



# PGS Newsletter

<http://www.pittsburghgeologicalsociety.org/>



Vol. LXIX, No. 6

Karen Rose Cercone, Editor

February 2017

**Wednesday, February 15, 2017**

## Source To Sink Relationships From Provenance Studies: Insights To The Marcellus Shale

**Dr. Amy Weislogel**  
**West Virginia University**

Provenance analysis of sedimentary rocks has seen major advances in recent years, most notably in the application of radiogenic isotope geochronology to sand- or silt-sized detrital tracers. Through these studies, significant teleconnections can be assessed between character of the sedimentary records preserved within basins and processes governing detrital sediment generation in the sediment source regions. Applying a similar strategy to mudrocks, though challenging, offers the opportunity to test controls on terrestrial clastic influx and associated organic matter preservation.

Bulk mineralogical analyses of 53 sidewall plugs from the Marcellus Shale Energy and Environmental Laboratory (MSEEL) show that, throughout the unit, muscovite and illite comprise between 60-80% of crystalline material. Bulk geochemical analyses, however, reveal increase in Ti/Al concomitant with decreasing Si/Al, suggesting an increase in terrestrial detrital influx, which in turn coincides with decreasing TOC. Assessment of the Chemical Index of Alteration (CIA) along with other geochemical proxies, indicate detrital clay minerals formed from weathering of an overall old, felsic/upper continental source rock, with increasing weathering intensity throughout deposition of the Marcellus Shale. Sm-Nd radioisotopic analysis reveals uniform composition with  $\epsilon\text{Nd}$  values of -10.2 to -10.5 and depleted mantle model ages (TDM) between ~ 1.79 to 1.85 Ga.

We hypothesize these data reflect mixing of sediment derived from northeastern Canada with material derived from the adjacent Acadian fold-thrust belt. This model is consistent with other reconstructions of Paleozoic sedimentary provenance that reflect predominantly south-directed systems occupying the eastern US. This southward sediment transport model suggests diachronous timing and/or differing controls on organic matter preservation/production are possible for the Marcellus Shale play along strike from northeastern PA to southwest PA/northern WV, which holds significant implications for correlating organic-rich vs. clay-rich facies and predicting response to hydraulic fracture stimulation of shale gas reservoirs in these areas.

**Social hour - 6:00 p.m.**

**Dinner - 7:00 p.m.**

**Program - 8:00 p.m.**

Dinner costs \$30.00/person, students \$10.00; checks preferred. For reservations, please email your name and number of attendees in your party to [pgsreservations@gmail.com](mailto:pgsreservations@gmail.com). You can also reserve and pay for dinners via PayPal on our website <http://pittsburghgeologicalsociety.org>. Please include your name and number of attendees in your party. **The deadline for reservations is noon on Monday, February 13.**

**Meeting will be held at Foster's Restaurant, Foster Plaza Building 10, Green Tree.**

## SPEAKER BIOGRAPHY



Born and raised in Erie, Pennsylvania, I received my B.S. in Geology from Allegheny College, my M.S. in Geology from New Mexico State University, and my Ph.D. from Stanford University. I first became a faculty member at the University of Alabama and have

been on the faculty in the Geology & Geography department at West Virginia University since 2010. I lead my research group in Sedimentary Basin Studies using grain-scale to basin-scale techniques, including provenance, stratigraphic and sedimentologic analyses, to reconstruct tectonic and paleoenvironmental processes. Primary research focus has been on Mesozoic sedimentary records of China, South Africa and the eastern Gulf of Mexico, and recent projects have been developed to investigate Acadian and Appalachian basin evolution.

## PRESIDENT'S STATEMENT



First and foremost I wish to extend my heartfelt congratulations to Mary Ann Gross and Frank Benacquista for being awarded Honorary Membership to PGS. They have been long time members and have made great contributions

to the society as Board members and officers. Both are past presidents and Mary Ann once served as our newsletter editor. Neither is a voting Board member at present but each continues to serve us in other capacities. Frank is our hard-working Chairperson of the Continuing Education Committee and the one regularly supplying us with the social hour refreshments. And the late Maury Deul might not have frequented the meetings and blessed us with his presence as much as he did in his final years had Mary Ann not given him a ride. Prior to my retirement the greatest pleasure I experienced during assignments as acting supervisor was presenting awards to deserving colleagues and I'm just as happy to have that opportunity again. I announced Mary Ann's award at the last meeting and will honor Frank during this month's event. Speaking of Maury Deul, he was posthumously presented with the Walt Skinner award in January. I cannot overemphasize his contributions to the field of mining geology and his general humanity. I wish he were here to receive the

honor personally.

