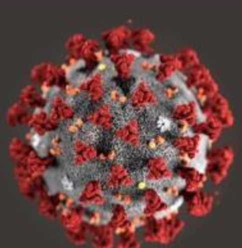
PITTSBURGH GEOLOGICAL SOCIETY

The Story of Our Early Years

In celebration of our 75th Anniversary, the next two issues of our newsletter will be devoted to a retelling of our society's history as documented by John Harper, PGS Counselor.

The Pittsburgh Geological Society was founded in October 1944 "To stimulate geologic thought; to advance and disseminate geologic knowledge; and to provide a forum for geological problems." Although the first meeting to organize the Society was held on October 27, 1944, the founders did not consider it a formal entity until they had established and adopted the first constitution and by-laws on April 18, 1945. PGS owes its existence to a group of like-minded geologists, paleontologists, engineers, and even a clerical employee with an interest in geology.



Due to the coronavirus outbreak, all Pittsburgh Geological Society meetings and events have been cancelled until further notice.

The following is a list of the founders and their affiliations in 1944-1945.

Edith I. Baum, Secretary, Huntley & Huntley, Inc.

Robert E. Bayles, Geologist, Peoples Natural Gas

Raymond E. Birch, Research Engineer, Harbison-Walker Refractories Company

Hugh R. Brankstone, Geologist, Gulf Oil Corporation

Daniel A. Busch, Geologist, Huntley & Huntley, Inc.

Charles H. Feldmiller, Geologist, Equitable Gas Company

Charles R. Fettke, Professor of Geology, Carnegie Institute of Technology

Richard M. Foose, Geologist, Pennsylvania Geological Survey

Jane Freedman, Vertebrate Paleontologist, Carnegie Museum

John T. Galey, Independent Oil and Gas Producer

Sidney S. Galpin, Geologist, Peoples Natural Gas Company

John V. Goodman

George C. Grow, Geologist, Peoples Natural Gas Company

L. Guy Huntley, Geologist, Huntley & Huntley, Inc.

F. Arthur Johnson, Independent Oil and Gas Producer

J. LeRoy Kay, Vertebrate Paleontologist, Carnegie Museum

David K. Kirk, Geophysicist, Gulf Research & Development Company

James H. C. Martens, Mineralogist, West Virginia Geological Survey

Shailer S. Philbrick, Geologist, U.S. Army Corps of Engineers

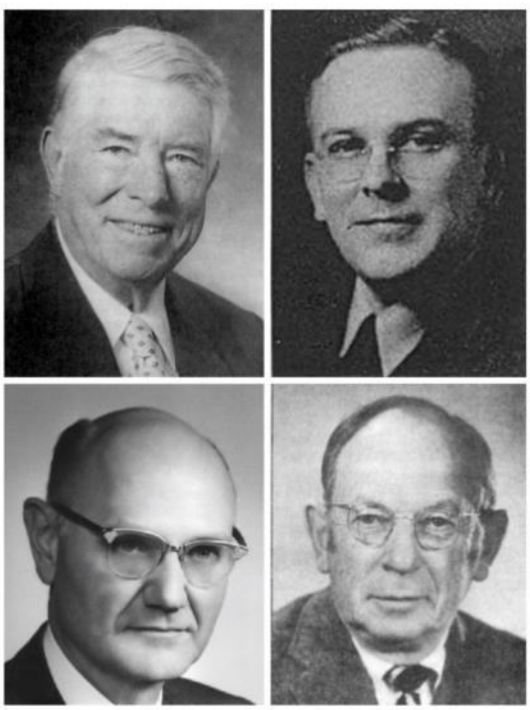
Frank W. Preston, Glass Technologist and Owner, Preston Laboratory

W. Bernard Robinson, Geophysicist, Gulf Research & Development Company

Richard E. Sherrill, Professor of Geology and Department Head, University of Pittsburgh,

James F. Swain, Geologist and Partner, Huntley & Huntley, Inc.

Dana Wells, Associate Professor of Geology, West Virginia University



PGS's first officers, clockwise from top left, President George C. Grow, Jr., Vice President Raymond E. Birch, Secretary W. Bernard Robinson, and Treasurer Dr. Shailer S. Philbrick.

PGS was a welcoming society from the beginning. Despite its elite-sounding scientific objectives, the Society encouraged anyone interested in geology and the earth sciences to join and become active participants in the membership. Many of the industries concentrated in the Pittsburgh area maintained active geological research and exploration in oil and gas, coal, iron and steel, aluminum, ceramics, glass, and others. In addition, the University of Pittsburgh, Carnegie Institute of Technology, and the Carnegie Museum of Natural History had active geologists and paleontologists on staff, some of whom were founding members. Initially, the founders had hoped to recruit about 40 members from this diverse community of industries, academe, and science, but it immediately began to grow beyond leaps and bounds. By the end of its first program year (1944-1945), PGS had a total paid membership of 172 from nine states, consisting of everyone from geologists with Ph.D. degrees and/or decades of professional experience to students and those interested in geology as a hobby.

When PGS was formalized, the Constitution provided for the selection of four officers who were part of the governing Council. During the first full program year, 1945-1946, George C.

Grow, Jr. served as President, Raymond E. Birch was Vice President, W. Bernard Robinson was Secretary, and Dr. Shailer S. Philbrick was Treasurer. Other Councilors included Robert E. Bayles, Hugh R. Brankstone, C. H. Feldmiller, Richard M. Foose, John T. Galey, David K. Kirk, and James H. C. Martens. L. Guy Huntley was the editor of the Society's newsletter, called *Pittsburgh Geologist*, which was printed on various colored papers on a mimeograph machine.

The early Society had three classes of membership: Member (for professional geologists and engineers, with "Charter Member" reserved for the founders), Associate Member (for interested lay persons), and Student Member. With the exception of students, all members were eligible to vote but only Members could run for office or other Council positions. In 1948, annual membership dues included $5.00 for Members (there were 160 in 1948) and Associate Members (16), and $1.00 for Student Members (10). In celebration of the 25th Anniversary of PGS in 1970, those Charter Members (the Founders) of the Society who had maintained membership through the years were named as Honorary Life Members. Eighteen of the original 24 received this honor.

