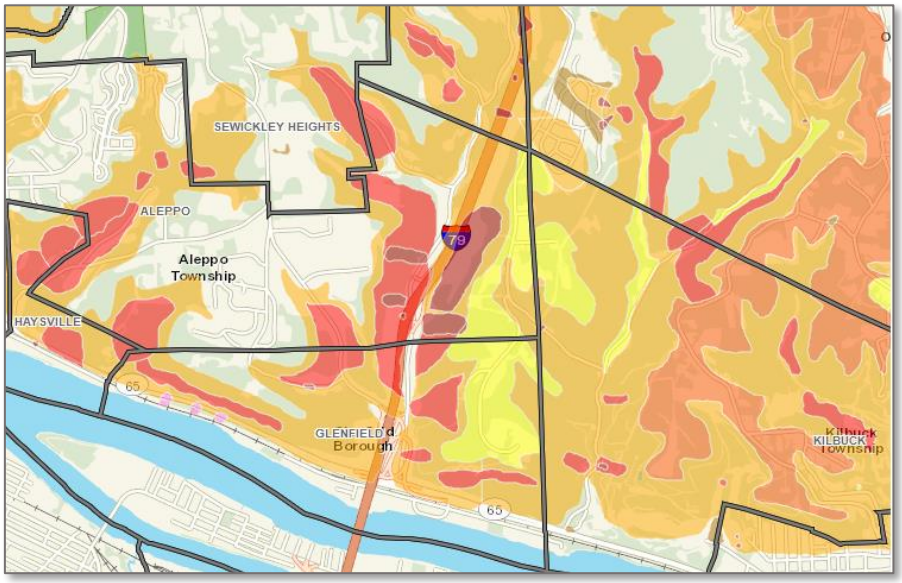
Celebrating 75 Years

PITTSBURGH GEOLOGICAL SOCIETY

This meeting is hosted by the ASCE Geo-Institute Pittsburgh Chapter in association with PGS and AEG.

GEO-INSTITUTE Pittsburgh Chapter

I-79 Landslides Near Pittsburgh, PA – A 50 Year Perspective



James V. Hamel Ph.D. PE PG

Consulting Engineer

Early Bird Deadline: Monday, January 6

January 15, 2020

MEETING TIMES

Social Hour	5:30 PM
Dinner	6:30 PM
Speaker	7:30 PM

DINNER COSTS

Early bird prices:

Students .....FREE
PGS members $35
Non-members $45

After January 6

Students $10
PGS members $40
Nonmembers $50

RESERVATIONS

Register online at
www.asce-pgh.org
Use code 01P15G20S

MEETING LOCATION

Cefalo's Banquet & Event Center, Carnegie PA

Speaker Abstract

Reactivation of marginally stable Pleistocene age rockslides and associated colluvial landslides during construction of Interstate Route 79 (I-79) near Pittsburgh in 1968-1969 provided a unique opportunity to investigate these slides. Dr. Hamel studied these slides as part of his Ph.D. research at that time, and then left the Pittsburgh area from 1969-1972. He has been studying the slides ever since returning to the area in 1972, with intermittent visits for visual monitoring of slide behavior and escorting various field trips. Since 2014, he has made annual visits, typically each spring.

The geologic setting and geotechnical framework of the slide area will be presented. Reactivation of old rockslides and colluvial slides will be illustrated along with some of the shear zones and failure surfaces. Key findings from the 1968-1969 investigation will be summarized. Large portions of these slides were excavated in 1969-1970 to stabilize the slopes. Unexcavated slide remnants continue to creep downslope. Because of large buffer zones, they pose no threat to the highway.

Engineering investigations since 1972 will also be summarized. These include re- evaluation of low residual shear strengths for failure surface clays (2017) and estimation of long-term creep movements from tree trunk deformation (2019).

Finally, the 2006 Kilbuck (Walmart) landslide located a mile southeast of the major I-79 slide area will be cited as a monumental failure to apply knowledge gained from the extensively published and disseminated I-79 experience.

Speaker Biography

Dr. James Hamel has degrees in civil engineering from the University of Pittsburgh (B.S ., 1965; Ph.D., 1970) and the Massachusetts Institute of Technology (S.M., 1966). Jim is a Fellow and Life Member of the American Society of Civil Engineers and an Honorary Member of the Association of Environmental and Engineering Geologists and the Pittsburgh Geological Society.

In 1989, Jim was named Pittsburgh Civil Engineer of the Year by the Pittsburgh Section, American Society of Civil Engineers. He also received the Distinguished Practice Award from the Engineering Geology Division of the Geological Society of America in 2008.

Editor's Note: Our cover page illustration was taken from the Allegheny County Landslide Portal: https://landslide-portal-alcogis.opendata.arcgis.com/pages/map-tools

PRESIDENT'S STATEMENT

New Years Day is the time when many people around the world reflect on the past year and make resolutions for the upcoming year. Most of these resolutions are an attempt to improve one's life. These range from eating healthier, losing weight, exercising more, saving money, reducing stress, quitting smoking, etc. But in my experience, by February, I am back to my regular routine and the resolutions are forgotten.

Since many people end up not following through on their resolutions, what is the point and when did this notion of making changes for the new year start? The ancient Babylonians were the first to make New Year's resolutions approximately 4,000 years ago. They may even have been the first people to celebrate the New Year in a festival called Akitu. At that time, the New Year was in March not January, on the first new moon following the vernal equinox, the day with an equal amount of sunlight and darkness. It is written that they may have been the first people to make resolutions as promises to the gods in the hopes for a successful growing season.

January 1st became the start of the new year when Julius Caesar changed the calendar around 46 BC. January is named after the two-faced god, Janus. It was thought that the spirit of Janus inhabited doorways and arches symbolically looking backwards into the previous year and forward into the future. Romans offered gifts and sacrifices to Janus with the hopes that the future would bring them fortune. So, the tradition continued that the first day of the new year was a good time to reflect on accomplishments from the past year and make promises for the future.

As I reflect on the past year, PGS had many accomplishments for 2019. These include:

- Finding a new meeting venue after our previous home in Foster's Restaurant closed for remodeling.
- Producing and adopting a formal code of conduct for our members.
- Sponsoring another successful two-day student drilling workshop.
- Holding our 17th Annual Student Research Night in association with AEG and ASCE.
- Awarding the first ***PGS Frank Benacquista Student Scholarship***.
- Providing funding to support education and professional development in our region.
- Organizing a fall field trip to investigate the geology of Southwestern PA and the archeology of Meadowcroft Rockshelter.
- Organizing a variety of professional speakers at our monthly meetings.

