

# The Lake George Gem and Mineral Club -

## Club News

October, 2017



Program for the month: **Saturday October 14, 10AM (Note winter hours):**

Our October speaker, **Big Ben Higley**, will talk about gold mining and claims.

The “**Mineral Physical Properties**” class didn’t attract enough interest and has been cancelled.

### Coming Events

✓ ✓ Several mineral, fossil, and geology clubs meet relatively nearby and encourage visitors. These include:

>**Cañon City Geology Club**, meets on the 2<sup>nd</sup> Monday of the month at 6PM in the United Methodist Church, Cañon City;

>**Colorado Springs Mineralogical Society**, meets on the 3<sup>rd</sup> Thursday of each month at 7PM in the Colorado Springs Senior Center, 1514 N. Hancock Ave., Colorado Springs;

>**Columbine Gem & Mineral Society**, meets on the 2<sup>nd</sup> Thursday of each month, 6:30PM in the meeting room, Mt. Shavano Manor, 525 W. 16<sup>th</sup> (at J St.), Salida;

>**Pueblo Rockhounds**, meets on the 3<sup>rd</sup> Thursday of each month at 6:30PM in the Westminster Presbyterian Church, 10 University Circle, Pueblo.

✓ ✓ **Pete Modreski** and others sent notices of the following upcoming events:

**Wed. Oct. 4**, and following Wednesdays, 11:30 a.m. – 1:00 p.m.: **21st Century Maps—Smart Mapping**, a course for the general public to get people excited about mapping and spatial thinking! Taught by Dr. Joseph Kerski, ESRI, through the Academy for Lifelong Learning. At Calvary Baptist Church, [6500 E. Girard Ave., Denver, CO 80225](http://www.calvarybaptistchurch.com). For details & registration see <http://academyll.org/course/21st-century-maps-smart-mapping-new/>.

**Thurs., Oct. 5**, 7:00 p.m., The Friends of the Colorado School of Mines Geology Museum's "First Thursday" lecture series continues on 05 October 2017 on the Mines campus in the Ben H. Parker Student Center, Ballroom E, 1200 16th Street, Golden, CO 80401. Socializing begins at 6:30 PM and the lecture will start at 7:00. Admission is free and all are welcome. **An Overview of Current Research in Extractive Metallurgy and Mineral Processing at the Colorado School of Mines**, by Dr. Patrick R. Taylor.

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**Oct. 8-14 is Earth Science Week**, sponsored by the American Geoscience Institute and many cooperators (including the USGS). See more about it at <http://www.earthsciweek.org/>, including about public activities taking place in many towns throughout the U.S. One of these will be a **Geology Hike** to be held in the Golden-Morrison-Lakewood area, led by USGS Geologist Pete Modreski, probably to take place on Sunday afternoon, October 8; details will be available later.

USGS also has available free copies of the **2017 Earth Science Week Teachers Packet**, containing classroom material (posters, calendars, activity ideas, etc.) for school or other educational use. The theme of the 2017 packet is "**Earth and Human Activity**". Educators can pick up a copy at the USGS Library, Building 41, Denver Federal Center, Lakewood, CO, at the Reference Desk. The library is open 8 to 4 p.m. weekdays (closed on Federal holidays); see <https://library.usgs.gov/denlib.html> for directions. We will also have copies of the packet to give out at the USGS booth at the Denver Gem and Mineral Show (Sept. 15-17) and at the Colorado Science Conference (Nov. 17). Most of the material in the packet is aimed at middle to high school level students.

**Sat., Oct. 14, Dinosaur Discovery Day**, public tour day at Dinosaur Ridge, featuring **Girl Scout Day/National Fossil Day**, 10 a.m. – 2 p.m. "Girl Scouts of all levels can earn badge requirements. Girl Scout registration information will be posted as soon as the event is finalized. We'll also be celebrating National Fossil Day with the National Park Service and many other special guests! Hands-on activities at the Visitor Center for all ages, and scientists will be along the Ridge interpreting fossils and geology for all attendees. Public welcome!  
"Contact: Erin LaCount – [tours@dinoridge.org](mailto:tours@dinoridge.org)