We have a number of big events coming up. For our outreach program, Peter Cormas, Professor of Math and Science Education at California University of Pennsylvania, will represent PGS at the February 16 Allegheny Intermediate Unit Network Connections and demonstrate "Google Earth inquiry activity" to middle and secondary education teachers. Also in the works is the annual drilling workshop for students that will take place this year in March or April on the new Chatham University Campus. More details on the exact location, date, and time of the event are forthcoming. Other important upcoming events include the annual PGS Spring Field Trip, entitled "*Geology of the Pennsylvania Main Line Canal*", on April 8 and the AEG/ASCE/PGS Student Night at our April 19 meeting. More information on both the field trip and Student Night is available in this newsletter. Finally we are looking into making a presentation about PGS and the profession it supports at the Chartiers-Houston Community Library this summer. The affair would be part of the library's Summer Reading program and take place on one of their "family nights". This year the theme of the summer program is "Build a Better World," and of course there is much in the field of geology that can contribute to just that. The challenge will be to develop a presentation or activity conducive to such a broad age group. We are asking for volunteers that live in the Houston area to assist in this effort. If we can pull it off, the undertaking may open up a new kind of outreach activity we can offer to the surrounding community. You can contact Ken LaSota, Chairperson of the Outreach Committee, at [lasota@rmu.edu](mailto:lasota@rmu.edu) or me at [shabell9@comcast.net](mailto:shabell9@comcast.net) if you're interested in lending a hand.

I have good news for those who wish to contribute to the PGS Endowment and Galey funds. You can now give a check to the Treasurer, Kyle Frederick, who will transfer it to the Endowment Fund or mark it for the Galey Fund. I described the funds in my December 2016 president's statement, which is available in the archive section of our website. Last but certainly not least, I wish to express sincere gratitude for recent corporate contributions provided by American Geotechnical and Environmental Services, Inc., Seneca Resources Corporation, and Woodard & Curran.

Looking forward to our next meeting on the 15th.

*Peter R. Michael*

# Sponsors Needed for the 2017 GSA Joint Section Meeting in Pittsburgh

Dear PGS Members,

Please support the approaching NE-NC GSA meeting at the Omni William Penn Hotel, 19-21 March 2017. Sponsorship provides critical funding for student volunteer registrations, student and early career mentoring, K-12 teacher participation, a keynote speaker at the banquet, catering needs throughout the meeting including coffee breaks, the Association of Women Geoscientists breakfast, SEPM colloquium, Career Blast pizzas and much more. The PGS, along with many of your colleagues and their firms, have joined the roll of donors. Please contribute a check for \$100 or more made payable to the Geological Society of America and forward it to me at Patrick Burkhart, PO Box 27, Harrisville, Pa 16038. Thank you greatly for helping Pittsburgh to host another fine meeting,

-- Patrick (NEGSA Meeting Co-Chair)

## 2017 GSA Joint Section Meeting

Northeastern (52nd) and North-Central (51st)

### *Shale Gas Production:*

Views from the Energy Roller Coaster

19-21 March 2017 • Pittsburgh, Pennsylvania, USA  
Omni William Penn Hotel

**Register at [www.geosociety.org](http://www.geosociety.org). Reserve hotel rooms at 1-800-THE-OMNI, code GSA2017.**



The Pittsburgh Geological Society welcomes the following new members:

### **Kenneth A. Urbanec, PE**

Senior Engineer  
Pennoni Associates  
Gibsonia, PA 15044

1991 BS in Civil Engineering  
The University of Pittsburgh

### **Maraina L. Miles**

Student Member, Slippery Rock University of Pennsylvania

**Show your support of PGS  
with your very own mug!**



Mugs come in two designs (shown above) and can be purchased at any monthly meeting for \$15 each or two for \$25.

**CONGRATULATIONS TO OUR NEW PGS HONORARY MEMBERS**

**MARY ANN GROSS AND FRANK BENACQUISTA**



## PGS Professional Member Featured Interview

# FRANK BENACQUISTA, P.G.

### Company, title or role, years with company:

KU Resources, Inc. / Chief Geologist / 2004 to Present

### How long have you been a member of PGS?

Since the mid-1990's

### Have you held any officer positions?

President, Secretary, Board Member

### Education: BS at the University of Pittsburgh (1981)

### What are some of your day-to-day responsibilities?

Project management, proposals, answering general geology questions

### What is the best and worst thing about your current job?

Best - Involved with the development of the city of Pittsburgh. Worst - Chasing account receivables!

### What was your first geology job out of college, or your weirdest geology job, and did learn anything you would like to pass on?

First job: Intern at Doran & Associates – mapping oil & gas wells. Strangest Job: Being lowered down 75-feet in a 30-inch caisson on the ball hook of crane. Yes, I was A LOT thinner then.

### What is one class you wish you would have taken in college? Basic Accounting

### What is the most geologically exciting place you have been?

The Sterling Hill Mine in New Jersey and the Trona Mine in Wyoming

### What is your favorite or least favorite “Bad” geology movie and why?

“Volcano” (Tommy Lee Jones): Really? The magma is going to erupt and you have the City of Los Angeles mobilize a fleet of excavators and dig a trench in 20-minutes?

### What's your favorite rock, mineral, or fossil? Magnetite

### What is one of your favorite quotes? Actually, I have two:

“Experience is a hard teacher. It gives the test first and the lesson afterwards.”

“I would have written a shorter letter if I had more time.”

### If you could meet any geologist, living or dead, who would you meet?

I would like the opportunity to go back and thank Dr. Norman Flint for taking the time to explain to a wayward mechanical engineer what geology is all about.

### Name 3 things on your Geology Bucket List.

Meteor Crater, Stonehenge and the Pyramids of Giza Plateau

### Anything else you would like to share about yourself?

In 1994, I was judged second in the World In-Car Stereo competitions.