These accomplishments would not have been possible without the hard work and dedication of the board members. They spend much-appreciated time organizing these events and opportunities for the membership. I would also like to thank all the members for their support throughout the last year and I especially want to express my gratitude to our Corporate Sponsors because many of these activities would not have been possible without your donations. As we start 2020, I look forward to celebrating PGS's 75th Anniversary with field trips and special events for everyone.

In honor of Janus, take some time to reflect on your successes in the past year and to set the intention for the new year is to attend more monthly meetings and participate in events sponsored by PGS.

Happy New Year!

Tamra

PGS WALT SKINNER AWARD GIVEN TO DAN BILLMAN

At the December 2019 meeting of the Pittsburgh Geological Society, PGS President Tamra Schiappa presented the Walt Skinner Award to long-time member, supporter, and corporate sponsor Dan Billman. A full list of past awardees can be viewed on the Awards and Honors section of the PGS website, and is a roll-call of distinguished names in local geology.

The Pittsburgh Geological Society established the Walt Skinner Award in 1987 to honor those members who have provided exceptional service to the Society and to the geological community at large. The award is named in honor of its first recipient, Professor Walter S. Skinner of Duquesne University, a long-time member of the Society who served as President, officer, board member, and unofficial counselor and mentor to the society.

Dan is the 17th recipient of the Walt Skinner Award, which is not awarded in every year. He was recognized not only for his work as liaison with both AAPG and PCPG, but also for his many hours as a volunteer at student workshops, community outreach events, and local professional meetings. Congratulations, Dan!

PGS - AEG - ASCE STUDENT NIGHT IS APRIL 15!

University students, start planning to present your college research projects at the **18th Annual PGS – AEG – ASCE Student Research Night on April 15, 2020**. If you have been conducting undergraduate or graduate research in any geological or geotechnical field, you can show off your work to members of three regional professional scientific societies. All presenters will receive official certificates of recognition, as well as a complimentary dinner. The three students chosen to give oral presentations will each receive awards of $100, while the three best poster presenters will each receive awards of $50.

LOCAL GEOLOGICAL EVENTS

ACS ENERGY TECHNOLOGY GROUP

January 16, 2020 **6:00 PM - 8:30 PM**

"Historical Carbon Footprinting & Implications for Sustainability Planning: A Case Study of the Pittsburgh Region" by Dr. Rachel Hoesly, KeyLogic Systems Team.

Lombardozzi's Restaurant, Pittsburgh PA

SOCIETY OF PETROLEUM ENGINEERS

January 20, 2020 **11:00 AM – 1:00 PM**

"SPE Distinguished Lecture: A Performance-Based Approach For Developing Upstream Professionals" by Salam Salamy, Saudi Aramco

Cefalo's Banquet and Event Center, Carnegie, PA

NORTHERN ALLEGHENIES GEOLOGICAL SOCIETY

January 21, 2020 **5:30 PM – 8:00 PM**

"The Whale Mountain Allochthon: petrologic and paleontological evidence of an accredited 'Paleo-Galapagos' in the Brooks Range of Alaska" by Dr. John Taylor, Indiana Univ. of Pennsylvania

La Fiesta Restaurant, Ebensburg PA

PA COUNCIL OF PROFESSIONAL GEOLOGISTS

January 23, 2020 **5:30 PM – 7:00 PM**

Central-PA Continental Drifters Networking Event. Conversation and complimentary beer/wine/soda.

Appalachian Brewing Company, Harrisburg PA

GEOPHYSICAL SOCIETY OF PITTSBURGH

February 18, 2020 **11:30 AM – 1:00 PM**

Luncheon meeting on "Distributed Accoustic Sensing Processing and Workflows" by Brian Fuller, Sterling Seismic & Reservoir Services

Cefalo's Banquet and Event Center, Carnegie, PA

The Pittsburgh Geological Society welcomes two new professional members:

Katherine E. Brust
Geologic Specialist, American Geotechnical & Environmental Services, Inc.
Canonsburg PA

Abbey V. Smith
Analyst, Test America
Pittsburgh PA

The Pittsburgh Geological Society Endowment Fund

Established May 8th, 2014 through the

COMMUNITY FOUNDATION

UPCOMING PGS MONTHLY MEETING

The next PGS Dinner Meeting will be held on February 19, 2020.

Dr. Barbara Tewksbury

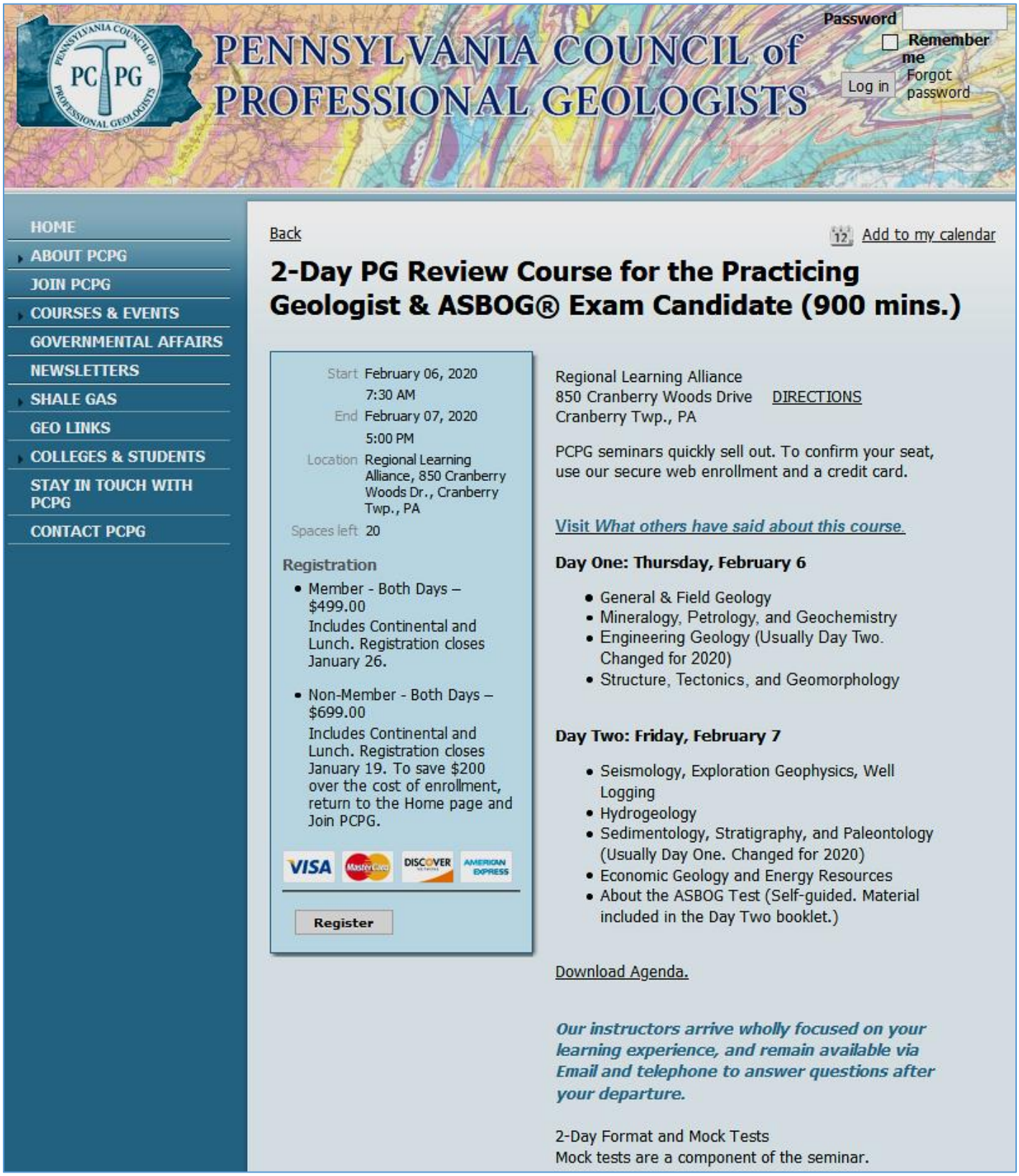
Enigmatic Surface Features in the Western Desert of Egypt

