing. He spoke on Ghost Mines and Mining Camps of the Old West, and illustrated his talk with many slides he had taken on his extensive travels to see the towns and the processing facilities they contained.

10 Years Ago in NMS

March 2004 saw our our fifth program on geodes by Jeff Smith. Then, as now, Geode Night was one of our most popular programs of the year.

Classifieds

Ads may be submitted to the Editor (see page 8)

FOR SALE: 2 Homemade Lapidary saws for sale - 14" and 18". Both come with working motors, arbor, belt, pulley, rock clamp/carriage, and a blade. Both are mucked-out and ready to move. Both could use a little TLC. For more info contact Mike Zelazny at fabricatefilm@yahoo.com

Some Upcoming Shows and Meetings

Our web site <http://www.nittanymineral.org> has links to more complete lists and details on mineral shows and meetings around the country.

March 22-23, 2014: Che-Hanna Rock & Mineral Club Show. Athens Twp Vol. Fire Hall, 211 Herrick Ave., Sayre, PA. Dealers, exhibits, kids activities, demonstrations, fossil ID, exhibit & silent auction by Carnegie Mus., fossil exhibit by Paleontological Res.Inst. Sat. 9-5, Sun. 10-4. <http://www.chehannarocks.com/show.html>

March 22-23, 2014: 36th Annual Gem- Mineral & Jewelry Show, by Franklin County Rock & Mineral Club, Chambersburg, PA; Hamilton Heights Elem. School, 1589 Johnson Rd, Chambersburg, PA. Sat 10-5, Sun 10-4

March 29-30, 2014: EFMLS Convention and Philadelphia Mineral Treasures and Fossil Fair, by Philadelphia Mineralogical Society and the Delaware Valley Paleontological Society. Lulu Temple, 5140 Butler Pike, Plymouth Meeting, PA 19462. Sat. 10-5, Sun. 10-4. <http://pms.moonfruit.com/#/mineral-show/4527879809>

April 18-19, 2014: First Gem, Mineral & Fossil Show for the non-profit North Museum of Natural History and Science. At Farm & Home Center, 1383 Arcadia Rd (off Manheim Pike), Lancaster, PA. Friday 10-6, Saturday 10-5. www.northmuseum.org/rockshow/

April 26-27, 2014: Monongahela Rockhounds Gem, Mineral and Fossil Show. West Mifflin Volunteer Fire Co. #4 Skyview Hall, 660 Noble Drive, West Mifflin (Pittsburgh), PA 15122. Sat. 10:00 - 6:00. Sun. 10:00 - 4:00. Free Admission & parking. www.monongahelarockhounds.org

April 26-27, 2014: 42nd Annual NJESA Gem & Mineral Show (plus outdoor swap and sell), by New Jersey Earth Science Assn., Franklin-Ogdensburg Min. Soc. & Sterling Hill Mining Museum (NJ). Franklin School, 50 Washington Ave., Franklin, NJ. sterlinghillminingmuseum.org

May 3-4, 2014: 11th Annual Show & Sale, by Mineral. Soc. NE PA. Oblates of St. Joseph, 1880 Hwy 315, Pittston PA

May 10, 2014: South Penn Spring Rock Swap, sponsored by Central Penn. and Franklin County Rock & Mineral Clubs. South Mountain Fairgrounds, Arendtsville, PA.

May 17-18, 2014: World of Gems and Minerals, by Berks Mineralogical Society. Leesport Farmers Market Banquet Hall, Rt 61, Leesport PA.

June 7, 2014: Spring Minerafest - Mineral Fossil and Gem Show sponsored by the Pennsylvania Earth Sciences Ass'n. Macungie Memorial Park, Macungie, PA

Geo-Sudoku Solution

T	C	W	I	R	H	E	A	P
I	P	H	T	E	A	R	W	C
A	R	E	P	W	C	H	T	I
H	I	T	C	P	R	W	E	A
R	E	C	A	I	W	T	P	H
W	A	P	H	T	E	C	I	R
P	H	R	E	A	T	I	C	W
C	T	I	W	H	P	A	R	E
E	W	A	R	C	I	P	H	T

INVITE A FRIEND TO JOIN THE SOCIETY

The Nittany Mineralogical Society prides itself on having among the finest line-up of speakers of any earth sciences club in the nation. Everyone is welcome at our meetings. If you'd like to be part of our Society, dues are \$20 (regular member), \$7 (student rate), \$15 (seniors), \$30 (family of two or more members, names listed). Those joining in March or later may request pro-rated dues. Your dues are used for programs and speakers, refreshments, educational activities, Bulletins, and mailing expenses. Please fill out a membership form (available at www.nittanymineral.org), make checks payable to "Nittany Mineralogical Society, Inc." and send them to

Nittany Mineralogical Society, Inc.
P.O. Box 10664
State College, PA 16805

or bring your dues to the next meeting.

We want to welcome you!

SOCIETY OFFICERS

David Glick (President) 814-237-1094 (h)

e-mail: xidg@verizon.net

Dr. Bob Altamura (Vice-President) 814-234-5011 (h)

e-mail: raltamura@comcast.net

Ellen Bingham (Secretary and Acting Treasurer)

e-mail: emb22@psu.edu

John Passaneau (Treasurer, on leave) 814-231-0969 (h),

e-mail: jxp16@psu.edu

OTHER CONTACTS

Field Trips: Ed Echler 814-222-2642

e-mail preferred: eechler@comcast.net

Junior Rockhounds: Dr. Andrew Sicree

814-867-6263 (h) e-mail: sicree@verizon.net

Membership Chair: David Glick (see above)

Programs: Dr. Duff Gold 865-7261(o), 238-3377(h)

e-mail: gold@ems.psu.edu

Door Prizes: *volunteer needed!*

Refreshments: *volunteer needed!*

Facebook: Mike Zelazny e-mail: maz166@psu.edu

The **Bulletin Editor** will welcome your submissions of articles, photos, drawings, cartoons, etc., on minerals, fossils, collecting, lapidary, and club activity topics of interest to the members. Please contact:

David Glick E-mail: xidg@verizon.net

209 Spring Lea Dr. phone: (814) 237-1094 (h)

State College, PA 16801-7226

Newsletter submissions are appreciated by the first Wednesday of the month. If you include photographs or graphics, please do not embed them in word processor files; send them as separate graphics files (TIF, or good to highest quality JPEG files, about 1050 pixels wide, are preferred). Please provide captions and name of photographer or artist.

Visit us at www.nittanymineral.org