## **GEOLOGICAL EVENTS**

### ***AEG- ALLEGHENY-OHIO SECTION***

February 8, 2017

Scott A. Anderson, 2016-2017 Richard H. Jahns Distinguished Lecturer –“Natural hazards, risk, and the resilience of transportation infrastructure.”  
Fosters Restaurant, Greentree PA

### ***HARRISBURG AREA GEOLOGIC SOCIETY***

February 9, 2017

Al Guiseppe PG – “Tackling Complexity through Stochastic Models – Yet Another Hydrogeologic Study of the Gettysburg Basin”  
GTS Technologies, Harrisburg PA

### ***PITTSBURGH AREA PETROLEUM GEOLOGISTS***

February 22, 2017

Bill Boykin NUTECH - "Methodology for Identifying Reservoir Production Potential, its Role in the Digital Oil Field and how it enables Strategic Field Development Optimization"  
Cefalo's Event Center, Carnegie PA

### ***SPE - PITTSBURGH CHAPTER***

Feb 23, 2017

Dr. Nathan Meehan, Baker-Hughes – “Educating the Public about Oil and Gas”  
Cefalo's Event Center, Carnegie PA

### ***ASCE GEO-INSTITUTE OF PITTSBURGH***

February 23, 2017

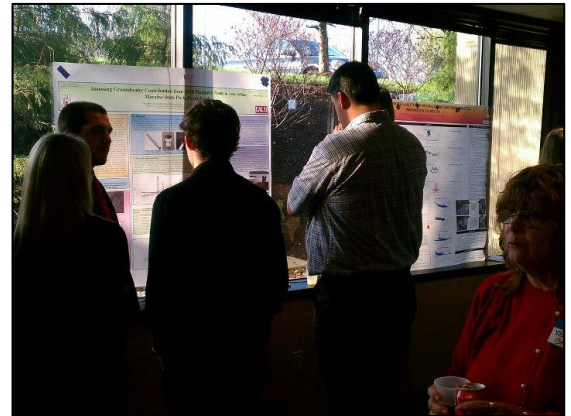
Suresh Gutta. A.G.E.S. Inc. – “The New Baltimore Landslide”  
Gaetano's Banquet Center, Pittsburgh PA

### ***PENNSYLVANIA COUNCIL OF PROFESSIONAL GEOLOGISTS***

March 7, 2017

Annual PCPG Meeting and Luncheon  
Red Lion Hotel, Harrisburg PA

## **APRIL 19, 2017 AEG – ASCE – PGS STUDENT NIGHT**



Students will once again have the chance to present their research at the 15<sup>th</sup> Annual Student Night on April 19, 2017 at Foster's Restaurant, #10 Foster Plaza, Greentree. If you have been conducting undergraduate or graduate research in any geological or geotechnical field, here is an opportunity to show off your work to members of three professional scientific societies, and receive the benefits that go along with it. Students who present their original research grow from the experience by improving their public speaking skills, networking with professionals and experts in their fields, listing a presentation on their resume, and possibly winning a cash award.

Each of the three sponsoring societies will select one student paper (graduate or undergraduate) for oral presentation. Additional abstracts will be accepted for poster presentations. All presenters will receive certificates of recognition and appreciation, as well as complimentary dinner. The three oral presenters will each receive awards of \$100, while the three top poster presenters will each receive \$50.

**Abstracts must be submitted to [tamra.schiappa@sru.edu](mailto:tamra.schiappa@sru.edu) by March 1.**



## PGS SPRING 2017 FIELD TRIP

### GEOLOGY OF THE PENNSYLVANIA MAIN LINE CANAL (WESTERN DIVISION) NEAR SALTSBURG, PA

SATURDAY, APRIL 8, 2017

In 19<sup>th</sup> century America, the most advanced way to ship goods and transport people across the country was by canal. The financial success of the Erie Canal in 1825 convinced the state of Pennsylvania to build a much longer and more technically difficult canal from Philadelphia to Pittsburgh. The Western Division (constructed between Johnstown and Pittsburgh between 1827 and 1831) was “the longest and most troublesome on the entire Pennsylvania Main Line route” according to canal historians.

Our spring field trip will examine the route of the Pennsylvania Main Line Canal near Saltsburg and Tunnelton, PA, focusing on the geology of this region and the engineering challenges it presented.

**Stop One: Type Locality of the Saltsburg Sandstone.** Upon our arrival in Saltsburg, we will follow the Pennsylvania Canal’s former route north to examine the type locality of the Saltsburg Sandstone. Recent studies of this unit in West Virginia have suggested it may be an estuary deposit in an incised river valley.

**Stop Two: Rebecca Haddon Stone House Museum.** The Pennsylvania Canal was routed along the Conemaugh and Kiskiminetas Rivers in part because of the economic value of the salt-producing wells that gave Saltsburg its name. We will examine the history and geology of salt brine production at this historical gem of a museum, under the leadership of Gary Ball, museum affiliate and long-time PGS member.

**Stop Three: Glenshaw Formation.** By following the canal’s path south from Saltsburg, we can observe some of the engineering feats required to place early rail and canal routes in the same narrow river valley. We will also see excellent exposures of fluvial deposits in the Glenshaw Formation.