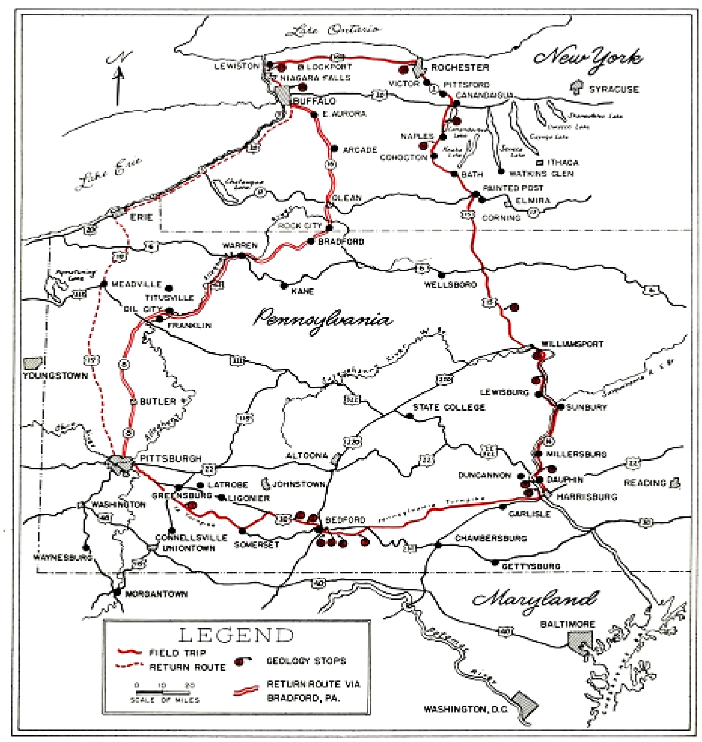
Many of the speakers during the Society's first 10 years included famous geologists such as, clockwise from top left, Ernst Cloos, Richard Foster Flint, M. King Hubbert, George Gaylord Simpson, W. H. Twenhofel, and J. Tuzo Wilson.

From the beginning, PGS has limited its annual meetings to nine, September through the following May (except for the very first year; the Society did not exist in September 1944). Summer months were reserved for fieldwork. The Society's monthly meetings were a major contributing factor in PGS's growth, following the principle that speakers should be among the best in their field, and their subjects must be of interest to all. Although many of the founders worked in the petroleum industry and sought, successfully, to become affiliated with the American Association of Petroleum Geologists (AAPG), petroleum geology did not dominate Society programs. No single geologic discipline received priority over any other. Geology and geology-related topics of all disciplines were presented by a host of speakers, many of whom were nationally or even internationally known and would come to be included in the pantheon of 20th century American geologists. These included the likes of Marland P. Billings, Ernst Cloos, Robert H. Dott, Maurice Ewing, Richard Foster Flint, M. King Hubbert, Philip B. King, W. C. Krumbein, A. I. Levorsen, W. W. Rubey, Francis P. Shepard, George Gaylord Simpson, Lawrence L. Sloss, W. H. Twenhofel, and J. Tuzo Wilson, just to name a few. This enabled the Society to attract membership from a broad range of specialties across western Pennsylvania and adjacent states. PGS meetings gave individuals not only an opportunity to hear many diverse subjects but also to network with others interested in geologically-related subjects. Meetings offered the chance to become acquainted with other members, to discuss topics of interest, and to find out what others were doing and what they might have discovered. Attendance at meetings during the first years averaged more than a hundred persons, with attendees drawn from Ohio and West Virginia as well as from throughout western Pennsylvania. PGS meetings were held in downtown Pittsburgh at the William Penn Hotel (now called the Omni William Penn) and the former Fort Pitt Hotel (which stood at the intersection of Penn Avenue and Tenth Street where the Westin Pittsburgh, adjacent to the David L. Lawrence Convention Center, now stands), and in Oakland at the Mellon Institute (now part of Carnegie Mellon University).

PGS also began early to be involved in organizing and leading field trips, symposia, and other special events. In November 1946, the Council extended an invitation to AAPG to hold a regional meeting in Pittsburgh in October 1947 that would include three days of meetings and a one-day field trip. Although the meeting lasted only one day and had no related field trip, the invitation resulted in *A Symposium on the Ordovician of the Appalachian Basin* held on May 16, 1947, with presented papers published in 1948 in the AAPG Bulletin, v. 32, no. 8, p. 1395-1657.

ROUTE MAP OF FIELD TRIP

A·A·P·G Midyear Meeting, Pittsburgh, Pa., October 4 to 9, 1948



Field trip route map for the first field trip hosted by PGS, for the 1948 AAPG Midyear Meeting in Pittsburgh. The field trip was led by Dr. Frank M. Swartz of Penn State.

On October 4-9, 1948, PGS hosted the AAPG Mid-Year Meeting at the William Penn Hotel with an attendance of almost 300. Ninety-seven people in three Greyhound buses attended the meeting field trip, led by Penn State Professor Frank M. Swartz (see map, right). In 1950, PGS co-hosted and co-led the 16th Annual Field Conference of Pennsylvania Geologists with the University of Pittsburgh, and five years later hosted *Appalachian Geology, Pittsburgh to New York,* a field trip held in conjunction with the annual meeting of AAPG in New York City. (All of these guidebooks can be downloaded from the PGS website: https://pittsburghgeologicalsociety.org/pgs-field-guides.html)

PGS got off to a great start and has never looked back. In its 75 years of existence, the Society has continued to provide services and superior programs to its membership and to the geological community of western Pennsylvania.

PRESIDENT'S STATEMENT

The world is battling a pandemic and most of the U.S. is under a stay at home order as we try to stop the spread of the contagion COVID 19. College campuses and other educational institutions have taken to the virtual space and most professionals are working remotely. This is new territory for many, learning new ways to communicate, gaining new technical skills and developing better time-management skills as they balance work, childcare, and home schooling. For many geologists, the work is divided between field and office/lab work. For now, the individuals with office work are not being impacted, but those who are field technicians may be waiting until they can resume working, or they are risking their health in order to complete their jobs.