**Sat., Oct. 14, 8 a.m. – 5 p.m., Bighorn Sheep Canyon Geology Bus Tour, Arkansas River between Salida & Cañon City.** Arkansas Headwaters Recreation Area (AHRA) Volunteer Geologist Bob Hickey will narrate an all-day bus tour on the geology of Bighorn Sheep Canyon between Salida and Cañon City on Saturday, October 14, 2017. The bus will depart Cañon City at 8:00 AM on US-50 and travel up the Arkansas River to the Salida East Recreation Site, then begin a slow return trip that will include a narrative description of the canyon's unique geologic features as well as several stops where tour participants may get off the bus to view the geology up-close. A Public-Address system will be used and a printed tour-guide provided to aid in understanding.

The event, part of Fremont Fall Heritage Days, is sponsored by the Fremont County Historical Society (FCHS) with cooperation from the Arkansas Headwaters Recreation Area (AHRA) and the support of Raft Masters, who is providing the bus. Registration fee for the tour is \$40, which may be paid by check to FCHS, PO Box 965, Cañon City, CO 81215. Lunch will be available but it is priced separately. The tour is limited to 43 participants. This is a Hold the Date announcement while final arrangements are being made.

Registration information, itinerary, tour details and additional information will be available soon at <https://www.fremontheritage.com/>. Look for the Bighorn Sheep Canyon Geology Bus Tour under Events. Further information is available from FCHS and [\(719\) 285-8284](tel:7192858284).

**Thurs., Nov. 2, Jaelyn Eberle (University of Colorado, Boulder), Life at the Top of the Eocene Greenhouse World.** Denver Museum of Nature & Science Earth Science Colloquium Series; VIP Room, DMNS

**Fri., Nov. 10, 3:00 p.m., Raymond Rogers (Macalester College), Twenty Years of Paleontological Adventure & Discovery on the Great Red Island, Madagascar.** Denver Museum of Nature & Science Earth Science Colloquium Series; VIP Room, DMNS; all are welcome, and museum admission is not required to attend. *[This talk had originally been scheduled for Sept. 22; data was changed]*

**Nov. 11-12, 38<sup>th</sup> annual New Mexico Mineral Symposium**, at New Mexico Institute of Mining & Technology, Socorro, NM; see <https://geoinfo.nmt.edu/museum/minsymp/home.cfml>

**Fri., Nov. 17, Colorado Science Teachers' Conference** (full name: Colorado Science Conference for Professional Development). Held at the Denver Mart, [451 E. 58<sup>th</sup> Ave.](#), and sponsored by the Colorado

Association of Science Teachers (CAST) and other science educators organizations. For full info see <http://www.coloradoscienceconference.org/> .

**Nov. 17-19, Denver Area Mineral Dealers Show**, Jefferson County Fairgrounds, Golden CO.

✓ ✓ **Wayne Orlowski** sent several interesting links, including the following:

\*\*Dinosaurs aren't known for their stunning intellect or for being highly adaptable. To most people, they are known for being a species that was brought to its knees by a massive meteorite. But in his new book, *Why Dinosaurs Matter*, paleontologist Kenneth Lacovara argues that dinosaurs are really good at one thing: being dinosaurs. "Dinosaurs are long-lasting champions of resilience and persistence. They reigned unchallenged on the land for the better part of 165 million years" he writes. "They were, and still are, an unqualified success."

[https://www.sciencefriday.com/segments/why-do-dinosaurs-matter/?utm\\_source=Weekly+Newsletter+List&utm\\_campaign=d812fd018b-NEWSLETTER\\_2017\\_09\\_25&utm\\_medium=email&utm\\_term=0\\_10d8eab927-d812fd018b-48669853](https://www.sciencefriday.com/segments/why-do-dinosaurs-matter/?utm_source=Weekly+Newsletter+List&utm_campaign=d812fd018b-NEWSLETTER_2017_09_25&utm_medium=email&utm_term=0_10d8eab927-d812fd018b-48669853)

\*\* NASA provides free e-books on Cassini - two examples of images are copied below. The images in the PDF file are worth a look if you are not into the details of the book and have a slow internet connection as we do in the mountains.

