Bulletin

of the Eastern Section of the National Association of Geoscience Teachers

Volume 72, Issue 1: Winter 2022

Stitch your science 2022

A call for climate-themed submissions

by Laura Guertin
Penn State Brandywine

In 2021, the first-ever **Quilt Your Science** event was held, inviting quilters of any age or skill level to create a quilt on an earth/space science theme. Twenty quilters from across the United States and Germany submitted images of 23 quilts for a virtual gallery and celebration in December. A summary of Quilt Your Science, along with quilts showcasing features ranging from a magma chamber to a Martian rover, is available online: https://blogs.agu.org/geoedtrek/2021/12/27/a-celebration-of-quilt-your-science-2021/

The organizers of Quilt Your Science (Laura Guertin and Betsy Wilkening) were thrilled to have so many geoscientists that are amateur crafters share their non-quilted STEM projects, that we decided to expand the categories for entries in 2022. This year, **Stitch Your Science 2022** invites knitters, crocheters, weavers, quilters – anyone that creates a project that involves stitching – to submit an image and description of their work.

Stitchers of all ages and skill levels are encouraged to create a project of any size that relates to this year's **theme of climate**. Topics may include climate data visualizations, climate change, climate justice, climate solutions, climate actions, and more. The items can be crafted by individuals or by groups/teams/classrooms. Individuals may submit

up to two crafted items and can be one created in previous years.

Images and 300-word descriptions of completed items will be showcased in a virtual display during the 2022 AGU Fall Meeting in December (there will be an opportunity to connect virtually for those not in attendance in Chicago).

The deadline to submit your photo and description is November 15. Stitchers do not need to be geoscientists or AGU members to participate. For more information, please visit the Stitch Your Science 2022 website: https://tinyurl.com/stitchscience22 or contact Laura Guertin (guertin@psu.edu).

STEAM in the Park

by Andrea Mangold
Holland Elementary School

Expeditions in Education: STEAM in the Park 2021
The summer of 2021 presented a slow return to in-person teacher professional development opportunities, largely in response to declining COVID-related diagnoses. The STEAM in the Park program, which took place in mid-July, took place in Acadia National Park at the Schoodic Institute. The program consisted of a series of workshops designed to get teachers out in the wild, and to explore ways to bring the grandeur of America's national parks into the classroom.

The objective of the program was to introduce students – through their teachers – to a problem associated with the United Nations Sustainable Development Goals (https://sdgs.un.org/goals). Specifically, the workshop was focused on Goal 14: Life under Water. Using the PBL approach, teachers were educated on the invasive European green crab (*Carcinus maenas)* that has wrought

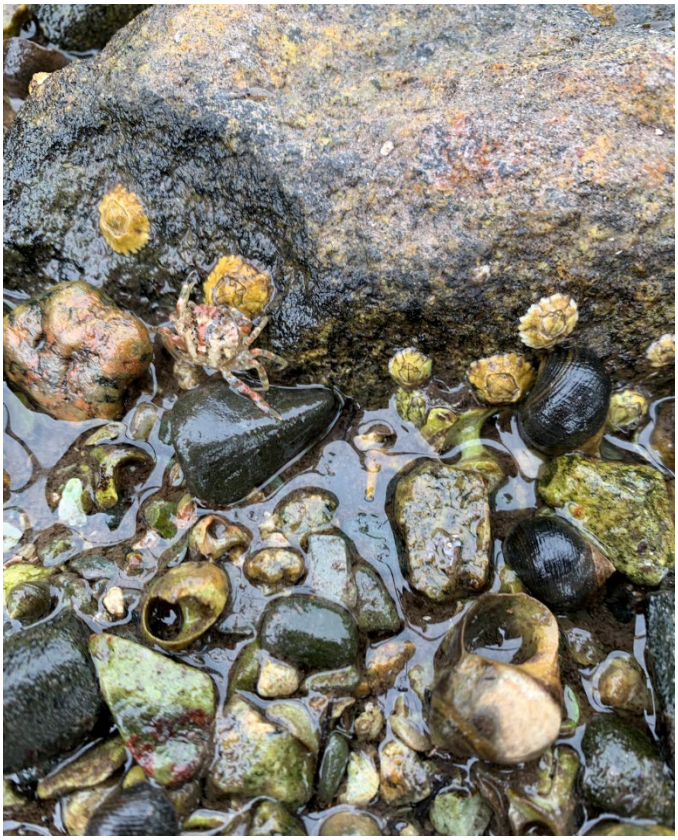
havoc on the soft-shell clam industry in the Eastern U.S. Where once eel grass and and mussels were thickly matted together, now only mud and green crabs can be found. European green crabs have also disrupted the food chain of native fish and bird species, and the green crab feeds on many

organisms, including clams, oysters, mussels, marine worms, and small crustaceans.

The Schoodic Peninsula is a mainland part of Acadia National Park, famous for its granite cliffs that face the Atlantic. The program was hosted at the Schoodic Institute, an educational facility that partners with the National Park Service to provide programming for schools, institutions and the general public.

Rangers from the National Park Service conducted several workshops prior to teachers going into the park to make observations. The rangers shared their knowledge of the Acadia geosystem and explained why the introduction of green crabs in the region is detrimental to both sea and human life alike. The crabs, indigenous to Europe, have had a tremendous impact on the clamming industry in the area. Teachers learned about the green crab through field observations conducted in the tide pools at low tide. Participants waded into the tide pools to inventory the many creatures that depend on the tide pool ecosystem for survival, such as clams, mussels, and snails. Water samples were tested to better understand the delicate chemical balance of the intertidal waters. Park rangers took particular interest in European green crab females that were festooned with eggs.

Seeing the crabs in their natural environment, along with the countless varieties of marine life that are affected by their population explosion was powerful; the delicate balance between predator and prey extends laterally as well as linearly, and that concept was made clear in our field observations. STEAM in the Park seeks support from both sponsors and teacher participants. For more information on 2022 national park opportunities check www.expeditionsineducation.org. The application window for new participants will open shortly. Of course, if you have any questions or would like additional information, please contact me at amangold@crsd.org.



This pic shows an intertidal pool where the invasive European green crab has proliferated along coastal Maine. Other organisms, such as snails, are no match for the green crab's voracious takeover.

You can contribute to the _Bulletin_!
Consider writing up your recent teaching triumphs, field trip locations, geoscience-themed travels, or essays. This issue offers a wealth of examples you might emulate for future editions of ***our*** newsletter.

Book review

The Day We Found the Universe, by Marcia Bartusiak. 337 pp. Vintage Books, New York, NY, 2009. Price: $16.95. (paperback) ISBN 978-0-307-27660-5.

by David J. Ludwikoski
Community College of Baltimore County

Most, if not all of us, have had to serve on committees of one sort or another in our lifetimes. We hear stories of the intense fighting and battles that go on in Congress and in our state legislatures nearly every day, it seems. It is often a difference of opinion, a battle of wills, and an exercise in compromise before an agreement is reached. Usually, no one gets exactly what they want, but, in the end, some good gets accomplished and we all move forward.