The hardest part of all is not being able to see the enemy leading to a fear of the unknown. People are afraid to go outside for fear they may become infected or become a vector and in return infect someone else. What is it that we are trying to avoid? They call it COVID 19, a single stranded RNA virus that can cause severe respiratory symptoms. What are viruses really? Do viruses have an evolutionary history? Could a viral infection have played a role in mass extinctions? It turns out that viruses leave no physical fossil record since they only persist for short periods of time and commonly degrade quickly, leaving no direct trace of their existence. However, paleovirologists have identified a genetic fossil record of extinct viruses that are preserved in the genomes of modern organisms. This piqued my interest while staying at home trying to find some relative information for my paleo class. So here is a synopsis of what I found.

Let's start with the definition of a virus from Merriam Webster. Virus is any large group of submicroscopic infectious agents, ranging in size from ~ 20 to 400 nanometers. Viruses are vessels of nucleic acid, either DNA or RNA, surrounded by a semipermeable protein (or lipid) membrane. On a side note, health officials tell everyone to wash your hands with soap and water. This is important because soap will destroy this semipermeable membrane killing off the virus. These vessels are only capable of growth and multiplication once they have entered a host cell. Outside a living cell, a virus is dormant or may not survive, because it lacks the materials needed for reproduction. Once inside a living cell it uses the cell's metabolism to reproduce. Viruses have short generation times, and some have high mutation rates, meaning once they enter the genome in the host cell, they change rapidly.

Since viruses do not survive outside of a host cell and are not preserved in the fossil record, what do we know about their evolutionary history? Viruses have a rapid mutation rate and evolve when there is change to their RNA or DNA sequence upon interaction with the host cell. Because of their high mutation rate viruses quickly adapt to changes in their host environment and pass these mutations on to the offspring. The best adapted mutants will quickly outnumber their less fit counterparts, following the Darwinian evolution premise. One group of viruses that paleovirologists study is the retroviruses. A retrovirus is a type of RNA virus that inserts a copy of its genome into the DNA of the host cell changing the genome of that cell. This change in the genome can be passed on to the next generation and potentially preserved in the genome of the host population. Essentially, paleovirologists investigate viral fossils that are not mineralized but are pieces of genetic code held over in the genome of modern animals.

The genomes of most vertebrate species contain sequences derived from ancient retroviruses and are used as evidence for the understanding their evolutionary history. For example, paleovirologists have discovered hepadnavirus (a virus group that includes hepatitis B) hiding in the genomes of modern songbirds. The researchers traced the common ancestors of these birds and have estimated that this family of viruses has been around for at least 19 million years—and possibly 40 million years (Gilbert and Feschotte, 2010). Is it possible to use the modern genome to determine if viruses and other diseases were responsible for extinction events of the past, for example the End-Cretaceous mass extinction? Unfortunately, this is highly unlikely. A virus will cause disease only in one species or in a group of related species. Therefore, even if there was a virus that infected and killed off multiple species of dinosaurs, it would not have infected the ammonites, or marine reptiles, or flying reptiles too.

As always, I want to thank our corporate sponsors and the membership for your constant support and understanding during this difficult time. We will keep you updated through April to the status of the May meeting and look forward to getting together to celebrate the return to some normalcy. Please stay safe from the COVID-19.

Tamra

Reference: Gilbert C, and Feschotte C. 2010, Genomic fossils calibrate the long-term evolution of hepadnaviruses. PLoS Biology, v. 8, no.9, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2946954/

PGS 75th ANNIVERSARY FIELD TRIPS

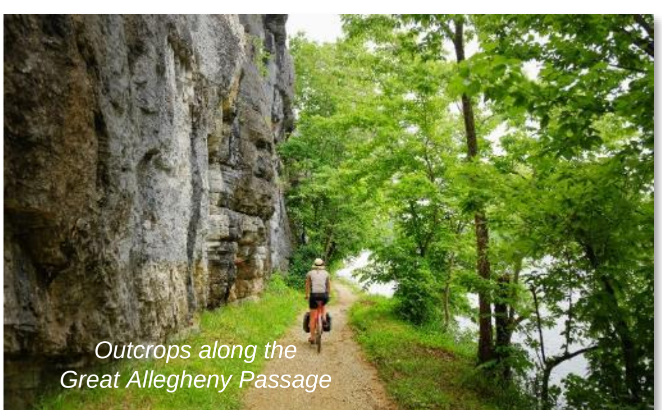
In celebration of the founding of PGS in 1945, the PGS 75th Anniversary Committee is pleased to offer two or, possibly, three field trips during our anniversary year.

Postponed – details to be announced.


[illegible] features north of Pittsburgh

The first field trip will take place on **Saturday, March 28, 2020** when Dr. James V[illegible] time Honorary Member [illegible] and engine[illegible] [illegible]est) of [illegible]io River/Glenfield [illegible] and the Mt. Nebo exit. Jim spoke of [illegible] history with these landslides at the January 2020 meeting held jointly with the ASCE Geo-Institute and AEG. In addition to the I-79 slides, we will be investigating slides on the nearby Western Pennsylvania Conservancy property along Toms Run Road and discuss Kilbuck Township's infamous Walmart slide along PA Route 65. Early registration will open on the PGS website on February 15. The early bird price will be $40 ($20 for students) until March 14. If any spots remain open, the price will rise to $45 ($25 for students) until the final closing date of March 23, 2020. **This trip will be limited to 40 participants.**

On **Saturday, September 19**, **2020**, Albert Kollar will take us on a journey from the Carnegie Museum through Schenley and Frick Parks and the eastern Pittsburgh suburbs to the Braddock/East Pittsburgh area to discover the Geology, History, Energy and Industry that made Pittsburgh great. A detailed itinerary of this field trip along with photos of the planned stops can be found on the following page.


Outcrops along the Great Allegheny Passage

A possible third field trip to examine the geology and history of the Great Allegheny Passage rail trail south of Pittsburgh is being considered for some time during the summer months. Stay tuned to the PGS newsletters, email announcements and the website for more information concerning this trip.

PGS 75th ANNIVERSITY FALL FIELD TRIP PITTSBURGH EAST

GEOLOGY, HISTORY, ENERGY, AND INDUSTRY THAT MADE PITTSBURGH GREAT

19 September 2020 8 AM – 4:45 PM

Leader Albert D. Kollar

Stop 1: Carnegie Museum Parking Lot: Carnegie Museum, University of Pittsburgh, Carnegie Mellon University, Geology of Oakland, John Kane Landscape Painting - Cultural and Education Center of Pittsburgh.