**Stop Four: Tunnelview Historic Site.** We will eat our brown-bag lunches at an overlook near Bow Ridge, a topographic feature so extreme and narrow that four different tunnels were cut through it to allow the canal and subsequent railroad lines to shorten their paths.

**Stop Five: Bow Ridge.** A hunter’s access road will allow us to climb up through the paleosols and fluvial channels that make up the upper Bakerstown interval of the Glenshaw Fm. At the top, we will view the incised meander bend around Bow Ridge from both sides.

**Stop Six: Conemaugh River Lake Dam.** The US Army Corps of Engineers will give us a tour of the dam that was built here in 1952 to protect Pittsburgh and other down-stream communities from floods. Note: field trip participants must submit their driver’s license and birthdate to get security clearance for this tour.

#### FIELD TRIP LOGISTICS

Our rental van(s) will depart from the Shop and Save Parking Lot at the corner of Tarr Hollow Road and Route 22 in Murrysville at 8:30 AM and return by approximately 5 PM. You must bring your own bagged lunch; snacks and water will be provided by PGS. Cost of the field trip is \$25. To reserve a spot, email your name, birthdate and driver’s license number to Karen Rose Cercone at [kcercone@iup.edu](mailto:kcercone@iup.edu).

**The deadline to sign up for the PGS spring field trip will be March 1, 2017.**



# THE ORIGIN OF WESTERN PENNSYLVANIA PLACE NAMES

Black Lick, a village on the flank of Chestnut Ridge in southern Indiana County, derives its name from Blacklick Creek, which borders the town on the northwest. Blacklick Creek is an English translation of Naeska-honi (or some variation thereof), a Native American word meaning “black lick” or “dirty lick” (in



**Acid mine drainage in Blacklick Creek**

eastern Pennsylvania, the word is spelled Nesquehoning, the name of both a creek and a town in Carbon County). Blacklick probably refers to a salt lick associated with a coal seam exposed somewhere along its 30-mi length. The creek also lends its name to townships in Cambria and Indiana counties. Black Lick is home to Naeskahoni Town, a full-scale French and Indian War-era village that has brought together five different cultures to educate people about the Eastern Woodland people and their way of life. The famous Ghost Town Trail, a rail trail on the right-of-way of the old Ebensburg and Black Lick Railroad, runs 36 mi from Black Lick to Ebensburg, Cambria County. The trail follows Blacklick Creek, passing many ghost towns that

were abandoned in the early 1900s when coal mining, the major industry and producer of acid mine drainage in the area, declined. The acid mine drainage remains, but is being slowly remediated.

---

## DID YOU KNOW . . . ?

After the last Ice Age, Antarctica warmed nearly 20°F, 2 to 3 times the average global temperature increase, according to a new study by a team of American geophysicists. This highlights the fact that, in both the Arctic and Antarctic, the effects of changing climate are amplified regardless of whether it gets warmer or cooler. The calculations pretty much agree with estimates from most climate models, indicating that such models are good at estimating both past and future climatic conditions during a time of climate change and global warming. Global climate models that have been used to analyze what the planet looked like 20,000 years ago are the same models used to predict global warming in the future. Such models are doing a good job reproducing how cold it was in Antarctica, which is noteworthy because it confirms that we know how the system works. Based on these models, because of global climate change, Antarctica will warm twice as much as the rest of the planet, although it won't reach its peak for several hundred years. Given the current greenhouse gas emissions, the most likely climate change scenario suggests a global average

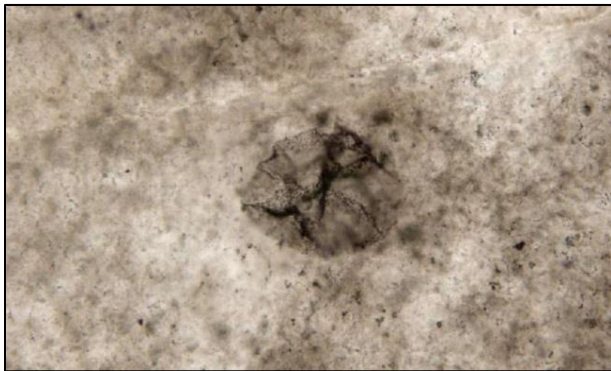
increase of 5°F by 2100, with Antarctica warming by about 10°F. Measurements of Antarctic temperature from 20 ka came from a 2-mile deep ice core. While ice at the bottom of the borehole was deposited about 70 ka; ice about 1/3 of the way to the surface was deposited about 20 ka. The researchers took temperature measurements throughout the core and smoothed the data to account for heat diffusion in the ice, then combined the data with isotopic measurements of old ice to come up with an estimated temperature of 52.3°F ± 32.5°F warming since about 20 ka.



**The Antarctic warmed significantly more than the rest of the Earth after the last Ice Age**

---

Microbes evolved and diversified into basically all of the metabolic forms that now exist during the first 2 billion years of Earth's history. The morphological and geochemical evidence for this ancient biological history is sparse, but we're learning more each day. Now there is evidence for 2.52 Ga, exceptionally large, organic, smooth-walled, spherical microfossils preserved in a deep-water black chert found in the Gamohaam Formation of the Kaapvaal craton of South Africa. The fossils occur primarily as compressed solitary spheres ranging in size from 20 to 265  $\mu\text{m}$ ; they also occasionally occur in short chains of cells.