In science, there are definite similarities, but also distinct differences. Yes, there are differences of opinion, and there are battles of will. But, in science, it all boils down to who has the proof to show that his/her idea or explanation is the correct one. Without verifiable proof through peer review, anything else is just speculation. In Marcia Bartusiak's *The Day We Found the Universe,* we not only learn <u>when</u> Edwin Hubble changed our view of the cosmos, but the "story behind the story" of that momentous announcement on January 1, 1925. She states it well in her preface: "The discovery of the modern universe is a story filled with trials, errors, serendipitous breaks, battles of wills, missed opportunities, herculean measurements, and brilliant insights. It is science writ large." [xviii] Her book, written for the science enthusiast, is more than just a historical narrative. It is an engaging, persuasive adventure through humanity's defining of the cosmos with all its personalities, competitions, and leaps of faith amid caution.

Like many historical works, Bartusiak sets the stage by starting at the end: the annual meeting of the American Astronomical Society in Washington, D.C., December 30, 1924 – January 4, 1925, where Hubble's proof that our Milky Way was not the only galaxy or "nebula" was presented on January 1, 1925. As she does throughout the book, she puts events in the context of the day by including other events that happened at the time, and, in this case, it was the middle of the "Roaring '20s." Hubble was so unsure that his premise was correct and irrefutable that he did not attend and had Henry Norris Russell present the paper instead. As we soon see later in the book, this lack of confidence in one's work was not unique to Hubble: Others made major discoveries but were very cautious in sharing their findings.

Bartusiak then takes the reader back in time to the 1880s, where she begins her story with the building of the Lick Observatory in California, the first of several telescopes built by men of money (Lick, Lowell, Hale, Yerkes) who built monuments to themselves in the form of large telescopes. As scientists were continuing the quest to understand what those "fuzzy nebulae" were (even going back to William Herschel), bigger and bigger telescopes were built over the next several decades to not only solve that problem, but, more importantly, whether these "nebulae" were part of our Milky Way or else separate "island universes" unto themselves. As bigger telescopes were built, better ways of depicting these nebulae were developed in the form of photographic plates, and the spectra of these nebulae were studied in more detail to learn the nature, distance, and then movement of them, which led to both of Hubble's major discoveries in the 1920s. Along the way, there were disagreements, debates, personality conflicts, and periods of both recklessness and caution in the pursuit of knowledge.

Initially, the foundational work was done by James Keeler, the first to operate the 36" Crossley reflector at Lick by taking both excellent photographs of various nebulae as well pioneering the use of the spectroscope to measure speeds of nebulae in the Milky Way in the late 1800s. Soon after, Heber Curtis took up the baton at Lick and, after discovering novas in other nebulae in 1917, stated in 1919 that the nebulae are "island universes," based on the images he took with the Crossley. At the same time, Bartusiak judiciously relates the competition that ensued between the Lick and Percival Lowell's Observatory he built near Flagstaff, AZ (3,000' higher in elevation than the Lick with a better spectroscope). Lowell then hired Vesto Slipher to study the spectra of "white nebulae" in order to compare it to planetary atmospheres, but Slipher, by tweaking the

spectroscope and upping its capabilities, managed to discover that the spectra tell him that the nebulae are moving, and, with exception of the Andromeda Nebula, are all moving away from us in 1913. After much hesitation, he presented his results in 1914 (Bartusiak notes that Hubble was in attendance) and then embraced the "island universe" idea by 1917. This then begs question, "How far away are these nebulae?"

Bartusiak goes on to prove her point in introducing the next critical piece of the puzzle by telling the story of Henrietta Leavitt, and how she discovered the Period-Luminosity Law (1912), or what has come to be known as the Leavitt Law. Without it, Hubble could not have calculated the distance to Cepheid variable stars in other galaxies and determined that they were separate and very distant. Soon after, along came George Hale, and, with his money, built the Mt. Wilson Observatory outside Los Angeles, and hired Harlow Shapley, who used Cepheid variables and Leavitt's work in globular clusters to determine the Sun's position in the Milky Way, but because of his vanity (we're told) never gave her any credit.

The author then thickens the plot and sets the stage for Hubble's other great discovery of the expanding universe by introducing Einstein, how his general theory of relativity didn't account for a static universe, and how he "blundered" by introducing a cosmological constant. The debates between Einstein, Willem de Sitter, and Sir Arthur Eddington are entertaining (looking at them in hindsight), given Bartusiak's engaging style that sucks the reader into the drama. As it has been said, it took a lawyer to solve that debate in the form of Hubble. As with the other "players" in this grand adventure, Bartusiak keeps the reader's interest by giving the complete picture and humanizing him, "warts and all."

Interestingly, Hubble, using the brand-new 100' reflector at Mt. Wilson, moved cautiously in his investigation of the "nebulae," while he projected the persona of an English "stuffed shirt" that even made Shapley look charming and humble in contrast. He left nothing to chance, planning out everything in great detail, so that, even when he published about the distant "galaxies," he was not completely sure, but, once the word was out, the author describes how fame went to his head and drove him to solve the question of the receding galaxies and their red shifts. Once he did (establishing the now known Hubble Law in 1929) he not only used others' data (Slipher and Humason) without initially giving them credit, but publicly demonstrated what Slipher had shown over a decade earlier. This, in conjunction with Lemaitre's model of the expansion of the universe, further inflated Hubble's ego by proclaiming him as "the man who made Einstein change his mind" and abandon the idea of a static, spherical universe. So, "finding the universe" was the result of many decades of work done primarily in the United States with some distinct international contributions (Einstein, Eddington, Lemaitre, etc.). Marcia Bartusiak's story is more than a historical narrative. It is an engaging adventure through our defining of the cosmos with all of its personalities, competitions, and leaps of faith amid caution. It covers the approximately 50-year period from the 1880s until the 1930s, beginning with the investigations of those "spiral nebulae" by James Keeler at the new Lick Observatory followed by Heber Curtis, who called them "island universes." Shortly thereafter, Vesto Slipher at the Lowell Observatory began noticing that these nebulae were moving away from Earth, paving the way for Henrietta Levitt to determine the distances to stars in the Milky Way using her Period-Luminosity relation. Edwin Hubble, using the 100", or "next generation" of telescope at Mt. Wilson, uses Leavitt's work to "find the universe" and make his first landmark discovery that the "island universes" are actually separate galaxies in 1925 and then takes it to the next level by definitively determining that the universe is expanding, shattering Einstein's idea of a static universe in 1929.