<https://www.nasa.gov/connect/ebooks/the-saturn-system.html>

Over a period of 13 years, Cassini has captured about 450,000 spectacular images within the Saturn system, providing new views of the "lord of the rings" and a plethora of iconic images. To honor the art and science of Cassini, this book was developed collaboratively by a team from NASA's Planetary Science Division (PSD), NASA's Jet Propulsion Laboratory (JPL), and the Lunar and Planetary Institute (LPI). While these images represent the tip of the iceberg—each telling a story about Saturn and its mysterious moons—our hope is that the mission will inspire future artists and explorers. The sheer beauty of these images is surpassed only by the science and discoveries they represent.

› [iBooks: The Saturn System \[37 MB\]](#)

› [Kindle readers: MOBI \[34.1 MB\]](#)

› [All other eBook readers: EPUB](#)

\*\***Steve Veatch** sent the following item:

### **TABLE BANNER DONATED TO THE PIKES PEAK PEBBLE PUPS**

By Steven Wade Veatch

The Pikes Peak Pebble Pups, made up of the youth from the Colorado Springs Mineralogical Society and the Lake George Gem and Mineral Club, participate in several outreach programs to meet the public. The Pups participate in these events to increase the awareness of the two mineral clubs and their youth programs and to recruit new Pebble Pups. Betty Merchant, the Pebble Pup program assistant, has purchased a large table banner to help promote the Pebble Pups and make them more visible at these events. Betty is donating the table banner that will cover a standard event table. The front of the banner has a design that will attract attention at these events.

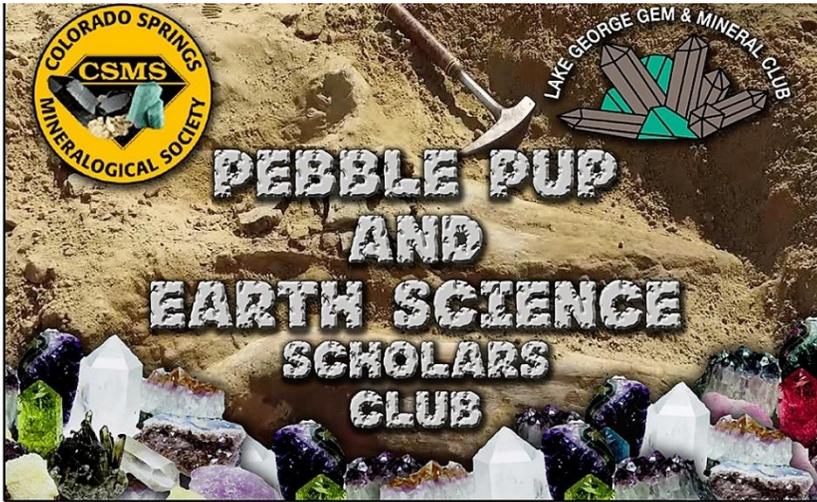


TABLE FRONT  
46" x 29"

Several outreach events are already scheduled:

- Cool Science at the University of Colorado Springs (October)
- National Fossil Day at the Garden of the Gods Visitor Center (October)
- Fun with Science at the Rocky Mountain Dinosaur Resource Center (October)
- Family Geology Day at the Western Museum of Mining and Industry (January 2018)
- Cool Science at the Colorado College (April, 2018)
- Colorado Springs Mineralogical Society Show (June, 2018)

The Pebble Pups are in high demand to participate at public events. During the day Pebble Pups greet the public, demonstrate a fossil dig, share information about rocks and minerals, and demonstrate various aspects of our hobby and Earth science. The Pikes Peak Pebble Pups thank Betty Merchant for her dedicated support and for the donation of this banner.

✓ ✓ And here is the latest installment of “Bench Tips” by Brad Smith ([www.BradSmithJewelry.com](http://www.BradSmithJewelry.com)):

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## LAYOUT TOOLS

Dimensions on some features of a design can be fluid while others must be accurate for the design to work. When precision on a piece is important, good layout techniques are essential.

These are the tools that I rely upon to get holes in the right place, to achieve correct angles, and to cut pieces the correct length.