Stop 2: Schenley Park: George Westinghouse Memorial - Industry.

Stop 3: Calvary Cemetery: Appalachian Plateau Geology, Monongahela River Valley, John Kane Landscape Painting – Geology and Industry.

Stop 3a: Squirrel Hill: "Summerset at Frick Park" Slag Dump - Industry.

Stop 4: Frick Park: Pre-Pleistocene Geology, Landslides, Fern Hollow Trail, Conemaugh Group Geology, Nine Mile Run Gas Belt – Geology - Energy.

Stop 5: Lunch. Frick Park Environmental Center. Modern restrooms.

Stop 6: North Braddock: Braddock's Battlefield History Center - French and Indian War History c. 1755, George Washington Monument - History.

Stop 6a: Braddock: Braddock Carnegie Library open in 1889 was Andrew Carnegie's first library in U.S. The library expanded in 1893 - Architecture.

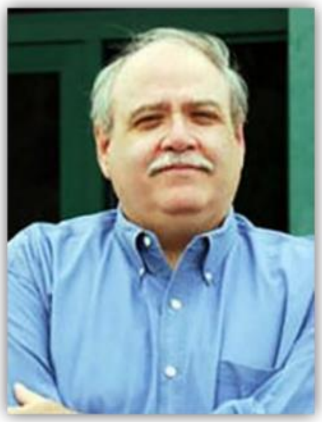
Stop 7: Braddock: Edgar Thomson Plant, first Carnegie Steel 1875 – Industry.

Stop 8: East Pittsburgh, PA: George Westinghouse Memorial Bridge built 1932, John Kane's Turtle Creek Valley No. 1 circa 1930, and George Westinghouse Electric Company East Pittsburgh Plant open 1886 – Industry and transportation.

Stop 9: East Pittsburgh, PA: 2018 Landslide of Rte. 30 – Geohazard.

End of field trip return to Carnegie Museum.

The Pittsburgh Geological Society is proud to announce



The Frank Benacquista Undergraduate Scholarship

The PGS Frank Benacquista Undergraduate Scholarship is an award of $500 to an undergraduate earth science student. This scholarship, created in honor of a long-time PGS member and student advocate, is intended to assist a student with college education costs and to promote student participation in the Pittsburgh Geological Society. Submissions will be judged based on cover letter, recommendation letter, transcript, and the content and creativity of the essay as determined by the Scholarship Committee.

Eligibility Requirements and Acceptable Use of Funds

Any student who is majoring in the earth sciences, is at least a sophomore, and attending a four-year accredited college or university in the Pittsburgh region is eligible to apply. The applicant must be a student member of PGS or must have applied for student membership at the time of application for the scholarship. Students may use the scholarship toward tuition fees, for field camp, to purchase equipment required for geologic course work or research (e.g., rock hammers, hand lens), to attend geologic conferences or field trips, such as a school-sponsored trip, a PGS field trip or the Field Conference of Pennsylvania Geologists.

Required Materials

- One-page resume
- Cover letter introducing yourself with a focus on activities outside of the classroom such as research projects, academic club service, or community involvement
- One-page essay describing your background, decision to pursue earth science, career goals, and academic objectives beyond the bachelor's degree (if any)
- Copy of your transcript (unofficial) and documentation that you are a current student. The requisite standard to apply is a minimum of 12 semester credits of earth science courses. Successful applicants should have a strong academic record in course work, research or service
- Letter of recommendation from a professor or another professional in the earth science field that provides information on your performance and activities in the classroom, in the department, or elsewhere. The letter should address your work ethic and your character in how you work and assist others in the classroom or field.

Scholarship Application Process

Your application may be printed and submitted by mail to: **Pittsburgh Geological Society**
Attn: Scholarship Committee
P.O. Box 58172 Pittsburgh, PA 15209

The application may also be sent in digital form (email with attachments) to tamra.schiappa@sru.edu. If submitted by email, please type "PGS Scholarship Application" and include your full name in the subject line. Include a professional message stating that you are submitting your application for the Benacquista Undergraduate Scholarship. Attach all documents required as Word or PDF documents. Please make sure that each document is titled with your last name (for example: Jones Resume.pdf, Jones Essay.pdf).

Application Deadline and Award Date

All applications must be received by **Friday, May 1, 2020**. The scholarship will be awarded at the first meeting of the Pittsburgh Geological Society in September.

LOCAL GEOLOGICAL EVENTS

GEOPHYSICAL SOCIETY OF PITTSBURGH

Due to the spread of coronavirus disease (COVID-19), the Geophysical Society of Pittsburgh (GSP) officers and Appalachian Basin Geophysical Symposium (ABGS) organizers have decided to cancel the remaining GSP events and delay the ABGS conference until next year.

ASCE GEO-INSTITUTE

The ASCE April 4 Short Course on Quantitative Risk Assessment has been cancelled and the April 19 Point Park Charity Bike Ride has been postponed.

ACS ENERGY TECHNOLOGY GROUP

April 23, 2020 **11:00 AM – 1:00 PM**

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

Lobardozzi's Restaurant, Pittsburgh, PA

SOCIETY OF PETROLEUM ENGINEERS

May 11, 2020 **11:00 AM – 1:00 PM**

"Thriving in a Lower for Longer Environment " by Mary Van Domelen, Van Domelen International LLC

Cefalo's Banquet and Event Center, Carnegie, PA

PA COUNCIL OF PROFESSIONAL GEOLOGISTS

May 15, 2020 **7:30 AM – 3 PM**

The Big Picture: Geologic and Environmental Applications of Drones (420 mins.)