The book as a whole is thoroughly engaging, extremely informative, well-written, thoroughly researched, and an overall joy to read. Bartusiak sets out her goals early on and fulfills them, point-by-point, in taking the reader through the journey of how we discovered the universe. Along the way, she makes it entertaining by providing plenty of side notes regarding the personalities and conflicts and by immersing the reader directly in the time period to get a complete sense of what things were like. She is totally persuasive in her argument from the outset, and I whole-heartedly recommend the book to anyone with an interest in either history, astronomy, or both.

Celebrate and Save these Rare Massachusetts Rocks!

by Prof. Richard D. Little, Prof. Emeritus,
Greenfield (MA) Community College

It was 50 years ago that, as a new instructor at Greenfield (MA) Community College (GCC), I found **lithified armored mud balls** in the Mesozoic Era rocks of the Connecticut River Valley of Massachusetts. They were prominently exposed in quarried blocks, part of a dismantled suspension bridge cable anchor at the edge of the Connecticut River at Unity Park, Turners Falls, MA. Armored mud balls form as hard mud chunks fall into a stream, become tumbled, round, and have sand and pebbles stick into the exterior of the mud ball (the armor). They must be quickly buried before they disintegrate. Next, add some geologic time for lithification (solidification to rock) of the armored mud balls, along with the surrounding sediment layers.

After several years of bringing many students and others to study and admire the Turners Falls armored mud balls, I researched the literature and discovered that lithified armored mud balls are extremely rare and that no one had documented them from the sedimentary rocks of our region. I wrote a paper describing them in the Journal of Geology* and also was able to get permission and assistance to have many of the bridge cable anchor stones moved to GCC to preserve them. They became the core attraction of a new Rock Park, now relocated to the Geology Path (picture below),** part of the GCC Outdoor Learning Lab. The Geology Path has, by far, the world's best examples of lithified armored mud balls.

If not appreciated the rare lithified armored mud balls of Franklin County are at risk of being forgotten. To bring attention to and "save" these rare features, I have embarked on a project to have them celebrated as an official State "symbol" -- the Massachusetts State "Sedimentary Structure." *(Note: like ripple marks, raindrop impression, and dinosaur footprints, armored mud balls are part of the geological category "sedimentary structures".)* There are over 50 symbols of Massachusetts celebrating bean, bird, donut, dinosaur, pie, horse, mineral, rock, gem, and many others, but the lithified armored mud balls are truly unique, not only for Massachusetts, but in the world. They

deserve to be officially recognized. Occasionally, people have seen and documented *contemporary* armored mud balls, but the discovery of *lithified* armored mud balls is very rare.*** The Massachusetts examples are not only rare, but unique in several ways. They have a great range of sizes from less than an inch to over a foot in diameter plus their armor coating is, in most cases, very distinct and colorful. Also, they are found in two different geological formations: the upper Triassic age Sugarloaf Arkose (Greenfield and Deerfield, MA) and the lower Jurassic age Turners Falls Sandstone (Turners Falls and Gill, MA). In between these two sedimentary formations is the 201,000,000 year old (early Jurassic Period, Mesozoic Era) Deerfield Basalt lava flow. Thanks to radiometric dating of the basalt, the armored mud balls are accurately dated in geological time. They are found in sedimentary layers both below and above the lava and indicate several hundred thousand years of armored mud ball formation episodes preserved in a tropical Mesozoic Era rift valley as the supercontinent of Pangea was splitting. Today, they are in a very localized area -- adjacent parts of four towns in Franklin County, MA, along the Connecticut River. Only about 40 specimens have been found, both in situ and in quarried blocks from two local quarries.

It is also notable that excellent specimens in monumental-sized quarried blocks have been assembled along the Geology Path at Greenfield Community College. (They are in the 6 blocks on the left side of the path (see picture) and can be easily viewed).**
The story of the Massachusetts armored mud balls plus references and pictures of many other contemporary (unlithified) and lithified armored mud balls is presented on this web site. https://armoredmudballs.rocks.

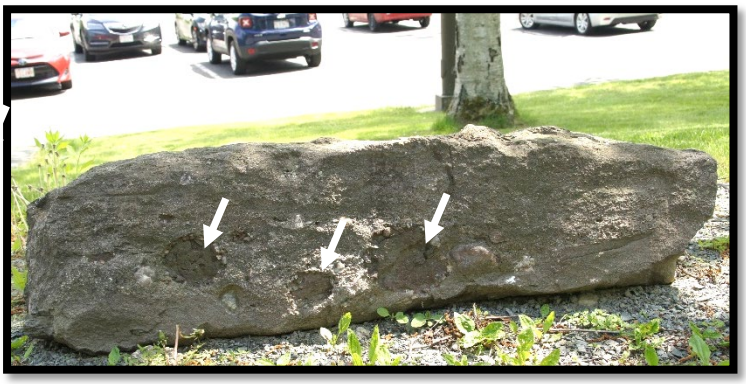
I am leading the effort to preserve, protect, and celebrate the Massachusetts lithified armored mud balls and have dozens of geologists plus three State Representatives ****supporting this effort. I work for free but am soliciting help with publicity and funding needed for promotion. There is a "Go Fund Me" link on the above web site.
The next time a bill can be presented to the State Legislature is January 2023, so 2022 is the year for extensive support to be gathered. If you care about science, education, or preserving history **please consider adding your name to the petition on the above web site, and/or just send me a note and a comment that might be included in promotional materials.** You do not need to be from Massachusetts to add your voice. Effective publicity and education is needed for the citizens of Massachusetts to appreciate this geological heritage and the State of Massachusetts needs to be recognized for having these rare sedimentary structures.

Everyone who sees the armored mud balls is impressed by these intriguing and photogenic sedimentary structures that record such interesting ephemeral events along these ancient dinosaur-age streams. They are a fun and effective way to promote Earth science education!

In conclusion: These ancient lithified armored mud balls are the best in the world and very likely the only ones in the world able to be easily seen and studied. Besides the beautiful scenery that Western Massachusetts offers, these unique features will likely become a favored and fun tourist destination. *They preserve not "rock and roll" but "roll and rock"!*

Note to all Massachusetts' and other Earth Science Teachers: please add the topic of armored mud balls as part of your Sedimentary Rocks studies. Textbooks do not include them.

Please forward this letter to other individuals or groups. That would be helpful and appreciated. ***Thank you, in advance, for your suggestions, comments, and support.*** If you reply to my email address I will update you about the progress of this effort.



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https://EarthView.rocks
https://armoredmudballs.rocks

Photos: Armored Mud Ball, Turners Falls Sandstone Fm., Turners Falls, MA, in quarried block. Dime for scale.
Geology Path, Greenfield Community College. Quarried block of Turners Falls Sandstone, GCC Geology Path, with armored mud balls indicated.
Photos by Richard D. Little, public use encouraged.

References

* Little, R.D., 1982, Lithified Armored Mud Balls of the Lower Jurassic Turners Falls Sandstone, North-Central Massachusetts, Jour. Geology, v. 90, p. 203 – 207. [Errata: V. 90, p. 465.]