Department of Geosciences, Hamilton College

2020 PGS EVENT SCHEDULE

Meeting Date	***Scheduled Speaker***	***Presentation Topic***
March 18, 2020	Kendra Murray, Idaho State University	Geochronology and Landscape Change
April 15, 2020	Student Research Night Joint Meeting with ASCE and AEG	Student Posters & Presentations
The deadline for submitting student research abstracts this year will be March 15, 2020. Abstract submission forms and guidelines are available at: https://www.pittsburghgeologicalsociety.org/student-night.html.		
May 13, 2020	Randy Blood, PGS Award Winner DRB Geological Consulting	Energy Resources
Sept 19, 2020	PGS 75th Anniversary Field Trip – Pittsburgh East (tentative)	Geology, Energy, And Industry That Made Pittsburgh Great

OTHER EVENTS OF INTEREST TO PGS MEMBERS



PENNSYLVANIA COUNCIL of PROFESSIONAL GEOLOGISTS

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Back

Add to my calendar

2-Day PG Review Course for the Practicing Geologist & ASBOG® Exam Candidate (900 mins.)

Start February 06, 2020 7:30 AM
End February 07, 2020 5:00 PM
Location Regional Learning Alliance, 850 Cranberry Woods Dr., Cranberry Twp., PA
Spaces left 20

Registration

- Member - Both Days – $499.00
  Includes Continental and Lunch. Registration closes January 26.
- Non-Member - Both Days – $699.00
  Includes Continental and Lunch. Registration closes January 19. To save $200 over the cost of enrollment, return to the Home page and Join PCPG.

VISA MasterCard DISCOVER AMERICAN EXPRESS

Register

Regional Learning Alliance
850 Cranberry Woods Drive DIRECTIONS
Cranberry Twp., PA

PCPG seminars quickly sell out. To confirm your seat, use our secure web enrollment and a credit card.

Visit What others have said about this course

Day One: Thursday, February 6

- General & Field Geology
- Mineralogy, Petrology, and Geochemistry
- Engineering Geology (Usually Day Two. Changed for 2020)
- Structure, Tectonics, and Geomorphology

Day Two: Friday, February 7

- Seismology, Exploration Geophysics, Well Logging
- Hydrogeology
- Sedimentology, Stratigraphy, and Paleontology (Usually Day One. Changed for 2020)
- Economic Geology and Energy Resources
- About the ASBOG Test (Self-guided. Material included in the Day Two booklet.)

Download Agenda.

Our instructors arrive wholly focused on your learning experience, and remain available via Email and telephone to answer questions after your departure.

2-Day Format and Mock Tests
Mock tests are a component of the seminar.

OTHER EVENTS OF INTEREST TO PGS MEMBERS

THE PENNSYLVANIA

BROWNFIELDS CONFERENCE

MARCH 9-11, 2020

The Penn Stater Hotel and Conference Center

State College, PA

PENNSTATE

Call for Papers, Exhibit & Sponsor Reservations Opening Soon!

Planned in collaboration between;

the Pennsylvania Department of Environmental Protection (DEP) and the Engineers' Society of Western Pennsylvania (ESWP), the conference (which is held in different cities in PA), offers high-quality educational sessions on important brownfield topics! Additional benefits include:

- Earn PDH Credits for select sessions throughout the day and a half conference!
- Conference activities, such as Mobile Workshops and Walking Tours highlighting the best of PA brownfields developments;
- An Exhibit Hall of companies and organizations who can help ensure a successful brownfields project;
- Networking reception and special guest speakers;
- a Special Grant Writing Workshop sponsored by the U.S. Environmental Protection Agency; and much more!

THE ORIGIN OF WESTERN PENNSYLVANIA PLACE NAMES

Creighton is an unincorporated community in East Deer Township, Allegheny County, about 20 miles up the Allegheny River from Pittsburgh. Originally a mere station on the Western Pennsylvania Railroad, it was named in honor of James Creighton who was the superintendent of the railroad.

Creighton owes its existence primarily to the construction of the Pittsburgh Plate Glass Company (PPG) works, established there in 1880 as the New York Plate Glass Company (the name change occurred three years later). A historical marker at PPG Plaza in downtown Pittsburgh reads, *First commercially successful U.S. plate glass maker, founded 1883 by John Ford, John Pitcairn and others. First plant was at Creighton; office was half a block east of here on Fourth Avenue. The company became PPG Industries in 1968.*

Works No. 1, the Creighton plant of Pittsburgh Plate Glass Company, was the first commercially successful plate glass factory in the United States.