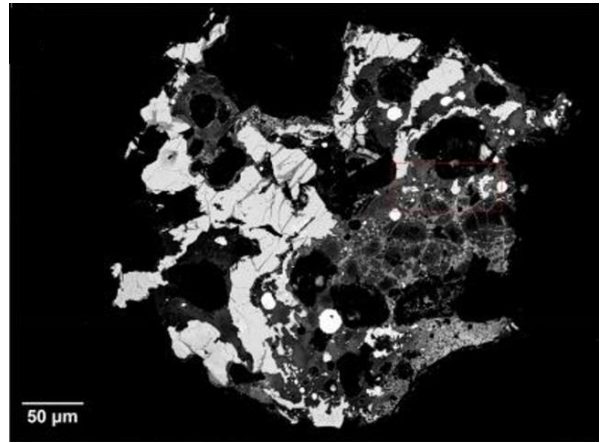


**A fossil of 2.52 billion-year-old sulfur-oxidizing bacterium**

These fossils are morphologically similar to Proterozoic and Phanerozoic organic microfossils called acritarchs, and to certain Archean fossils interpreted as possible cyanobacteria ("blue-green algae"). Their large size, simple cell wall microstructure, and paleoecological setting, as well as multiple sulfur isotope systematics of pyrite within the unit, however, suggest that the Gamohaam Formation fossils were sulfur-oxidizing bacteria, organisms that live in anoxic and sulfidic deep-water settings. These are the oldest fossil sulfur bacteria ever reported. They reveal a diversity of life and ecosystems, previously only interpreted from geochemical proxies, just prior to the Great Oxidation Event, a time of major atmospheric evolution.

---

Quasicrystals are crystals that violate the mathematical constraints on how crystals are structured. They have a different orderly arrangement of atoms and molecules that does not regularly repeat, and their symmetries are "forbidden" to crystals or crystal patterns. For



**Fragment of the Khatyrka meteorite containing the newly discovered naturally-occurring quasicrystal**

example, normal crystals have patterns arranged in squares, triangles, hexagons, and rectangles, but not in pentagons, heptagons, or other arrangements. Quasicrystals can have five-fold, seven-fold, or any-fold symmetry that normal crystals can't have. For a long time it was believed that they could only occur by artificial synthesis in a laboratory; 100 different types of quasicrystal materials have been synthesized since 1984.

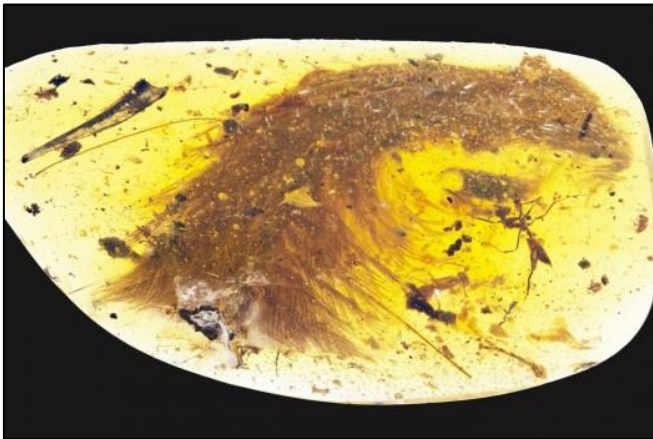
Then, in 2009, a team of physicists discovered a naturally occurring quasicrystal in a meteorite fragment, called Khatyrka, recovered from a remote site in Russia. It had the same chemistry and structure as one that had been synthesized in the laboratory in 1987 so its chemistry was already known, but it was naturally occurring. And more recently, they've discovered a completely new quasicrystal from the same meteorite. It's the first example of a natural quasicrystal whose chemistry has never been synthesized previously. The Khatyrka meteorite contains parts that date back more than 4.5 Ga, to the beginning of the solar system, and at least one of the quasicrystals found formed at that time. The new one, however, probably resulted from of a high velocity collision with another space body about 300 million years ago. It probably landed on the Earth less than 20,000 years ago. The quasicrystals and related metallic aluminum minerals found in the meteorite imply the existence of physical process in the early stages of the formation of the solar system that we did not know before; we are still trying to work them out. This research demonstrates that it is worth looking to nature for materials and chemistries that have not yet been dreamed of in the laboratory.



---

A newly discovered dinosaur tail with feathers preserved in 99 million year old amber was found by a researcher from the China University of Geosciences at an amber market in Myanmar. The amber was mined in a region that has been producing amber for sculptures and carvings for 2000 years, and that has been a major focus for fossil insect studies over the last 20 years. The dinosaur, which in life was the size of a sparrow, likely belonged to the Coelurosauria, a large group of dinosaurs that contains everything from *Tyrannosaurus* to modern birds.