Other descriptions and locations are in Little, R.D., 2020, Exploring Franklin County (MA), Earth View LLC, Easthampton MA, 200 p. and on the https://ArmoredMudBalls.rocks web site.

**The GCC Geology Path Guide is online – https://www.gcc.mass.edu/webdocs/science/geo-path.pdf Also see Prof. Little's 8 minute video tour -- https://youtu.be/_qyinmJ5P6c

***** Below is a listing of all the lithified armored mud balls noted in the geological literature or pictured online, with comments in italics.**

1. East Greenland, Kap Stosch Area. Triassic armored mud balls, cores eroded, but the armor included fossils from older rock, redeposited in the Triassic beds. Teichert, Curt and Kummel, Berhard; 1976, Permian-Triassic Boundary in the Kap Stosch Area, East Greenland; Meddelelser Om Gronland, Udgivne AF, Kommissionen For Videnskabelige Undersogelser I Gronland, Bd. 197, Nr. 5. *The Kap Stosch Area is a remote Greenland coastal area, 74 Deg. North.*

2. Teichert (above reference, p. 45) notes: Austria, "near Vienna", Eocene age "impression" of an armored mud ball found by noted geologist Rudolf Richter, 1926, Pl. 7, fig. 2 in Die entstehung von tongerollen und tongallen unter wasser: Flachseebeobachtungen zur Pal. U. Geol., XVI, Senchkenbergiana, Band VIII, Heft 5/6, p. 305-315.

3. Kugler, H.G., and Saunders, J. B., 1959, Occurrence of armored mud balls in Trinidad, West Indies: Jour. Geol., v. 67, p. 563-565. *This article mentions a "fossil" armored mud ball eroded from the Miocene Cruze formation at Erin Point along the south coast. Also mentioned are armored mud balls from Ecuador that were removed from a loose conglomerate layer in the middle of the marine sediments of the Socorro formation in the sea cliffs below Ancon, Ecuador. (p. 564). There is also a note that "Frass records such boulders with shell fragments for pebbles from the Jurassic of Spitzbergen." (p. 563) This article, therefore, references lithified armored mud balls from Trinidad, Spitzbergen, and Ecuador. The article has pictures of weakly lithified Miocene armored mud balls and recent ones from Trinidad.*

4. Stanley, D. J., 1964, Large mudstone-nucleus sandstone spheroids in submarine channel deposits: Jour. Sed. Petrol., v. 34, p. 672 – 675. *Noted from Eocene marine deposits from Contes, France.*

Picture: Romans, Brian; Friday Field Foto #41: Armored mudball (eroded out), Feb. 8, 2008, "Clastic Detritus" blog. *Pictured: a several inch round, hollow-shape marked by coarse sand & granules from the Eocene Grès d'Annot Formation of southeastern France. The poorly cemented "mud" is missing and only the outer armor remains.*

5. Cartwright, L.D., 1928, Sedimentation of the Pico Formation in the Ventura Quadrangle, CA: Am. Assoc. Petrol. Geol. Bull., v. 12, p. 235-269. *"Pudding balls" are mentioned from possible fluvial or shoreline Pliocene age deposits. No photos.*

6. Other locations with lithified armored mud balls: Eocene, Green River Formation, Cathedral Bluff Member – Wyoming and Colorado [https://dynamic-earth.blogspot.com/2011/10/armored-mudballs.html *– several photos of small, hard to distinguish, sand-armored balls in poorly consolidated conglomerate];* Patuxent Formation, Cretaceous, "Atlantic Seaboard" *[mentioned in Bell, 1940. No further reference found.] ;* Coastal cliffs near Coos Bay, Oregon*, [noted in a twitter photo with no further information. About a dozen balls, approx. 6 inches diameter, with apparent sand armor. The balls pictured were at the base of a sea cliff, at the high tide level*.] Belt Formation, Glacier National Park, MT. *[several red-clay, sand-armored mud balls].*

The above locations have been mentioned or photographed, but there is no evidence of distinct lithified armored mud balls with pebble armor. All are in remote and/or hard to find locations that may no longer be visible.

****** State Representatives supporting this effort:**

Paul Mark, Sean Garballey, and Ralph Lewis.

THE END: Please contact Richard Little for more information, questions, or comments.

RDLittle2000@aol.com // Little@gcc.mass.edu // 413-527-8536

FRANKLIN COUNTY'S UNIQUE ARMORED MUD BALLS **WHERE TO SEE THEM**

There are only 8 places to see Franklin County's unique lithified armored mud balls outside "in the wild". They are also in several museums, schools, and libraries.

This document reveals exactly where to see them (or where they have been found).

ONE PAGE OVERVIEW

(Please see the photos and details on following pages – OR -- at https://armoredmudballs.rocks)

Greenfield Comm.

Unity Park, Turners

Gill Bridge Cable

Stop & Shop, Greenfield

The Spring 2022 Eastern Section Conference May 19,20,21 at Berkeley Springs, West Virginia

The Spring 2022 meeting is set for the weekend of May 19-20-21 at Berkeley Springs, West Virginia. Our "base of operations" (meeting location, workshops, social events, Saturday night awards dinner, departure for field trips) will be the historic "Country Inn Of Berkeley Springs" located in the center of town right on main street (route 522). There are rooms available in the historic inn and also the hotel annex called the "West Inn" which is located in the rear lot of the Country Inn. There are other hotels and B&B's available in Berkeley Springs (Best Western) and nearby Hancock, Md. It is the responsibility of the meeting attendee to make their own housing reservations for the conference.

Conference host and coordinator; Steve Lindberg, Johnstown, Pa.

Tentative Meeting Schedule:

Thursday, May 19:
3:00 pm. Registration table will be open at the Country Inn. The first floor banquet room will serve as the center for all events held at the Country Inn. Arrive early and enjoy the historic town and area of Berkeley Springs. There are many pubs, gift, and antique shops. Berkeley Springs is located just a few miles south on Route 522 from Hancock, Maryland. In Hancock the Potomac River, and the C&O Canal Path provide excellent hiking and biking trails! Dinner is on your own tonight.

7:00 pm. Evening social gathering at the Country Inn banquet room. A new event for this conference will be a "Swap and Share". Bring your extra items; labs, handouts, maps, samples, etc. It is all swap and share, no selling. *Hors d'oeuvres* and soft beverages will be provided; other beverages are available at the Country Inn's "Morgan Tavern".

Friday, May 20.