For more information about the history of PPG Industries, see **Did You Know . . . ?** below.

DID YOU KNOW . . . ?

Looking back 75 years ….

Dr. Carey Croneis was a geologist, teacher, and president of Beloit College in Wisconsin when he gave the third talk ever heard at a PGS meeting, in January of 1945. He spoke on the subject of "Science and the Future." Dr. Carey Gardiner Croneis (1901-1972) was born in Bucyrus, OH. He received a BS degree in 1922 from Denison University, followed by an MS degree in 1923 from the University of Kansas where he had also been an instructor in geology. Following graduation, he received an instructorship at the University of Arkansas where he taught and studied the local geology. After two years, he left to work on a Ph.D. at Harvard; while there, he taught geology and paleontology at Radcliff and Wellesley colleges.

After graduating from Harvard, Croneis went to the University of Chicago as an assistant professor of geology, advancing to associate professor in 1931, then full professor in 1941. While at Chicago, he was curator of paleontology at the Walker Museum and organized the geology section of the Chicago Museum of Science and Industry. In addition, he was in charge of the geology section and chief of basic sciences at the Century of Progress World's Fair. He also produced films on geology for the University of Chicago and the National Park Service. Croneis served as

Carey Croneis was President of Beloit College in 1944 when he gave the third talk ever presented at a PGS meeting.

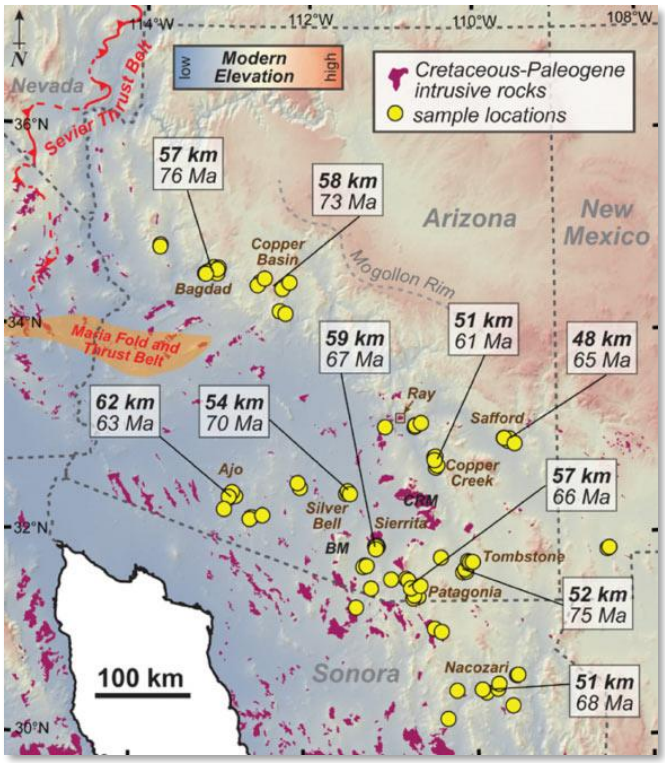
a consultant for the National Defense Research Committee during World War II, helping to plan coastal defenses for Brownsville, TX, and adjacent areas. He also helped select the proving grounds for the U.S. Chemical Warfare Service in Panama.

Dr. Croneis was named president of Beloit College in 1944, later moving on to Rice University in 1953 where he spent the rest of his distinguished career. He designed the Geology Department at Rice and was named the first Harry C. Wiess professor of geology. He was named provost, then acting president of Rice in 1960, and served as the university's first chancellor from 1961 until he retired in 1971 as chancellor emeritus. Despite all the administrative responsibilities, he still managed to carry a teaching load as well. Croneis was also involved in many outside activities, including:

- Chairman of the Houston City Charter Committee where he is credited with influencing the decision to establish what is now the Lyndon B. Johnson Space Center outside of Houston Founder and President of the Houston Council on World Affairs
- Charter member of the Texas Academy of Science
- Member of the Centennial Committee of the American Museum of Natural History
- Editor of Harper & Row's Geoscience Series (1941)
- Associate editor of the *Journal of Geology* (1930–1945)
- Author of *Geology of the Arkansas Paleozoic Area* (1930)
- Coauthor (with W. C. Krumbein) of *Down to Earth* (1936)
- President of the Philosophical Society of Texas (1971)

Croneis, a Phi Beta Kappa, was awarded nine honorary doctorates during his career. He received the Sidney Powers Memorial Medal from AAPG in 1967, as well as a gold medal from the Association of Rice Alumni for distinguished service to the university. He was a fellow of the World Academy of Art and Science. And in 1970, the American Federation of Mineralogical Societies established in his honor five two-year scholarships for graduate study in Earth sciences.

New research out of the University of Wyoming suggests that much of the southwestern United States had elevations in excess of 10,000 feet and looked more like the Tibetan plateau during the Late Cretaceous and Early Paleogene (between 80 and 50 ma). Because Earth's crust floats on the mantle much like ice floats on water there is some sticking out above the surface and some pressed down into the mantle. A thicker crust results in higher land surfaces (e.g., mountains) similar to an iceberg where the thicker the ice the higher the portion that sticks out of the water.



Map of a portion of the Arizona Plateau showing locations of samples used to estimate crustal thickness during the Laramide orogeny. White boxes – average crustal thickness and average age for locations. CRM – Catalina-Rincon Mountains, BM – Baboquivari Mountains.

The researchers analyzed the geochemistry of igneous rocks to figure out how thick Earth's crust was in the past and then how thickness relates to elevation. They were able to determine that the crust in southern Arizona was at one time 35.4 miles thick, twice as thick as it is today. When the crust was really thick, the underlying magma underwent extreme pressure from the weight

of the rocks above them, causing distinctive changes in both the types and the geochemistry of the minerals forming the rocks.

This research then raised the question of how the crust in southern Arizona became so thick. The standard way thick crust is created is by tectonic plates colliding or converging, thus stacking rock masses on top of each other. Southern Arizona traditionally has been viewed as a relatively quiet area, without enough faulting to account for the crustal thickness the researchers suggested. As a result, they are now working to resolve this problem by searching for long-dormant faults in the area that could help explain how the crust became so thick.