Regional Learning Alliance, Cranberry PA

The Pittsburgh Geological Society welcomes a new professional member:

Daniel E. Gillies
Mission Director
Astrobotic Technologies
Pittsburgh, PA 15205

We also welcome a new student member:

From the University of Pittsburgh

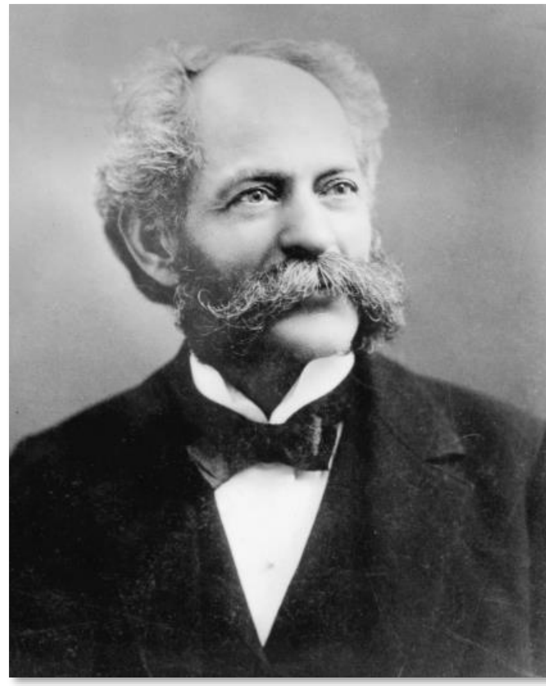
Chloe O. Glover
Graduate Student
University of Pittsburgh

The Pittsburgh Geological Society Endowment Fund

Established May 8th, 2014 through the

COMMUNITY FOUNDATION

THE ORIGIN OF WESTERN PENNSYLVANIA PLACE NAMES



Portrait of Henry John Heinz, founder of the H. J. Heinz line of food products. Heinz lived in Sharpsburg and began bottling and selling horseradish there in 1869.

The Borough of Sharpsburg, located about five miles north of downtown Pittsburgh on the Allegheny River, is located on land once owned by the Seneca Indians. One Seneca in particular, Guyasuta, became famous when George Washington chose him to be a hunter guide in 1753 and the two formed a strong friendship. In 1758, Guyasuta was involved in a battle in what is now uptown Pittsburgh where the County Courthouse stands. As part of a peace treaty with the British in 1760, the Senecas granted the government a tract of land in western Pennsylvania. James O'Hara, who had purchased land along the Allegheny River, donated a small part of that tract to Guyasuta.

In 1826, James Sharp purchased 257 acres in the same area and built a log cabin on the property. Sharp eventually began to open the land to settlers and built a school and church for them. In 1841, the little settlement applied for incorporation. The charter for the Borough of Sharpsburg was recorded on March 26, 1842. Since that time, Sharpsburg became known as an industrial town with iron, brick, and glass manufacturing, and transportation of goods along the Pennsylvania Mainline Canal and, later, the Pennsylvania Railroad that bisected the town.

One of the best-known industries that began in Sharpsburg was the H. J. Heinz Company, including the Heinz glass works that at one time manufactured all of the glassware for Heinz products. In 1869, Heinz started selling his horseradish from the kitchen of his Sharpsburg home, the place where the company began. Even after Heinz moved his factory to the North Side, he stayed true to his roots, donating gifts to the community that was his family home for many years, including a life-sized statue of Guyasuta that, unfortunately, became an unintended target of automobiles. The statue has been hit twice, with each incident resulting in the destruction and subsequent replacement of the statue.

DID YOU KNOW . . . ?

Dr. Walter H. Bucher, Professor of Geology at Columbia University, gave the sixth talk ever presented at a PGS meeting, in April 1945. He spoke on "The Deformation of the Earth's Crust."

Walter Hermann Bucher (1888-1965) was born in Akron, OH to Swiss-German parents. When he was five years old, the family moved to Frankfurt-am-Main, Germany, where his father had been sent by the Methodist Church to teach Hebrew, Greek, and homiletics in a missionary school.

PITTSBURGH GEOLOGICAL SOCIETY 1945 - 2020

Looking back 75 years ….

Young Walter received all of his training in Germany, including receiving a Ph.D. *summa cum laude* in 1911 from the University of Heidelberg. He initially entered college to study zoology and paleontology, but later changed to geology and paleontology. Following graduation, he moved back to the US, residing in Cincinnati and attending classes in geology and paleontology at the University of Cincinnati while tutoring and working to improve his English.

In 1913, he was awarded an instructorship, then through the years Assistant Professor, Associate Professor, Professor, and finally Chair of the Geology Department in 1937, a position he held for three years. He then left to become Professor of Geology at Columbia University, specializing in structural geology. By that point in his career, he had practically abandoned paleontology and become deeply involved in earth tectonics, particularly with cryptovolcanic structures and the major deformation of Earth's crust. He was something of a pioneer in this country dealing with the former, pointing out their similarities to structures in Europe. Jeptha Knobs in KY and Serpent Mound in OH were two of his earliest studies.

Dr. Walter H. Bucher, Professor of Geology at Columbia University, and the sixth speaker at a PGS meeting.

Regarding Bucher's career, it has been said that the two most important values of his work were that it stimulated other earth scientists to follow in his footsteps, and that he brought the ideas and conclusions of many European scientists to the attention of the Americans geological community. Bucher retired from Columbia in 1956, having served as the Newberry Professor of Geology during the latter part of his career. He then became a part-time consultant to the Humble Oil and Refining Company until his death.

Bucher was widely recognized as a leading figure in geology. He received many awards and positions of eminence during his long and distinguished career, including:

President, Ohio Academy of Sciences (1935)

Councilor, Geological Society of America (1935-1937)

Membership, National Academy of Sciences (1938)

Chairman, Division of Geology and Geography, National Research Council (1940-1943)

President, New York Academy of Sciences (1946)

Vice President, American Geophysical Union (1948)

President, American Geophysical Union (1950-1953)

Vice President, Section E, American Association for the Advancement of Science (1953)

Vice President, Geological Society of America (1954)

President, Geological Society of America (1955)

In addition, he was a Fellow of the American Academy of Arts and Sciences, an Honorary Member and Foreign Correspondent of the Société Geologique de France, and an Honorary Member of the Société Geologique Belgique and the Deutsche Geologische Gesellschaft. He was also awarded:

Honorary doctoral degree, Princeton University (1947)

The William Bowie Medal, American Geophysical Union (1955)

The Leopold von Buch Medal, Deutsche Geologische Gesellschaft (1955)

Honorary doctoral degree, Columbia University (1957)

The Penrose Medal, Geological Society of America (1960)

Honorary doctoral degree, Durham University, England (1962)

Honorary doctoral degree, University of Cincinnati (1963)

Many years ago it was proposed that the first humans, the ancestors of modern Native Americans, came to the Americas about 13,000 years ago as small bands of Stone Age hunters by walking across a land bridge between eastern Siberia and western Alaska. These hunting parties supposedly made their way down an ice-free inland corridor into the heart of North America, chasing big game and establishing thriving cultures that eventually spread across two continents as far south as the tip of South America.