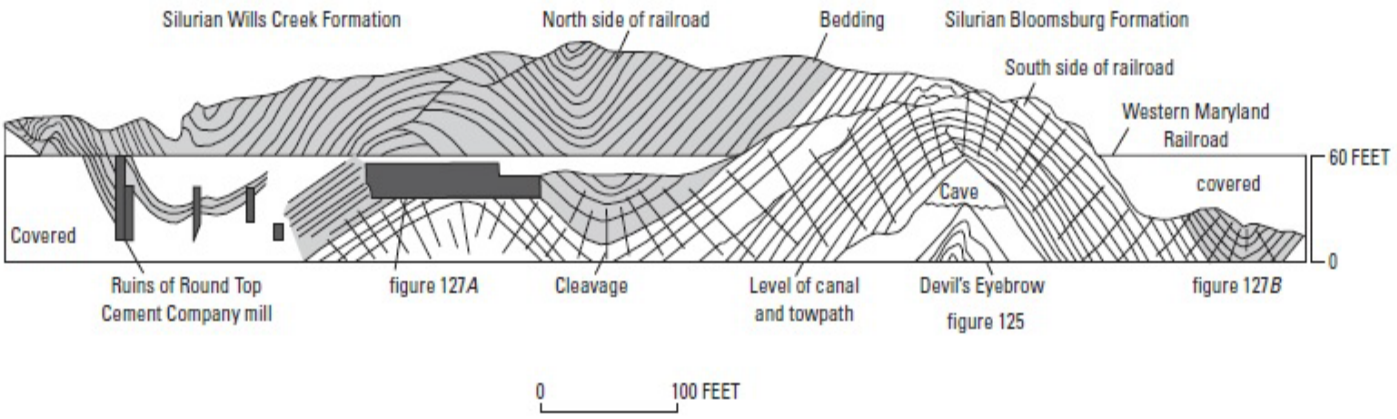
9:00 am -12:00 noon

"Short Presentations" session in banquet room. Coffee and rolls will be served. Full breakfast on your own at the Country Inn or other nearby restaurant. Similar to the short presentation sessions held at GSA meetings; prepare your posters, powerpoint presentations, demonstrations, short lesson, etc., to fit a *20 minute allotment*. Buffet lunch provided in the banquet room at 12 noon. Banquet room has a large screen and projector for group presentations.
See presentation form included in this announcement.

1:00 pm - 4 pm.

Field trip to National Park Site along C&O Canal in nearby Hancock, Maryland. Trip continues to the Sideling Hill "Big Cut" (I know, many of you have probably been there, but it is worth seeing again!) along route 68 a few miles west from Hancock. Third stop to the Sandy Mile Road cut along route 68 to view a very unique outcrop of the Devonian Oriskany Sandstone (called the Ridgeley SS in West Virginia). A great location to collect samples, including fossils!
Return to Berkeley Springs and dinner on your own.

7:00 pm - ????
Eastern Section Geoauction in the banquet room of the Country Inn with Hors d'oeuvres and soft beverages. Other beverages available in the Morgan Tavern.



Saturday, May 21. Breakfast on your own.

9:00am - 3:00 pm

Field trip to Hancock and the "Round Top Hill" geologic site along the C&O Canal. Departure will be from the Country Inn at 9:00am. Transportation to the drop off point will be provided due to limited parking. This trip requires approximately 2.5 miles of hiking along the level, paved C&O Canal bike trail that parallels the scenic Potomac River. The Round Top Hill exposures are about .5 mile in length and offer exceptional geologic structures that include folding and faulting that can be viewed closeup. Round Top Hill has been described as having "*some of the most beautiful folds and other structures in the Appalachian region*" (Cloos, E., 1951).

An optional hike to the lower path will be available to view the "Devils Eyebrow" anticline along with other folds at the abandoned cement plant along the Potomac River. Box lunch will be provided. Return to Berkeley Springs by 4pm.

6:00pm

Saturday evening eastern section awards/recognition dinner at the Historic Country Inn, banquet room; recognition of the eastern section state OEST and section awardees. Buffet dinner with several selections that will include a vegetarian entree.

Saturday evening speaker; Dr. Ryan Kerrigan, Department Chair, University of Pittsburgh At Johnstown, Energy And Earth Resources. Dr. Kerrigan will present "*Field Trips And Involving Students In Research*".

The State University of New York, and its partnership with NASA GLOBE, is partnering with the New York State Department of Conservation, the New York State Master Teacher's Program and the Erie 2-Chautauqua-Cattaraugus BOCES (E2CC) through grant funding from the University Corporation for Atmospheric Research, to foster the development and use of Earth System's Science into curriculum. While this work is focused closely on the Western New York Region, the hope of UCAR is that this partnership may serve as a model for other regions and states to incorporate ESS into their work.

The *Bulletin* is edited by Callan Bentley, Piedmont Virginia Community College. Please get in touch with your feedback, contributions, or if you would be interested in helping out with editing.

Registration Form

National Association of Geoscience Teachers Eastern Section Conference and Field Trips. May 19, 20, 21, 2022. Berkeley Springs, West Virginia

Each participant must submit a registration form. Lodging accommodations are the responsibility of the registrant. Pre-registration for the conference deadline date is **May 5, 2022. Registration questions? Please contact Steve at slindber@pitt.edu.**

Please fill in the form below and indicate your registration preferences.

Please register early!

*Make a check for the total registration fee payable to **Steve Lindberg** and send it along with this form to:*

Steve Lindberg, 615 Indiana Street, Johnstown, PA. 15905

Name and affiliation

_____

Email and phone number

_____

Mailing Address

_____

****OESTA Award Winners from Spring 2019, 2020 and 2021 meeting attend Free! Please indicate this on your registration information. Email me if you have any questions! OEST awardees for this year, 2022, receive Saturday field trip and awards dinner for free. Subtract $30 from full registration fee.**

Registration fees: Please circle the appropriate selection(s) below:

FULL CONFERENCE REGISTRATION INCLUDES ALL THREE DAYS, LUNCHES AND REFRESHMENTS AS DESCRIBED IN MEETING AGENDA AND SATURDAY EVENING DINNER: Price is per person.

NAGT Member $100 Spouse/significant other $50

Student $70

Non-NAGT member $140 Non-member spouse/significant other $70

Any one day registration Friday and/or Saturday, includes field trips and Saturday dinner; $70 per day.

Are you an OEST awardee? Please indicate that here, provide year of award and state.

On site registration day of conference or registration after May 5, 2022 add $10 to each fee listed above.

Register early, make your hotel reservations. Send registration form and presentation form by May 5, 2022 with full payment, check payable to Steve Lindberg. You will receive a confirmation of your registration.

Questions? Concerns? Did I forget something? Email me and be nice about it.

Hope to see you in Berkeley Springs for the Eastern Section Conference !

Steve Lindberg

Conference Coordinator

Eastern Section Archivist

PRESENTATION PROPOSAL FORM

NAGT-Eastern Section 2022 Annual Meeting

Submission Deadline: May 5, 2022

Presentations will be scheduled for **20 minute sessions**. Double sessions will be accommodated only as space and time permits. As many presentations as possible will be accommodated.