This new research might help explain why copper is so abundant in southern Arizona, because several studies have suggested there is a correlation between large copper ore deposits and regions of thick crust. There are many copper mines in the Andes Mountains in Chile, for example. Thus, the results of this research help strengthen that correlation and may assist in exploration efforts.

http://www.sci-news.com/geology/arizona-plateau-07874.html

Two of the biggest questions faced by Earth scientists are, "How, and when, did the Earth evolve from a molten mass into a rocky planetary body continually resurfaced by plate tectonics?" Now, according to new research by scientists from Australia and the US, this transition might have been triggered by intense extraterrestrial bombardment. By using modeling simulations and comparisons with lunar impact studies, the researchers suggest that large impacts continued to shape the planet for hundreds of millions of years after Earth's accretion about 4.6 ga.

An artist's concept of meteors impacting the ancient Earth

Even though such events seem to taper off over time, Australia's Pilbara craton and South Africa's Kaapvaal craton suggest the Earth experienced a period of intense bombardment during the Archean Eon about 3.2 ga. This is about the same time the first indications of plate tectonics appear in the geologic record, which caused the researchers to wonder whether these two things could be related. Modeling studies have suggested that impacts by bolides more than 186 miles in diameter could generate a significant thermal anomaly in the mantle that could have altered the mantle's buoyancy enough to create upwellings capable of driving plate tectonics. However, what sparse evidence from the Archean has been found so far suggests that mostly smaller impacts (less than 62 miles in diameter) occurred during this interval.

So, the researchers used existing techniques to expand the Middle Archean impact record, then developed numerical simulations modeling the thermal effects of such impacts on Earth's mantle to see if they were large and frequent enough to initiate global tectonics. Their results indicate that 62-mile-wide impacts during the Middle Archean were capable of weakening Earth's crust enough to trigger tectonic processes, particularly if the crust was already

prepared for subduction. If the lithosphere had been the same thickness everywhere, such impacts would have little effect. During the Middle Archean, however, the planet had cooled enough for the mantle to be thicker in some places and thinner in others. The team's modeling showed that, if an impact happened in an area where such differences existed, it could create a point of weakness in a system where there were large contrasts in buoyancy, thus triggering modern tectonic processes. Their work, in other words, showed there is a physical link between impact history and tectonic response at around the time plate tectonics was suggested to have begun.

http://www.sci-news.com/geology/massive-asteroid-impacts-early-plate-tectonics-07847.html

Yes, Virginia, there once were dinosaurs living at the South Pole! Of course, today's South Pole is very different from that of the Mesozoic. All of the southern landmasses – Antarctica, Australia, South America, and Africa, along with India and Arabia – were all part of the giant supercontinent called Gondwana, which sat more or less directly centered on the South Pole. Earth's climate was also a lot warmer so that Gondwana wasn't a frozen wasteland all year round. Instead, the climate was far more temperate, with lush ecosystems full of plants and animals. But, although it wasn't exactly freezing, the poles still experienced long periods of sunlight in summer, and darkness in winter so that anything living in such conditions still had to deal with an extended, chilly twilight.

So how could dinosaurs and other life survive in such an environment? Well, a team of researchers from Slovakia, Sweden, Australia, and the US might have found the answer – feathers! Although there have been hints of feathered dinosaurs in the fossil record, most of them lived in the Northern Hemisphere, and the fossils represented an array of coverings that could have helped Mesozoic life regulate their temperatures, hide, and occasionally even glide in relatively warm climates. Until recently there were no directly attributable integumentary remains discovered showing that dinosaurs used feathers to survive in extreme polar habitats. There are a few sites in the southern hemisphere where fossil feathers have been found, notably from Koonwarra in Victoria, Australia, but they were recognized as evidence of ancient birds and never examined closely until recently.

The new research was the first to comprehensively document and examine those remains using cutting-edge technologies such as advanced forms of microscopy and spectroscopy. Only 10 specimens dated to about 118 ma were included in the study, but all of them provided solid evidence of wing feathers from ancient birds, tufted dinosaur proto-feathers, and partly decomposed body feathers. The technologies used allowed the team to secure a large level of detail from the well-preserved remains, providing information on their anatomy and even coloration in some specimens. Some of the feathers were relatively advanced, sporting barbed "zips" similar to modern bird feathers that help them interlock for flight, and giving the animal protection against the elements. But it was

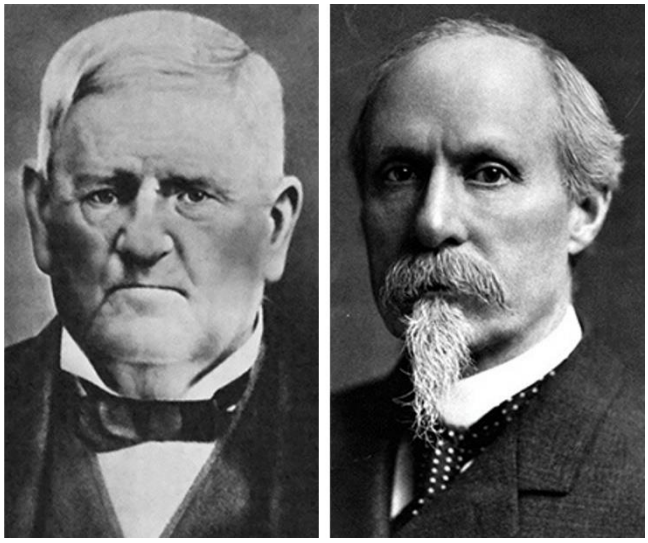
Researchers have analysed fossils representing an array of feathers grown by dinosaurs and birds that once lived within the southern polar circle.

the simpler proto-feathers that were of particular interest because they would have been used for insulation. Thus, the discovery of such proto-feathers at Koonwarra provides hard evidence suggesting that fluffy feather coats might have helped small dinosaurs keep warm in ancient polar habitats.

The researchers also found densely packed fossil pigment bodies (melanosomes) that indicated dark colouration that might have helped to absorb heat and possibly help with camouflage or communication in dimly lit winter months. Interestingly enough, Australian paleontologists found clear evidence of a 110 ma dinosaur burrow at another Victorian site about 10 years ago that suggested at least some species burrowed underground to wait out the cold. So, yes, Virginia, dinosaurs DID live at the South Pole, and they would have had a variety of features and behaviours that would have helped them live comfortably in a highly variable environment.

https://www.sciencealert.com/palaeontologists-have-analysed-the-feathers-that-kept-polar-dinosaurs-toasty-warm

Captain John B. Ford (1811-1903), an entrepreneur, and John Pitcairn, Jr. (1841-1916), a railroad official, founded the New York Plate Glass Company in 1880. Their first plant was located on the Allegheny River in Creighton, about 20 miles northeast of Pittsburgh. They changed the name to Pittsburgh Plate Glass Company (what we now know as PPG Industries) in 1883 when they moved the company headquarters to Pittsburgh. By the time the company headquarters moved to Pittsburgh, it was producing 20 million square feet of plate glass per year. It became the country's first commercially successful producer of high quality, thick flat glass using the plate process. It was also the world's first plate glass plant to power its furnaces with locally produced natural gas, an innovation which rapidly stimulated widespread industrial use of the cleaner-burning fuel. By 1900, it was known as the Glass Trust and included 10 plants, had a 65% share of the US plate glass market, and had become the nation's second largest producer of paint as well.