More recently, however, archaeological sites in North and South America (e.g., Meadowcroft in Washington County, PA) show that humans had been on the continent 1 to 2 ka before the supposed first migration. That old idea crumbled under the hypothesis that the hunters traveled a "Kelp Highway," wherein the first humans arrived on the continent not only by foot, but by boat, traveling down the Pacific shore and subsisting on abundant coastal resources as the massive ice sheets melted. Archaeological sites 14 to 15 ka along the West Coast of North America helped support that hypothesis.

Now a new hypothesis is emerging that suggests humans might have arrived in North America at least 20 ka, more than 5 ka earlier than was commonly believed. The new research suggests that an intermediate settlement of hundreds or thousands of people spread over the wild lands stretching between North America and Asia, with the heart of that territory long submerged by the present-day Bering Strait. That vanished world is called Beringia, and the developing theory about its pivotal role in the populating of North America is known as the Beringian Standstill hypothesis.

Cultural and human remains were found under 23 feet of frozen sediment at archaeological excavation along the Yana River in Siberia.

The term "standstill" indicates generations of people migrated from the East and possibly settled there before moving on to North America. Much of this hypothesis is driven by evolutionary geneticists taking DNA samples from some of the oldest human remains in the Americas, and from even older ones in Asia.

There is now a wide gap between what genetics seems to be saying and what archaeology has so far discovered. Humans may have been on both sides of the Bering Land Bridge some 20 ka years ago, but many skeptical archaeologists will not accept this grand idea until they can hold relevant artifacts in their hands. They point out that no confirmed North American archaeological sites currently known are older than 15 to 16 ka. Other archaeologists, on the other hand, are confident that older sites will be discovered in the sparsely populated lands of eastern Siberia, Alaska, and northwestern Canada.

https://www.smithsonianmag.com/science-nature/how-humans-came-to-americas-180973739/

A team of USGS researchers recently discovered a deposit of rare earth elements (REEs) in the Mountain Pass region of the eastern Mojave Desert. Rare earth elements are essential in modern civilian and military applications, health-care and medical devices, and "green" technologies. REEs are as abundant in the Earth's crust as common industrial-grade metals such as chromium, nickel, copper, zinc, tin, and lead, but large economically-viable REE deposits are not common. Carbonatite ore deposits are the primary source of REEs on the planet. The largest-known such deposit, occurring in the Bayan Obo region of Inner Mongolia, China, has produced approximately 97% of the global output of REEs.

Efforts to characterize the geologic processes related to REE deposits in the US have been focusing attention on the Mountain Pass deposit, which is located about 60 miles southwest of Las Vegas. USGS researchers used geophysical and geological techniques to investigate the eastern Mojave Desert carbonatite terrane to provide new

Mountain Pass rare earth element (REE) mine in California's Mojave Desert with Clark Mountain visible in the background.

insights into the structural framework of the Mountain Pass REE deposit. They created images of geologic structures related to REE mineral-bearing rocks at depth. The results suggest REE minerals occur along a fault zone or geologic contact near the eastern edge of the Mescal Range. The geophysical study of the carbonatite terrane demonstrated the effectiveness of a multi-technique approach to studying the supporting structures that host REE deposits in the Mountain Pass area. The researchers suggested that future studies of Mountain Pass would benefit from high-resolution airborne geophysical surveys capable of continuous data gathering over much broader regions, including coverage of rugged and otherwise inaccessible mountain ranges. They suggested that high-resolution aeromagnetic, gravity gradiometry, lidar, and radiometric data would be ideal for evaluating the region in greater detail. In addition, a better understanding of faulting, structural analysis, and kinematics associated with 1.4 ga structures would dramatically improve the overall constraints and insights related to the REE mineralization in the Mojave Desert.

http://www.sci-news.com/geology/mountain-pass-rare-earth-element-bearing-deposit-07987.html

Not all of the CO_2 that is generated during fossil fuel combustion remains in the atmosphere. The ocean and ecosystems on land take up large amounts of CO_2 emissions from the atmosphere. Earth's oceanic sink takes up CO_2 in two steps: 1) the CO_2 dissolves in the surface water where oceanic circulation distributes it; and 2) ocean currents and mixing processes transport the dissolved CO_2 from the surface deep into the ocean's interior where it accumulates. The size of this sink is important for the atmospheric CO_2 levels. Without the oceanic sink, the concentration of CO_2 in the atmosphere, and the extent of anthropogenic climate change, would be considerably higher.

Earth's ocean act as a very large sink for CO_2 sequestration, but too much acidifies the water, adversely affecting marine life.

Figuring out the share of the man-made CO_2 the oceans absorb has been a priority for climate researchers for a long time. Now, an international team of scientists has found that the ocean sequestered as much as 34 billion metric tons of man-made atmospheric carbon in the 13 years between 1994 and 2007, corresponding to 31% of all anthropogenic CO_2 emitted during that time. This percentage has remained relatively stable compared to the preceding 200 years even though the absolute quantity has increased substantially because, as long as the atmospheric concentration of CO_2 rises, the oceanic sink strengthens more or less proportionally; i.e., the more CO_2 gets into the atmosphere, the more that is absorbed by the oceans until it eventually becomes saturated. So far, that saturation point has not been reached.

The research findings also confirm various earlier, model-based estimates of the ocean sink for man-made CO_2. While the overall results suggest an intact ocean sink for man-made CO_2, the researchers also discovered considerable deviations in the different ocean basins. For example, the North Atlantic Ocean absorbed 20% less CO_2 than expected in the studied time period. The researchers suggested this probably was due to the slowdown of the North Atlantic Meridional Overturning Circulation in the late-1990s, which most likely was a consequence of climate variability. This lower sink in the North Atlantic was offset by a much larger uptake in the South Atlantic, however, such that sequestration by the entire Atlantic developed as expected. Similar fluctuations occurred in the Southern Ocean, the Pacific, and the Indian Ocean.