This is the first dinosaur skeletal material reported from amber. The tail belonged to a dinosaur outside of the group that included *Archaeopteryx* and modern birds; the vertebrae have not fused together to form a stiff rod. It is flexible and composed of a series of elongate, cylindrical vertebrae. The feathers also support a particular pathway for the evolutionary development of these structures. The tail probably had rows of feathers



**Feathered dinosaur tail preserved in 99 million year old amber**



**Artist's conception of a coelurosaur**

coming off the sides making it look fuzzy; the underside probably had pale or white feathers and the upper surface would have had brown feathers. Assuming that this kind of plumage ran the entire length of the tail, it is unlikely that the animal was an active flyer. A dinosaur with feathers is not unusual. There is strong evidence that many theropod dinosaurs had feathers at some point during their life, and there is mounting evidence that feathers or other outgrowths of the skin may have been present within a wider range of dinosaurs (like ceratopsians). The more well-preserved specimens that are found and studied, the closer we get to providing a solid answer to this question.

---

Several studies, including some on the large magnitude 7.3 earthquake in Kobe, Japan, in 1995, indicate that changes to the chemical makeup of groundwater may occur prior to earthquakes. But researchers needed to accumulate a lot of evidence to link the occurrence of earthquakes to such chemical changes before establishing a strong correlation between the two. Now, Japanese researchers have found a relationship between helium levels in groundwater and the amount of stress exerted on inner rock layers of Earth. The team found that, when stress exerted on Earth's crust is high, the levels of  $^4\text{He}$  released in groundwater was also high at sites near the epicenter of the April 2016 Kumamoto earthquake, also a magnitude 7.3 quake, in southwestern Japan. That earthquake caused 50 fatalities and serious damage.

The team used a submersible pump in deep wells to obtain groundwater samples at depths between 920 and 4265 feet from seven locations in the fault zones surrounding the epicenter 11 days after the earthquake. They compared the changes of  $^4\text{He}$  levels from chemical analyses of these samples with those from identical analyses performed in 2010. After careful analysis, they concluded that the levels of  $^4\text{He}$  had increased in samples that were collected near the epicenter due to the gas released through rock fractures. They estimated the amount of helium released by the rocks through fracture experiments in the laboratory using rock samples that were collected from around the earthquake region. They also calculated the amount of strain exerted at the groundwater-collection sites for using satellite data.

When the data were combined, the researchers found a positive correlation between helium in groundwater and stress exertion, with helium content higher in areas nearer the epicenter. The researchers suggested that more studies should be conducted in other earthquake areas to verify that their correlations are correct.



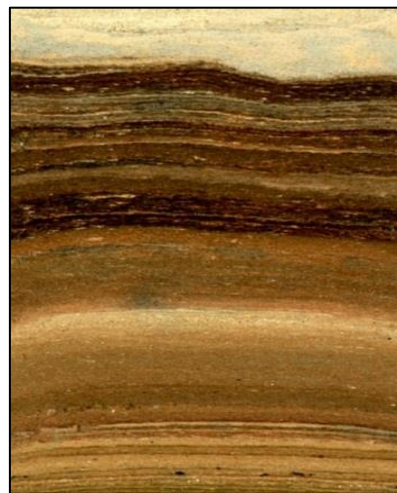
**Some of the devastation from the 2016 Kumamoto earthquake**

---

At the end of the last ice age, retreating ice sheets opened up a corridor in western Canada that, for a long time, was believed to be the most likely migration route for the first human inhabitants in the Americas arriving from Siberia. This is now considered highly unlikely, however, because new DNA analysis of sediment along the route indicates that it was devoid of plants and animals, so was unable to support human migration until thousands of years later.

It is well known that humans were in America south of the ice-sheets at least 14.7 ka – most likely even earlier than that (radiocarbon dating of artifacts at Meadowcroft Rock Shelter in Washington County, PA, indicates that humans were inhabiting eastern North America at least 16 ka and possibly even as long as 19 ka). How they got to the Americas is questionable, however. For decades, it has been assumed that they used a passage along the Pacific coast, or an interior corridor on the eastern side of the Rocky Mountains between two ice sheets that covered most of Canada. When the two ice-sheets retreated they created a corridor between them, but large areas of the corridor were flooded by ice-dammed lakes and the middle section opened last.

Researchers examined the accumulated lacustrine sediment from this area using radiocarbon dating of plant macrofossils imbedded in the sediments. They also performed pollen, macrofossil, and ancient DNA analysis to determine which plants and animals were in the environment at any given time. Employing DNA analysis is a relatively new method that has the potential to detect organisms beyond what can be gleaned from the other studies. Because the DNA were damaged, the researchers analyzed the complete pool of DNA, a technique called shotgun sequencing, instead of looking for specific genes. This enabled them to identify organisms in all the trophic layers, from small bacteria to large megafauna.



**Accumulated lacustrine sediments (varves) in a possible migration pathway from Siberia to America**

They found that the ice-free corridor suggested as a possible entry route for the first humans could not sustain a migration that would have allowed humans to reach South America 14 ka. Even the later groups associated with Clovis artefacts couldn't have used the corridor for entering America

because the corridor was not biologically viable until 12.6 ka. Prior to that time, it was flooded by ice-dammed lakes, and the land around the lakes were barren of vegetation and animals. Only after 12.6 ka could humans have been able to traverse the corridor. Although the route the first humans took is still being debated, much evidence points to a passage along the Pacific coast, which became ice-free earlier than the corridor.