Captain John B. Ford (left) and John Pitcairn, Jr. founded what is now PPG Industries in 1883.

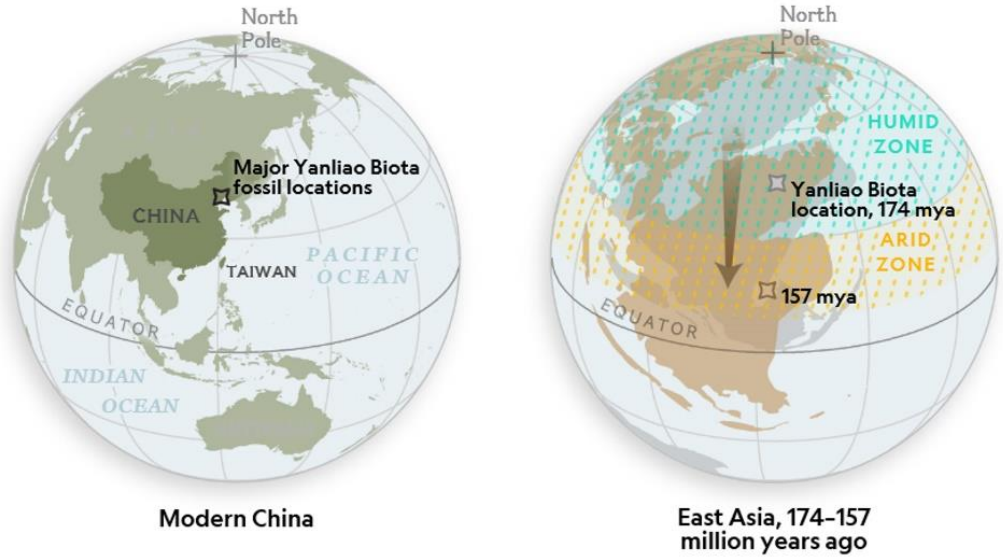
PPG obtained its glass sand from a sandstone quarry on west side of the Allegheny River near Kennerdell, Venango County; the crushing plant was on the east side of the river adjacent to the railroad that would carry the sand to the manufacturing plant at Creighton. In certain areas of western Pennsylvania, portions of the Homewood and Connoquenessing sandstone members of the Pottsville Formation are sufficiently high in pure quartz to be suitable for the manufacture of plate, window, and bottle glass. In fact, an analysis of the sandstone at the PPG quarry by Charles R. Fettke (one of the founders of PGS) indicated a SiO_2 content 98.35%. The PPG quarry exposed 30 to 40 feet of white quartz sand with a little limonite staining along joints at the northeast end, but with enough iron oxides in the southwest end to prevent its use for glass. As a result, only about 60% of the sandstone quarried was used for plate glass manufacturing; the remainder was used mostly for grinding and polishing.

The company quickly expanded, moving into research and development, and building its first research center in 1910. The Creighton plant began supplying airplane glass in 1926, then started to mass produce sheet glass and laminated safety glass for car windows in 1928. In 1934, they produced the world's first curved windshield for automobiles, and in the 1940s they produced glass for military aircraft for World War II. To ensure a continuous flow of new glass products, the Glass Division built a new research and development facility in 1958. Other changes soon followed with the production of sheet glass being phased out in the 1960s and research being phased out in the late 1970s as the plant was modernized and upgraded with computer controls.

In 2008, the company sold controlling interest in the Creighton plant and its automotive glass division to Kohlberg & Co., who renamed the business Pittsburgh Glass Works. Over the next ten years, the plant changed hands several times until the last owner, Vitro S.A.B. de C. V., shuttered the Creighton plant and moved its windshield manufacturing to more updated facilities. Today, PPG Industries is a multibillion-dollar, Fortune 500 corporation with 150 manufacturing locations in more than 70 countries around the world, producing coatings, glass, fiberglass, and chemicals. By revenue it is the second largest coatings company in the world.

http://corporate.ppg.com/Our-Company/company-history.aspx

During the Jurassic Period, more than 160 ma ago, life flourished in the cool, damp forests of what is now northeastern China. Suddenly (in geologic terms), the air warmed and the land dried out. As the water disappeared, so too did the life. Researchers have struggled to identify a climate-related culprit behind this ecological collapse because it seemed like a case of extinction by climate change. Now, a new study suggests that it wasn't the climate that changed, but rather the geographic location of the area. Paleomagnetic data from the area's rocks indicate that sometime between 174 and 157 ma the whole region shifted southward by a startling 25°, plunging the once-lush landscape into a zone of desiccating heat.



A new study of paleomagnetic data from northeastern China suggests that the surface of Earth rotated 25°, moving the landscape inhabited by the Yanliao biota from a cool, humid zone to a hot, dry zone.

It was part of a phenomenon known as true polar wander, in which the topmost layers of the planet, possibly down as far as the liquid outer core, rotate significantly even as Earth continues its normal rotation. During the Jurassic, the surface and mantle rotated around an imaginary line through the crook in Africa's west coast known as the Bight of Benin. The shift would have been massive. If a similar shift happened today, a flag planted in Dallas, TX, for example, would end up where northern Manitoba, Canada, currently