The marine sink does not respond just to the increase in atmospheric CO_2; its sensitivity to climate variations suggests a significant potential for feedbacks with the ongoing change in climate. The researchers' analyses used a new statistical method that allowed them to distinguish between the changes in the man-made and the natural (i.e., preindustrial) CO_2 components that make up the changes in the total concentration of dissolved CO_2 in the water. Although the oceanic sink helps moderate the rate of global warming, the increasing CO_2 dissolved in the ocean acidifies the water in some places to depths greater than 9,800 feet. This can have serious consequences for many marine organisms because $CaCO_3$ spontaneously dissolves in acidified environments, posing a hazard to shellfish whose skeletons and shells are made of $CaCO_3$. It can also impact physiological processes such as the breathing of fish.

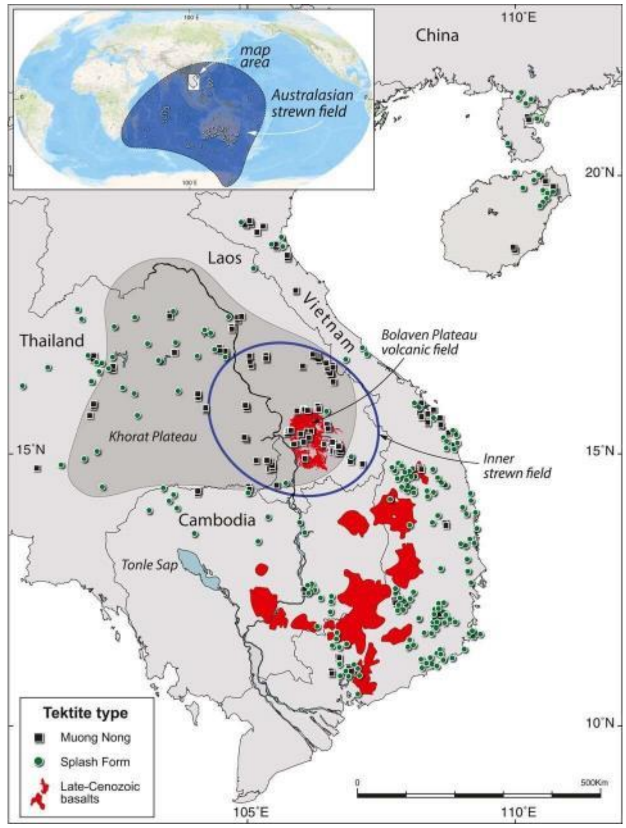
https://www.sciencedaily.com/releases/2019/03/190314151648.htm

About 790 ka, a meteorite slammed into Earth with such force that the explosion blanketed about 10% of the planet with tektites, which were strewn from Indochina to eastern Antarctica and from the Indian Ocean to the western Pacific.

For more than a century, scientists searched for evidence of the impact that produced them. Scientists can look at the abundance and locations of tektites to help locate an impact, even if the original crater is eroded or concealed, as it was in this case. There were plenty of tektites, but where was the crater? Tektites from the impact were largest and most abundant in the eastern part of central Indochina, but because they were so widespread, previous estimates of the crater's size ranged from 9 to 186 miles in diameter, and its precise position remained uncertain even though scientists spent decades searching for it.

Now, recent geochemical analysis and local gravity readings suggested that the crater lay in southern Laos on the Bolaven Plateau, but a field of cooled volcanic lava spanning nearly 2,000 mi^2 concealed the impact structure. The force of the impact is thought to have created a rim measuring more than 300 feet tall. During the new study, the researchers investigated several promising eroded craters in southern China, northern Cambodia, and central Laos, but quickly ruled out those location. In every case, the crater-like features were much older; instead, they were identified as erosion in Mesozoic rocks.

Eventually, the researchers found a site on the Bolaven Plateau where fields of volcanic lava might have hidden signs of an older meteor impact. Plus, in the region suggested as a likely spot for a crater, most of the lava flows were also in the right age range between 51 and 780 ka.

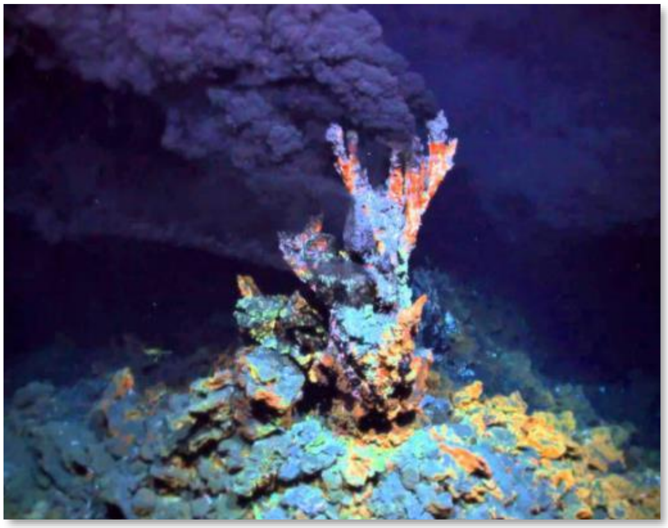


Geologic map of the Bolaven Plateau volcanic field in Laos. The blue ellipse marks the buried meteorite crater perimeter based on the best-fitting gravity model.

The researchers used gravity readings at more than 400 locations to generate a gravity map showing one particularly interesting area that had a gravitational anomaly consisting of a subsurface zone less dense than the volcanic rock surrounding it. Their measurements suggested an elliptical crater about 8 miles wide, 11 miles long, and 300 feet thick. All of these clues suggested that the impact crater is buried under a thick pile of volcanic rocks.

https://www.livescience.com/hidden-impact-crater-laos.html

There are multiple competing theories as to where and how life started on Earth. One of these, that life began in or associated with underwater hydrothermal vents, is among the most promising. Recently, a team of scientists from the University of London created protocells, seen as a key steppingstone in the development of cell-based life, in hot, alkaline seawater, thus adding weight to that theory with solid experimental evidence.



A typical deep-sea hydrothermal vent.