---

Hyaloliths were bizarre creatures that lived on the ocean floor during the Paleozoic. They had bivalved shells, shaped kind of like a subangular ice cream cone with a trap door on top, and two curved spines that protruded near the hinge that apparently were used either to stabilize the animal



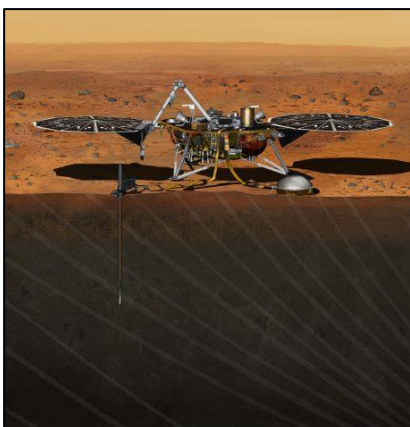
in soft sediment or to prop it off the sea floor. Since the first hyoliths were discovered and described in the 1800s, paleontologists have argued over their affinities. They were considered for decades to be an extinct form of mollusc, but some researchers have also suggested that they were probably unrelated to any extant life form.

Recently, an undergraduate student at the University of Toronto, who studied more than 1,500 hyolith fossils, now thinks they are closely related to brachiopods. This is based on specimens that preserved soft tissue, primarily from the Burgess Shale. Using SEM and other tools, he found that several samples had “tentacles” near their mouths. These tentacles have been interpreted as part of a lophophor, the kind of feeding apparatus used by bryozoans and brachiopods. Because this research has resolved a longstanding mystery about the Hyolitha and the group’s place in the tree of life, all the biology and paleontology textbooks will have to be rewritten. This discovery makes John Harper very happy because he never believed hyoliths were molluscs! *Thanks to Albert Kollar for bringing this story to our attention.*



**Artist’s concept of a living hyolith**

There are plans for a 2018 Mars mission, called InSight, that will place instruments on the surface of Mars to send information back to Earth about the planet’s interior. This will be the first mission to



**Artist’s concept of the InSight lander on Mars**

Mars focused on learning about the interior of the planet. There will be three primary experiments: 1) SEIS (acronym for Seismic Experiment for Interior Structure) will place a package containing two seismometers on a leveling tripod,

covered up with a wind and thermal shield to reduce the instrument noise, on the surface of Mars. This experiment also will have a suite of meteorological instruments and a magnetometer that will allow investigators back on Earth to correct for other sources of noise. And, hopefully, will also provide a lot of interesting science results; 2) HP<sup>3</sup> (Heat flow and Physical Properties Package) is a probe designed to dig down as much as 16 feet into the ground and make detailed temperature measurements of the amount of heat coming from the interior of the planet; and 3) RISE (Rotation and Interior Structure Experiment) will look for small variations in planetary rotation that will provided information about the deep, internal structure of Mars.

Despite the Drake Well and the entire sequence of oil and gas history that had occurred in Pennsylvania in the second half of the 19th century, many historians believe the modern oil industry was born on a hill in southeastern Texas in 1901. The hill, formed by a subsurface salt dome, was called "Spindletop", and had been known for centuries as a place where oil seeped to the surface. Western Pennsylvania’s premiere oil drillers, James Guffey and John Galey, had tried drilling in Texas previously without much success and had left the area unconvinced of the potential of Texas oil. Whatever made them change their minds, Galey traveled to Beaumont, TX, in 1900 to survey the area. He picked a spot, and the drilling began in October of that year. After many difficulties, the well came in a "gusher", shooting oil to a height of more than 150 feet. It was more oil than had ever been seen from a single well anywhere in the world previously. It was later assessed at nearly 100,000 barrels of oil per day, more than the combined production of all of the other oil wells in the US.



**Historic photo of the Spindletop “gusher”**



# PGS Website of the Month



<https://www.scientificamerican.com/article/how-dinosaurs-shrank-and-became-birds/>

---

## Pittsburgh Geological Society Officers and Board of Directors

**President:** Peter R. Michael  
**Vice President:** Tamra Schiappa  
**Treasurer:** Kyle Frederick  
**Secretary:** Karen Rose Cercone  
**Past President:** Ray Follador

**Director-at Large:** Diane Miller  
**Director-at Large:** Mark Barnes  
**Director-at Large:** Brian Dunst  
**Director-at Large:** Ken LaSota

**Director-at Large:** Wendell Barner  
**Director-at Large:** Peter Hutchinson  
**Counselor:** John Harper  
**Counselor:** Charles Shultz

---

### Other PGS Positions

**Historian:** Judy Neelan  
**Continuing Ed:** Frank Benacquista

**AAPG Delegate:** Andrea Reynolds  
**AAPG Delegate:** Dan Billman

---

**Officer Contacts:** If you wish to contact a current PGS Officer, you can email Peter Michael, President, at [shabell9@comcast.net](mailto:shabell9@comcast.net); Tamra Schiappa, Vice President and Speaker Coordinator, at [tamra.schiappa@sru.edu](mailto:tamra.schiappa@sru.edu); Kyle Fredrick, Treasurer, at [fredrick@calu.edu](mailto:fredrick@calu.edu); and Karen Rose Cercone, Secretary and Newsletter Editor, at [kercrone@iup.edu](mailto:kercrone@iup.edu).