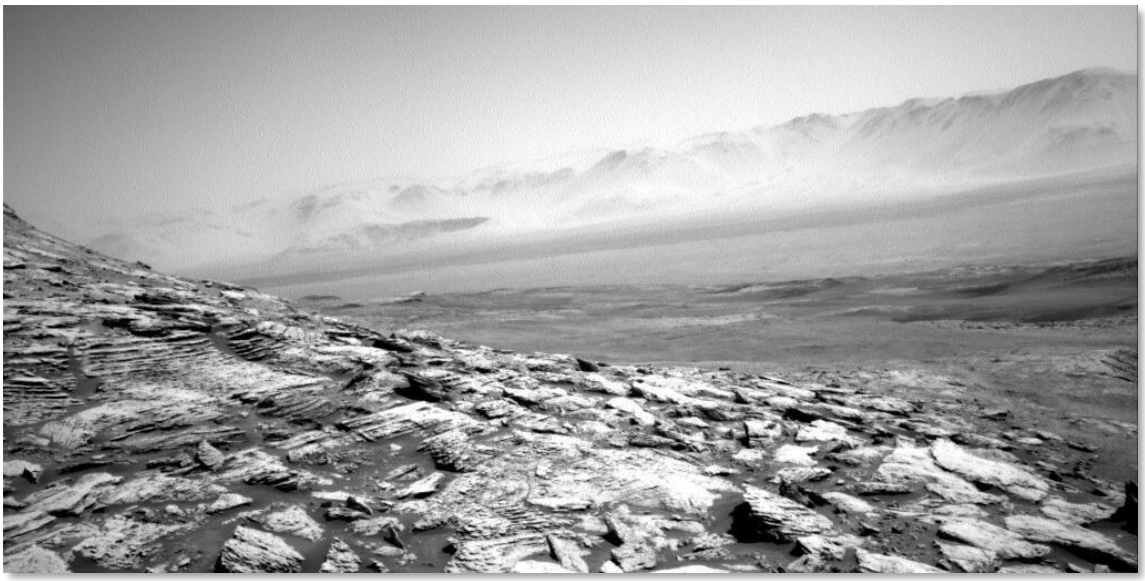
sits while Asia would move southward. Earth has probably experienced smaller amounts of true polar wander throughout its past, and some scientists think it is continuing today (this phenomenon is NOT the source of today's climate change).

While such deep gyrations can have drastic impacts on Earth's surface, the planet's magnetic field remains largely unchanged by such events because it is generated about 1,800 miles below the surface by the churn of molten iron and nickel in the outer core. As sediments collect and solidify, or lava cools to rock, iron-rich minerals align themselves with the global magnetic field like compass needles, recording a snapshot of a region's location on our planet at a given period in the past and allowing researchers to use such minerals to untangle the planet's past movements.

But not all rocks are perfect keepers of the paleomagnetic record. As sediments lithify, compression can tweak the magnetic signature and impact their inferred planetary positions. In 2010, researchers from Canada removed the confusion by looking only at volcanic rocks and found the signatures of the Jurassic shift. Their results suggested that Earth's surface shifted some 30^{o} sometime between 160 and 145 ma. The new data refined those numbers. Still, as impressive as this is, both the magnitude of the Jurassic shift and the actual existence of true polar wander are still being debated. Studying Earth's past and present geologic wanderings not only might help resolve the controversy; it could also improve our understanding of the planet's complex machinations.

https://www.nationalgeographic.com/science/2019/11/earths-odd-rotation-may-solve-ancient-climate-mystery/

On a beautiful winter day in New Mexico, someone stood on a ridge and snapped the accompanying photo, right?



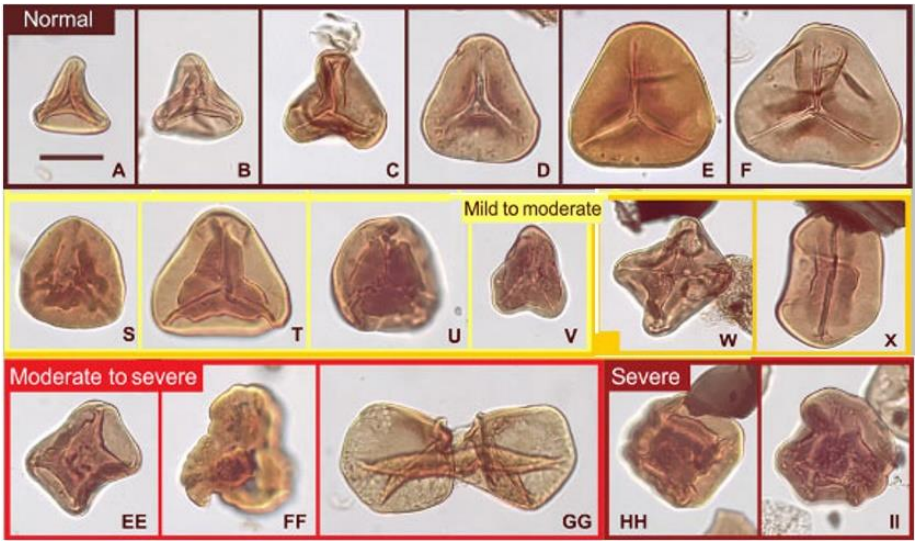
At first glance, this could be a photo of somewhere in the southwestern United States. But it actually is a photo from, Mars, shot by the Curiosity Rover on November 1, 2019.

Wrong! As Earth-like as the photo seem, this vista was actually snapped by the right navigation camera of the Mars Curiosity rover on November 1, 2019 from a location called Central Butte inside Gale Crater on the planet Mars, 235.7 million miles from New Mexico. The rock formations of the butte are in the foreground. This is an area that has rover scientists interested in the local geology. At first glance, it almost looks like the rover is seeing a weird fog or cloud bank in the distance. To get some perspective on Curiosity's viewpoint, the meteor-created Gale Crater is 96 miles in diameter. Mount Sharp, a towering mountain, lies in the middle and steep walls rise up all around the crater's edge.

Although Mars can be cruel, taking away NASA's machines and foiling their best-laid plans, it sometimes rewards us with otherworldly beauty that is all the more striking for both its alienness and its familiarity. Spend some time staring at this and other photos of the Martian landscape. Yes, this COULD be a winter day somewhere in a New Mexico desert, but it isn't. This is one of those amazing photos from Mars that is definitely worth more than a glance.

https://www.cnet.com/news/holy-smokes-this-nasa-mars-curiosity-rover-image-is-haunting/

The end-Triassic mass extinction, which occurred 201.51 ma and resulted in the demise of about 76% of all marine and land species, was, until recently, believed to have been caused by global warming due to the release of volcanic carbon dioxide. According to new research, however, an increase in mercury concentrations, considered the most toxic element to life on Earth, contributed to the end-Triassic crisis.