Hydrothermal vents are places where seawater comes into contact with minerals from the planet's crust, reacting to create a warm, alkaline environment containing hydrogen. The venting process creates chimneys that are mineral-rich and flush with alkaline and acidic fluids, providing a source of energy to facilitate chemical reactions between H_2 and CO_2 to form increasingly complex organic compounds. Scientists researching the origins of life have made great progress with experiments to recreate those early chemical processes in which basic cell formations would have developed. The creation of protocells, the most basic form of a cell consisting of bilayer membranes around aqueous solutions, has been an important step in creating cells with a defined boundary and inner compartment.

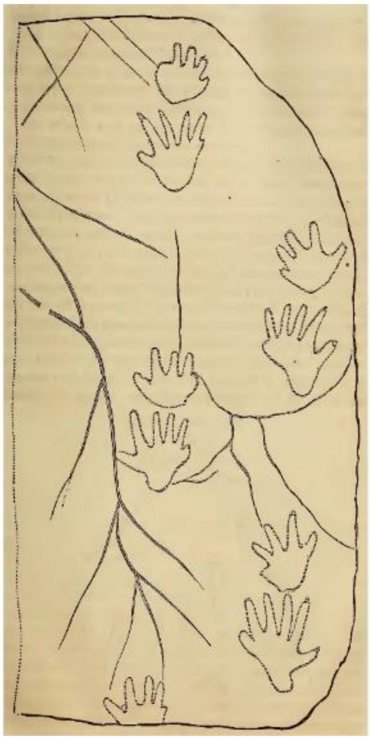
Although previous experiments to create protocells from naturally-occurring, simple molecules such as fatty acids have succeeded in cool, fresh water, these have only occurred under very tightly controlled conditions. Such protocells had fallen apart in previous experiments using hydrothermal vent environments, so the cool, fresh-water scenario had been winning out. The University of London scientists found a fatal flaw in those experiments, however. Previously, the researchers had all used a small number of molecule types, mostly with fatty acids of the same size. However, a wider array of molecules should be expected in natural environments.

The London researchers tried creating protocells with a mixture of different fatty acids and fatty alcohols that had not been used in previous experiments. They found that molecules having longer carbon chains needed heat in order to form themselves into a protocell, and an alkaline solution helped them keep their electric charge. Also, the fat molecules banded together more tightly in the salty fluid, forming more stable protocells, indicating that a saltwater environment was important. Although scientists still don't know where life first formed, the London study showed that deep-sea hydrothermal vents cannot be ruled out.

http://www.sci-news.com/biology/life-hydrothermal-vents-07772.html

Before 1844, it was scientific dogma that air-breathing vertebrate animals did not exist prior to the Permian, based on a supposed excess of CO_2 in the atmosphere that theoretically would have been necessary to produce the prolific Carboniferous coal-swamp vegetation. Even Charles Lyell was convinced that fish were the only vertebrates living during the Carboniferous. In 1844, however, that concept changed forever when Christian Erich Hermann von Meyer, a German paleontologist, discovered the skeleton of a fossil reptile in the Upper Carboniferous of Bavaria. But before news of that discovery reached America, an enterprising medical doctor and naturalist from Greensburg, PA, published the discovery of what he claimed were numerous footprints of fossil vertebrate animals left in sandstones in Westmoreland County, the first such report published in this country.

Alfred T. King, M.D. (1813-1858) was born in Galway, NY, and educated in Philadelphia, but moved to Pleasant Unity in Westmoreland County in 1838 when he answered the call for a much-needed physician in the area. He soon made the acquaintance of a Greensburg doctor named Postlethwaite and the two became partners in a medical practice, which gave King enough free time to devote attention to his interests in science and natural history, including geology. In 1844, King sent manuscripts to *The American Journal of Science and Arts* (AJSA - today's *American Journal of Science*) and the Academy of Natural Sciences of Philadelphia (ANSP), two of the leading scientific organizations/journals in North America. He described both the fossil footprints of supposed reptiles, birds, and mammals that he had found several years before, as well as the basic geology of the finds (there were several outcrops, most, if not all, within the Upper Pennsylvanian Casselman Formation). Dr. King also donated a collection of the fossils to the ANSP at the November 1844 meeting and plaster casts of footprints he described at the December 1844 meeting. Both the ANSP and the AJSA published the descriptions and illustrations of the tracks and trackways.



***(Left*) One of Dr. King's illustrations of a Westmoreland County sandstone slab bearing the footprints of a Carboniferous tetrapod now called *Limnopus heterodactylus.* *(Right)* The type specimen from the upper Virgilian Conemaugh Formation near Greensburg, Pennsylvania (courtesy of Spencer G. Lucas).**

It should be pointed out that: 1) William Logan discovered trackways of Carboniferous vertebrates in Nova Scotia in 1841, which was noted in the *Proceedings of the Geological Society of London* in 1842; and 2) Richard Owen, the famous British anatomist, referred Logan's discovery to an unknown form of reptile; but 3) it took until 1863 before a brief description and illustration of them was published. This was another instance of information unknown to Dr. King before he published his findings. However, King's was the first unequivocal indication in the US, and among the first in the world, of the existence of vertebrates older than the Permian.

In 1846, Lyell visited Dr. King and evaluated the outcrops where the "fossil footprints" occurred. Later that year, he published a brief paper in the *Quarterly Journal of the Geological Society of London* in which he disputed the validity of many of them. Of the seven ichnospecies King described and illustrated, six turned out to be petroglyphs carved in sandstone by some unknown tribe of Native Americans, probably before Europeans arrived! The seventh, which King originally named *Thenaropus heterodactylus*, turned out to be the only valid Carboniferous tetrapod footprint.

This fossil has gone through several ichnogeneric name changes over the past 170+ years, the first occurring even while King's description was still in editing at the AJSA. According to modern paleontologists, *T. heterodactylus* belongs to the ichnogenus *Limnopus*, and it might even be conspecific with the type of that ichnogenus. That makes Dr. King's work that much more valuable to vertebrate paleontology and the history of geologic explorations in western Pennsylvania

https://www.researchgate.net/publication/283268359_Alfred_King%27s_Pennsylvanian_tetrapod_footprints_from_western_Pennsylvania

PGS WEBSITE OF THE MONTH: https://www.earthday.org/

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Fun Fact Having Nothing To Do With Geology

On Earth Day (April 22), consider this: it requires approximately six (6) weeks to manufacture, fill, sell, recycle, and then remanufacture an aluminum beverage can.

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