Return completed form to: Steve Lindberg, 615 Indiana Street, Johnstown, PA. 15905. You may also submit proposals electronically at slindber@pitt.edu

Poster displays are also welcome and should use this same proposal form.

Name and
affiliation:_____

Email: _____

Address: _____

Phone: _____

Presentation Title: _____

Description (max. 100 words):

Presentation equipment needed: (room has projector and large screen)

Cooperative interests on different scales

by Martin Schmidt
The McDonogh School

Everyone else may have recognized this long ago, but I have recently become more aware of a contrast in attention to scale between geologists and mineralogists. Fortunately, however, they can and do still cooperate, and indeed have a symbiotic relationship that together expands our overall knowledge.

This came up while cataloging a mineral collection for the Natural History Society of Maryland that was mostly collected in the late 1930s. The interest of those collectors was truly minerals, not rocks, so the rocks are treated almost as asides, with labels like "aragonite on trap" - meaning in this case on something from the Baltimore Mafic Complex - or "phlogopite on limestone" - actually from a marble quarry, but the right chemistry. And there are samples on which one has to search for a grain or two of the labeled mineral, but getting those grains was the purpose of collecting that sample so the rock isn't even noted. The mineral folks seem to be intent on finding anything exotic regardless of how micro the sample, and creating as long a list as possible of minerals found at a particular site, adding the common rock-forming minerals to the list only if they show as crystals. In other words, they often work at small scales and may be most intent on locating very uncommon minerals.

Sometimes these mineral lists are so long, with such obscure minerals, the mineralogists seem to be looking for some other element that can sneak in to expand the mineral list to include never-heard-of-that abrahamlincolnite and georgewashingtonite and more. (As we keep on discovering more minerals, and sometimes all it takes is a small change in composition to declare a new mineral, mineral names have gotten to be crazy, like the sometimes nutty genus & species names we see in biology.) And how did they identify these oddball minerals in the first place, - especially 80 years ago without point-and-shoot spectroscopy or Mindat.org? I know I would need those tools if I wanted to dispute an identification, so when they are correct, I can complement them on their extensive knowledge. And as for long lists, I will also try to stay friends with the mineral collectors by admitting rock collectors can also save many samples that are "similar but a little different", and I had already cataloged hundreds of rocks at the Natural History Society that had sometimes small differences in textures or something else that those looking for fine, diverse minerals wouldn't have kept. Humans like to collect things, so the catalog listing keeps getting longer, be it minerals or rocks.

Another example of scale difference was a group of minerals found at one location: galena, barite, sphalerite, cerussite, malachite, hematite, & bornite - probably just in one pit since the mine is described as "never amounted to very much commercially, and was abandoned many years ago." (Minerals of Maryland, Ostrander & Price, 1940). As I am cataloging all of this collection, I'm trying to add what we might call the geologist view by attempting to find the locations and identify the named rock formations in which they occur, with mixed success. This requires the National Geologic Map Database to get the most detailed maps possible, and correlate with the LIDAR elevations map to find holes in the ground - sometimes easy for working quarries but other times some guesswork. In this case, the location (if I have it right) is in an intensely folded area of metamorphic rocks of the Sams Creek Group (which has 9 inter-folded members), adjacent to Ijamsville Phyllite (which has 2 members). Both of these units include marbles, and so this mixture of minerals probably formed in a pocket of marble that by whatever circumstances had also collected some Pb, Ba, Zn, Fe, Cu, & S, and provided a place during metamorphism for the chemical reactions to mix ions to give the variety of minerals included on the list. However, none of these minerals are even mentioned in the rock descriptions on the geologic quadrangle map, and the map even says the lenses of marble could be from either formation, making it difficult to be sure what formation or member this mineral location was in. I don't consider this a fault of the geologists making the map, but rather is due to it really being a complex situation, and the geologists were doing well to sort out the outcrop

locations at the scale of the 1:24,000 map, covering over 35,000 acres, and so couldn't locate every 1/2-acre sized area of a group of minerals. That's the difference in the scale at which the mineralogists and geologists can work.

For those educators following NGSS principles, scale is #3 of the cross-cutting concepts, so helping students understand all geologic scales - from atomic structure and crystals of mineralogy to geologic structures like mile-wide folds to huge tectonic plates - is valuable. Mineralogists also do geology, geologists also do mineralogy.

I also find this scale difference interesting historically. People dug up and quarried rock in the distant past because they needed it to build something. Once the hole was dug, some people (perhaps kids, closer to the ground and more curious?) noticed some unusual sparkly things and collected them. These minerals first became the early natural history "cabinet of curiosities" type things: interesting, exotic, unexplained, and somewhat random. But eventually science studied them and figured out the chemistry (or alchemy) of minerals, and began to see patterns in the curiosities, giving us the periodic table, and on to tracing evolution by connecting fossils or taxidermied animals. And for rocks, the scale changed with William Smith's first geologic map, recognizing a much broader connection between places. Even then, a lot of geology for a century & longer was unexplainable "curiosities" (e.g., geosynclines? ring of fire?) until they were unified as the scale became world-wide in plate tectonics. So human geo-knowledge has been developing at expanding scales for thousands of years.

And this is where the symbiosis becomes clear: While the geologist might map out the big picture, the details of varieties of minerals are also valuable to figure out the geologic history of an area. And the mineral collector will use the geologic maps to search for places similar to where they found their last interesting mineral pocket. All of this is how human knowledge advances, building & synthesizing. So, some will dig into pockets in rocks to collect well-formed mineral micromounts and attractive clusters of hand-sized crystals, while others will start with quarry-size geologic structures and move on to regional terranes & tectonic slabs - all will be improving our understanding of the amazing Earth.

Upcoming sessions at Northeastern GSA in Lancaster, Pennsylvania:

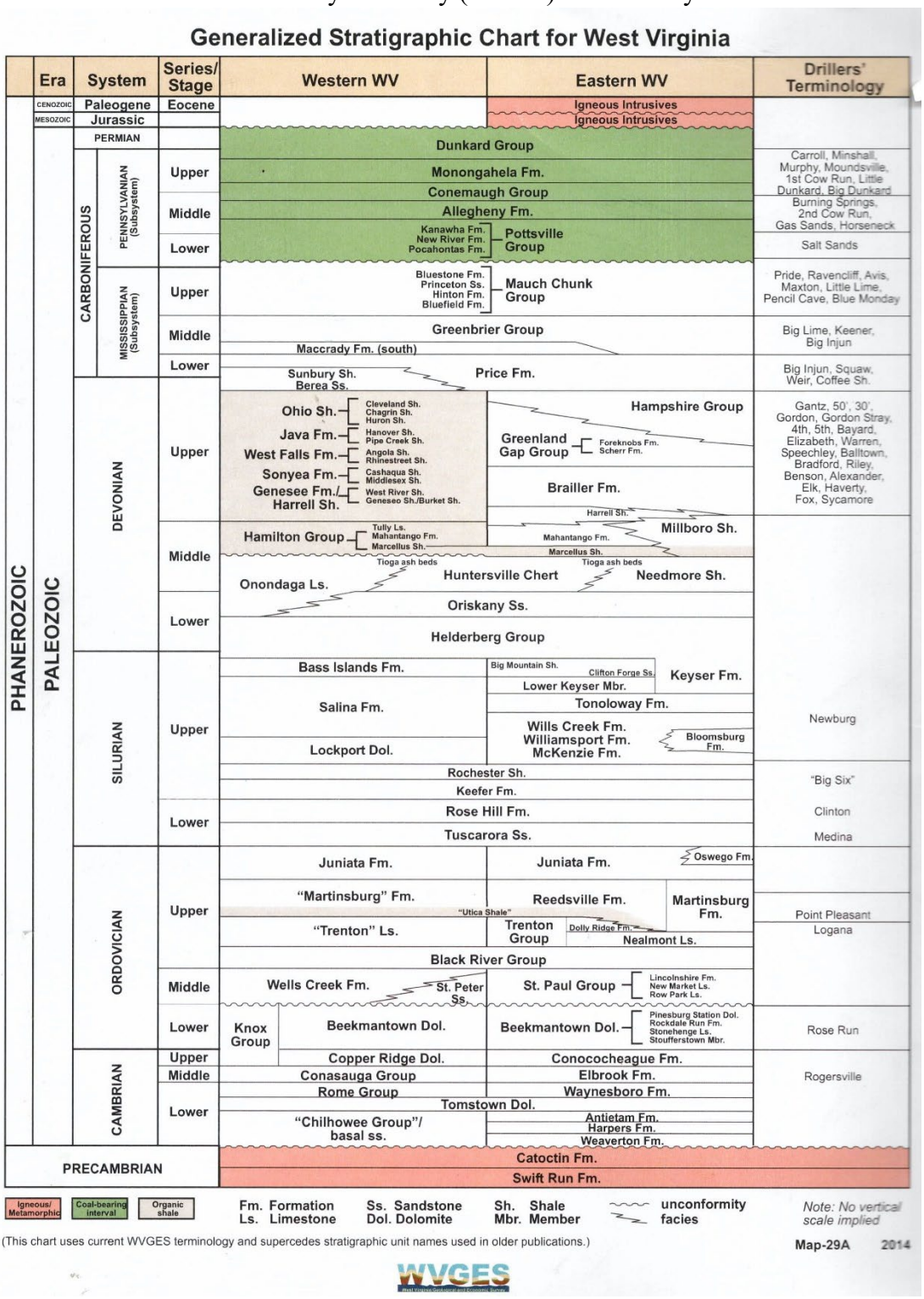
FT3. **The Piedmont and K–12 Pedagogy: How Geology Works and Why It Matters.**
Sat., 19 March, 8 a.m. departure, 6 p.m. return. US$105.
Endorsed by National Association of Geoscience Teachers (NAGT) Teacher Education Division (TED).
L. Lynn Marquez, Millersville University of Pennsylvania, Lynn.Marquez@millersville.edu.
Description: This trip to classic south-central Pennsylvania outcrops provides experience for K–12 educators to investigate rocks, geomorphology, and fluvial processes in the field. Each stop will include active investigation of the outcrops, discussion of the geology and geologic history of the region, and discussion of how the field experiences can be translated to classroom lessons and activities.
AND

SC5. **Teaching and Learning Geoscience in a Changed and Changing World.**
Sunday, 20 March, 9 a.m.–noon. US$25.
Endorsed by National Earth Science Teachers Association; National Association of Geoscience Teachers (NAGT) Teacher Education Division (TED).
Missy Holzer, National Earth Science Teachers Association, missy.holzer@gmail.com; Christopher Roemmele, West Chester University, CROEMMELE@wcupa.edu.
Description: We live on a planet that changes naturally and through human influences. What can we learn from our geologic past that can inform our decisions for the future? Join this active workshop that connects the conference theme and field trip to K–12 instructional resources.

"FROM THE ARCHIVES"

by Steve Lindberg,
University of Pittsburg at Johnstown
Eastern Section Archivist

The 2015 eastern section meeting was held in Beckley, West Virginia and included Saturday field trips to Bolt Mountain and New River Gorge. The West Virginia Geological Survey hosted the trip to Bolt Mountain with survey geologists Dr. Bascombe "Mitch" Blake and Jim Britton serving as trip leaders. Randy Newcomer (2015 section VP), eastern section member and conference organizer, lead the trip to New River Gorge. Randy also organized the Friday field trips to the Mine Health and Safety Academy (MHSA) and Beckley Exhibition Mine Tour. Participants on the Bolt Mountain field trip examined an exceptional exposure of Lower and Middle Pennsylvanian strata along route 99 between Bolt and Guyandotte Mountain. The New River Gorge trip included stops above and within the gorge to view rocks belonging to the Pennsylvanian Pocahontas, New River, and Kanawha formations; and also the Mississippian Hinton and Mauch Chunk formations. Reproduced here is the generalized stratigraphic chart for West Virginia that appeared on the back cover of the 2015 conference meeting and field trip guide, courtesy of the WVGES.