Normal and mutated fern spores from the end-Triassic mass extinction. Scale bar – 20 µm.

iBefore the Industrial Revolution, volcanic activity was the major release mechanism of large amounts of mercury from the Earth's crust. So researchers in Denmark used mercury found in sediments to trace major volcanic activity in the Earth's past and tie the extinctions of fossil organisms to large igneous province volcanism. Previous studies had found elevated mercury concentrations in Triassic-Jurassic boundary sediments over an area stretching from Argentina to Greenland and from Nevada to Austria. That made the researchers curious about the possible impact of volcanic mercury on the end-Triassic event.

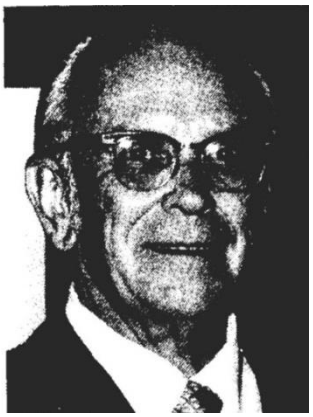
They analyzed fossil fern spores from core samples dating to the end-Triassic mass extinction and found a link between increased mercury levels and mutations in the spores during a period of increased volcanic activity in the Central Atlantic Magmatic Province that led to rising mercury levels. It was evident that those ferns with mutated spores were negatively affected by the mercury levels. Because mercury is accumulated in the food chain, it seems likely that other plant and animal species would have suffered as well.

The results of the study suggest that the end-Triassic mass extinction was caused not just by global climate change linked to greenhouse gases from volcanoes, but that those volcanoes also emitted toxins like mercury that wreaked havoc on life on Earth.

http://www.sci-news.com/paleontology/mercury-end-triassic-mass-extinction-07751.html

Raymond E. Birch (1905-1997), one of the founders of the Pittsburgh Geological Society and its first Vice President, was a research engineer, inventor, and industrialist dealing with ceramics and the minerals that used in the production of ceramics. Birch received his bachelor's degree in ceramic engineering in 1927 from Ohio State University and ten years later was a Professor of Ceramic

Engineering at his alma mater. Between those two dates, he worked as a Ceramic Engineer for the Carlyle Labold Company, an Ohio brick and tile manufacturer; a Research Engineer at the Engineering Experimental Station Ceramic Research Plant of Ohio State University in Roseville, Ohio; and a Research Engineer with Harbison-Walker Refractories Company in Pittsburgh.



Raymond E. Birch, PGS's first Vice President, was a research engineer with Harbison-Walker Refractories Company.

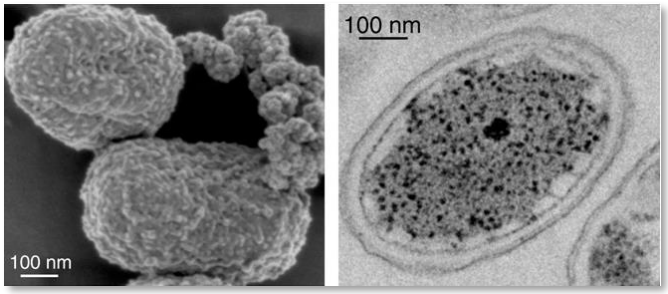
In 1945, Birch was named the Director of Research at Harbison-Walker, a position he held until he retired in 1970. His research focused on the behavior of inorganic materials and refractory products, particularly at high temperatures; high temperature mineralogy aided by X-ray diffraction and spectroscopy; the beneficiation of inorganic materials; and process development to minimize the limitations placed on the operators of high temperature equipment in many fields.

Birch was a member and officer of several ceramic societies, including the American Ceramic Society, the Refractories Division of the American Ceramic Society, the Pittsburgh Section of the American Ceramic Society, and the National Institute of Ceramic Engineers. And of course, he was a founding member of the Pittsburgh Geological Society. He earned numerous honors and awards, including:

- Fellow of the American Ceramic Society (1938)
- Fellow of the Geological Society of America (1947)
- A. F. Greaves-Walker Award from the National Institute of Ceramic Engineers (1968)
- The Greaves-Walker Roll of Honor from the American Ceramic Society (1971)

University of British Columbia (UBC) researchers and collaborators around the globe have found that the ancestors of modern bacteria cultured from an iron-rich lake in Democratic Republic of Congo could have been the key to forming the world's largest iron ore deposits billions of years ago.

The bacteria have special chemical and physical features that allow them to convert energy from sunlight into iron minerals in the complete absence of oxygen. The same process also creates cellular biomass that is then converted into the potent greenhouse gas methane by other microbes. That methane is likely what kept the Earth's early atmosphere warm even at a time when the sun was much less bright than today.

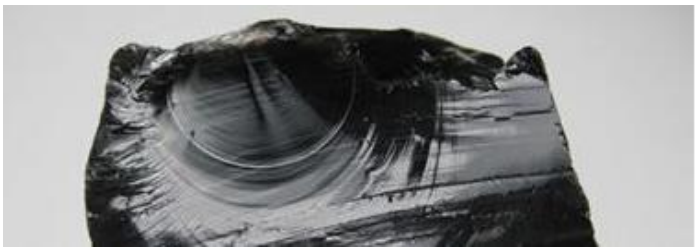


Scanning electron photomicrograph (A) and transmission electron photomicrograph (B) of *C. phaeoferrooxidans* bacteria shows cell structures as well as an association with Fe(III) precipitates.

A methane-rich atmosphere formed in connection to large-scale iron ore deposits and life was initially proposed by University of Michigan atmospheric scientist James Walker in 1987. This new study provides strong physical evidence to support the theory and finds that microscale bacterial-mineral interactions were likely responsible.

https://advances.sciencemag.org/content/5/11/eaav2869

PGS WEBSITE OF THE MONTH: PICTURES OF IGNEOUS ROCKS



https://geology.com/rocks/igneous-rocks.shtml

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

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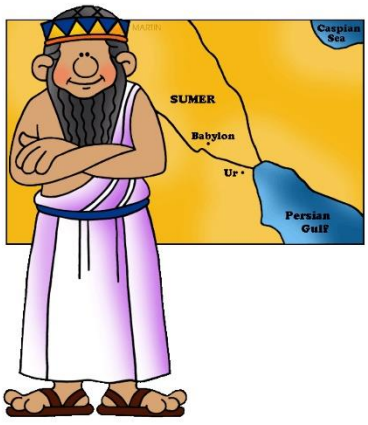
Fun Fact Having Nothing To Do With Geology

The earliest known New Year's celebrations took place in Mesopotamia over 4,000 years ago.



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