**Memberships:** For information about memberships, please write PGS Membership Chair, PO Box 58172, Pittsburgh PA 15209, or e-mail [jharper.pgs@gmail.com](mailto:jharper.pgs@gmail.com). Membership information may also be found at our website: [www.pittsburghgeologicalsociety.org](http://www.pittsburghgeologicalsociety.org).

**Programs:** If you would like to make a presentation at a PGS meeting or have a suggestion for a future speaker, contact Tamra Schiappa, Program Chair at [tamra.schiappa@sru.edu](mailto:tamra.schiappa@sru.edu).

**PGS Website:** Access many online PGS resources at <http://www.pittsburghgeologicalsociety.org/>

**Facebook:** Follow the PGS at <https://www.facebook.com/PittsburghGeologicalSociety> for breaking news, announcements and interesting geological facts.

**Twitter:** PGS now has a Twitter Feed! You find it at <https://twitter.com/> on the web or look for [@PghGeoSociety](https://twitter.com/PghGeoSociety) on your mobile Twitter app.

**LinkedIn:** PGS has added a dedicated [LinkedIn page](#) to our social media portfolio. We'll use it to post job opportunities and other professional announcements for our members.

---



## ***Fun Fact Having Nothing to Do with Geology***

Play-Doh, originally composed of flour, water, salt, boric acid, and mineral oil, was manufactured originally in Cincinnati, OH, as a wallpaper cleaner.

# PGS THANKS OUR 2017 CORPORATE SPONSORS



**ACA Engineering, Inc.**  
[www.acaengineering.com](http://www.acaengineering.com)

**American Geosciences, Inc.**  
[www.amergeo.com](http://www.amergeo.com)



**American Geotechnical &  
Environmental Services, Inc.**  
[www.AGESInc.com](http://www.AGESInc.com)

**Ammonite Resources**  
[www.ammoniteresources.com](http://www.ammoniteresources.com)



**AWK Consulting Engineers, Inc.**

**Barner Consulting, LLC**

**The Baron Group Inc.**



**Billman Geologic Consultants, Inc.**  
[www.billmangeologic.com](http://www.billmangeologic.com)

**DC Energy Consultants**

**DC ENERGY CONSULTANTS**

Geological / Geotechnical Consulting  
724-255-6527 // [dcenergyconsultants@comcast.net](mailto:dcenergyconsultants@comcast.net)

**DORSO LP**

**DiGioia, Gray & Associates, LLC**

<http://www.digioiagray.com>

**DIGIOIA GRAY**

**& ASSOCIATES**



**Enviro-Equipment, Inc.**

"When it *has* to work"

1-888-274-8929

**Enviro-Equipment, Inc.**

[www.enviroequipment.com](http://www.enviroequipment.com)

**Falcede Energy Consulting, LLC**



**GEO-COM LLC**

ENERGY CONSULTING FOR THE 21<sup>ST</sup> CENTURY!

P:412-269-1419 | C:412-877-8402 | F:412-224-5550  
362 Indian Ridge Drive Moon Township, PA 15108

**GEO-COM LLC**

**Gannett Fleming, Inc.**

[www.gfnet.com](http://www.gfnet.com)



**Gannett Fleming**

*Excellence Delivered **As Promised***

**GEO**

**GEO-ENVIRONMENTAL**  
DRILLING COMPANY, INC.

**Geo-Environmental Drilling Co., Inc.**

[www.geoenv.com](http://www.geoenv.com)

**Geo-Mechanics, Inc.**



# Hayward Natural Resources, Inc.

**Groundwater & Environmental  
Services, Inc.**

[hwww.gesonline.com](http://www.gesonline.com)



**HDR Engineering, Inc.**

[www.hdrinc.com](http://www.hdrinc.com)

**Howard Concrete Pumping Co., Inc.**

[www.howardconcretepumping.com](http://www.howardconcretepumping.com)



**Huntley & Huntley**

<http://www.huntleyinc.com/>



**Insite Group, Inc.**  
[www.insitegroup.org](http://www.insitegroup.org)

**Key Environmental, Inc.**

[www.keyenvir.com](http://www.keyenvir.com)



**Michael Baker**  
INTERNATIONAL

**Michael Baker International**

[www.mbakertntl.com](http://www.mbakertntl.com)

**Moody and Associates Inc.**

[www.moody-s.com](http://www.moody-s.com)



**Moody**  
and Associates, Inc.

Groundwater and Environmental Professionals Since 1891

## Natural Energy Development Corp.

## Oil & Gas Management, Inc.



**Pennsylvania Drilling Co.**  
[www.pennsylvaniadrillingco.com](http://www.pennsylvaniadrillingco.com)

**Pennsylvania Soil and Rock, Inc.**  
[www.pasoilrock.com](http://www.pasoilrock.com)



**RANGE RESOURCES'**

**Range Resources Appalachia**  
[www.rangeresources.com](http://www.rangeresources.com)

**Seneca Resources Corporation**  
[www.natfuel.com/seneca](http://www.natfuel.com/seneca)



**THG GEOPHYSICS**

**THG Geophysics, Ltd.**  
[www.THGGeophysics.com](http://www.THGGeophysics.com)

**Vista Resources, Inc.**  
[www.vistaresources.com](http://www.vistaresources.com)



**Woodard & Curran, Inc.**  
<http://www.woodardcurran.com/>