Outcrops

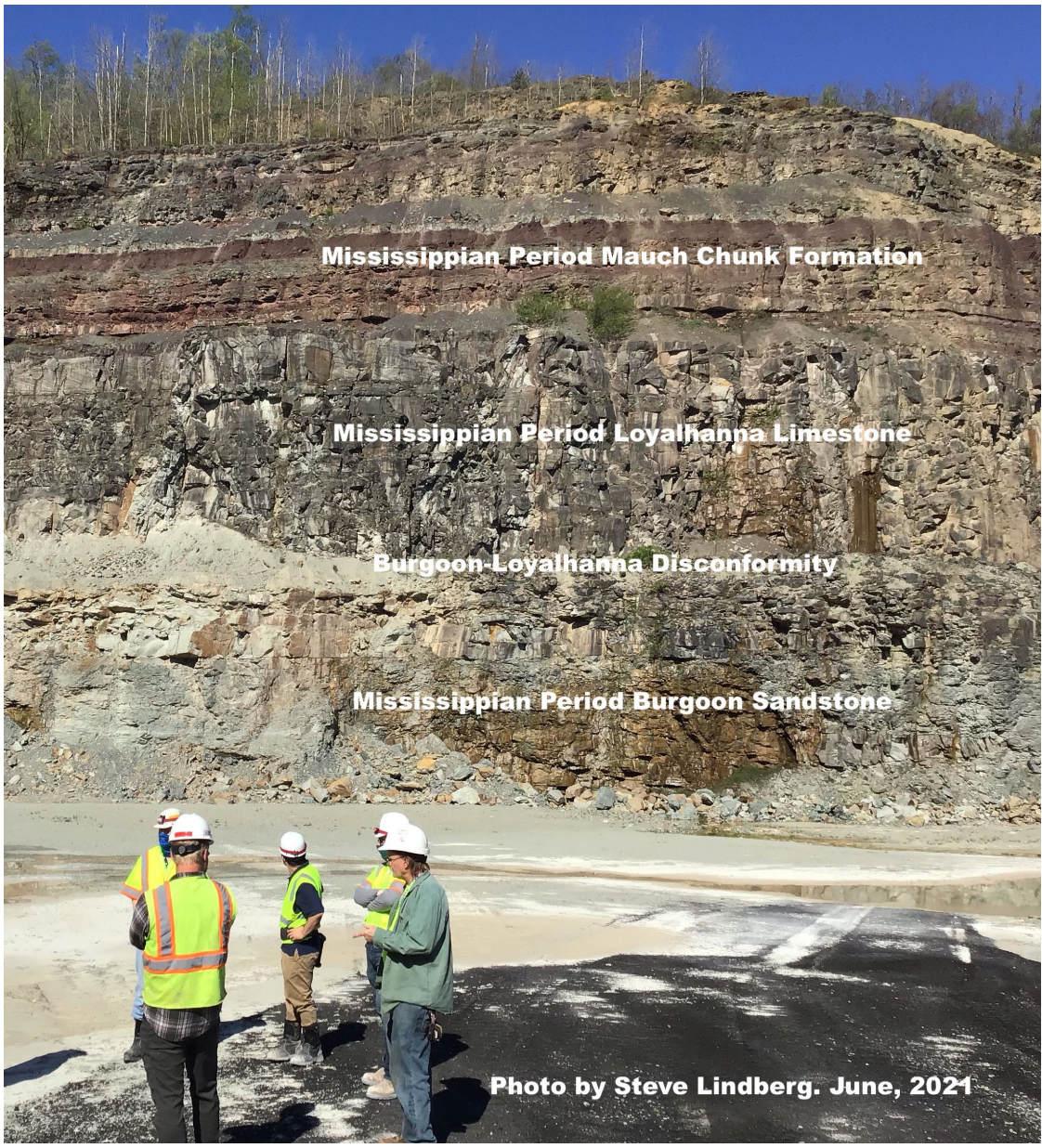
by Steve Lindberg
University of Pittsburg at Johnstown

This winter 2022 edition of Outcrops is a follow-up to a previous description of the units exposed in the Bakersville, Somerset County, Pennsylvania quarry operated by New Enterprise Stone and Lime Company. Aggregate production at Bakersville is from three separate quarries; Bakersville 1,2 and 3. Quarry #3 is the active, sub-surface mine producing Loyalhanna Limestone for use in hot asphalt road paving mix (see fall 2021 Outcrops). The quarry shown here is Bakersville #1, currently inactive, exposes a ~120 foot highwall providing an outstanding exposure of Mississippian Period rock units.

The basal unit here is the Burgoon Sandstone, which is named for exposures found along railroad tracks in Sugar Run Valley near Horseshoe Curve in Blair County, Pennsylvania. Paleocurrent studies indicate the Burgoon was eroded from sources to the east and deposited by a westward flowing, braided fluvial complex, or possibly an anastomosing deltaic sequence. The Burgoon is generally 100 to 300 feet in thickness.

The Burgoon - Loyalhanna Limestone contact is disconformable here in southwestern Pennsylvania, and may represent a gap of approximately 5 million years. The Loyalhanna averages 60 to 70 feet in thickness and is best described as “calcareous sandstone”. With it’s characteristic large scale cross-bedding it is an easily recognizable unit across southwestern Pennsylvania. The depositional environment for the Loyalhanna has long been debated. Recent studies have provided additional evidence that the Loyalhanna is marine in origin; deposited on a estuarine shelf as a sand wave complex by strong tidal currents.

The Mauch Chunk Formation is named for the exposures found in the vicinity of Mauch Chunk (Jim Thorpe) Pennsylvania. At the Bakersville quarry the lower 40 feet of the Mauch Chunk is well exposed. Characterized by interbedded red brown, gray, and gray green mudstones and sandstones, the depositional environment for the Mauch Chunk is interpreted to alternate between fluvial channels, alluvial plains, intertidal-subtidal-supratidal and beach.



Nominate your peers!

(Nominate yourself!)

by Christopher Roemmele
West Chester University

Greetings to all educators of geology and earth science. I am Christopher Roemmele, your new Awards Chair for NAGTES. I teach at West Chester University in West Chester, Pennsylvania, and taught high school/middle school earth science for 15 years in New Jersey. I know how hard we all work as teachers and getting a proverbial pat on the back and thank you is nicely motivating. Perhaps you work with or know someone whom you feel deserves this recognition. In that case, I strongly urge you to nominate this person for one of our Eastern Section awards, or one of the National NAGT awards. The Eastern Section meeting is a wonderful time to heap praise upon those individuals who have excelled in the work and promoted geoscience education.

Information about all our Eastern Section awards can be found on our section website. Please note the deadline is being/has been changed to February 1! So start thinking and get those forms filled out now! Completed nomination forms should be sent to me at croemmele@wcupa.edu. However, you must place your nomination via the online forms found on the National NAGT web site at http://nagt.org/nagt/programs/oest.html

Here is a list of our awards. Perhaps there is one with your (or a colleague's) name on it!

OUTSTANDING EARTH SCIENCE TEACHER

The OEST Awards program was adopted by NAGT in 1971. Its purpose to honor pre-college teachers of earth science, their excellence and commitment to teaching and teaching earth science

DIGMAN AWARD FOR EXCELLENCE IN GEOSCIENCE EDUCATION

The Digman Award is designed to recognize an individual who works to bring geoscience to the general public. We look for individuals who are not teachers, but work in a capacity that educates the general public in areas of the geosciences. Museum directors, curators and assistants, state survey employees, mine and quarry public relations people would all qualify for this award. The nomination information for this award is also on our section website.

JAMES O'CONNOR MEMORIAL FIELD CAMP SCHOLARSHIP

The James O'Connor scholarship is given to a college geology or earth science major who is attending a geologic field camp course (typically over the summer) as part of their college degree program. The $500 scholarship assists the student in covering the expenses of their field camp. Nominate a student currently enrolled in your geology program. Nomination information appears on the section website.

DISTINGUISHED SERVICE AWARD FOR THE EASTERN SECTION

The Distinguished Service Award is given to a member of the Eastern Section (still actively teaching or retired) who has, over the years, contributed to the growth and activities of the Eastern Section. This person should have a history of continued service to the Eastern Section. Nomination information appears on our website.

JOHN MOSS AWARD FOR OUTSTANDING COLLEGE TEACHING

The John Moss award is reserved for instructors and professors who, at the college level, model and promote outstanding teaching in the geosciences. Nomination information appears on section website.