I like crisp sharp lines to follow, so I often coat surfaces with a dark marker and scribe my layout lines onto the metal. A square makes quick work of checking right angles or marking where to cut, and the thin center punch helps me mark a place to drill holes exactly where I want them.

Finally, a good set of dividers is probably my favorite layout tool. They let me quickly mark a strip for cutting, swing an arc, and divide a line or curve into as many equal segments as I need. I keep at least one set of dividers in every toolbox.



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## INVENTORY RECORD

In an ideal world, each of us has a complete pictorial record of all pieces of jewelry in our inventory. We use the pics for marketing, and we use the record for insurance. We use it to remember which items have been sent out on consignment, or we use it to mark which items we're taking to a show. And eventually, we note in the record the pieces that have sold.

Unfortunately, we don't always have time to take good pictures of each piece for a detailed inventory. In situations like this I've been able to make a quick group shot with the help of a smart phone, a camera, a scanner, or a color copier. The quality is more than sufficient to accurately identify the pieces.

[See all Brad's jewelry books at Amazon.com/author/bradfordsmith](http://Amazon.com/author/bradfordsmith)

## Notes from the Editor

Bob Carnein, Editor

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Here's the second installment of an article by Beverly Keith on the Lykins Formation, near Cañon City. The first article appeared in the February, 2017 Newsletter.

## The Lykins Formation in Colorado-

Prepared by Beverly Keith, 8/2017

In January, I wrote a paper, published in the LGGMC Newsletter, about stromatolites discovered in an outcrop of the Lykins Formation, located on private property east of Canon City. Don and I attended a field trip to the site with several groups from Canon City and Karen Whiteley of the Department of Earth Sciences, Denver Museum of Nature & Science. Karen is a co-author of Reference 1. The site in Fremont County was unknown to researchers, and Ms. Whiteley wanted to confirm it is the Lykins, which she did. Further studies have since confirmed the Forelle Member of the Lykins Formation is represented at the site.

Later that morning, the group met at the Community College in Canon City, where Ms. Whiteley gave a detailed technical presentation regarding the paper she co-authored. She told us the Lykins Formation is found all along Colorado's Front Range to the Wyoming border, including locations in southeast Colorado and New Mexico. It is identified as a maroon, thick bedded siltstone, mudstone, and fine grained sandstone, with some dolostone, limestone, and gypsum. Some sediments bear raindrop imprints, mud cracks, and ladder ripples, suggesting deposition in intermittently emergent, quiet conditions. The sediments weather easily, leading to exposures in canyons and valleys.

Ms. Whiteley explained that the Lykins Formation in Colorado had not been extensively studied, and the purpose of this study was to determine the origin and time of deposition of the sediments in the state. To do so, researchers analyzed detrital zircons. Ms. Whiteley also explained how the Appalachian and Caledonian Mountains, a supercontinent named Pangea, and the Permian/ Triassic (P/T) Mass Extinction helped researchers to further understand the origin and deposition of the sediments.

I am a native of Pennsylvania, and the reference to the Appalachian Mountains really caught my attention, not to mention the Caledonian Mountains, a supercontinent, and a mass extinction! How could sediments from mountains located more than 2,000 miles east of Colorado contribute to a formation located a few miles from my backyard? The references listed at the end of this paper provided the answers to my questions. I will relate this info to you in very general terms and with approximate dates. I will begin with how researchers

determined the origin and depositional history of the Lykins sediments, moving on to the Appalachian and Caledonian Mountains, Pangea, and the P/T Mass Extinction.

Reference 1 (Hagadorn) frequently refers to detrital zircons. Not knowing much about zircons, I conferred with Dr. Bob Carnein, geologist and fellow club member. Bob, thank you for your assistance. Bob explained that zircons play an important role in radiometric dating of sediment source rocks. Zircons often contain radioactive isotopes that allow radiometric dating. They do not 'reset' as easily as many minerals do during metamorphism, so they can be recycled several times while retaining the age of their parent rock. In addition, they are very resistant to being broken up and exist for several generations of transport and deposition dating back to hundreds of millions or even billions of years.

Researchers knew that radiometric dating of detrital zircons could help them to determine the origin and time of deposition of the Lykins sediments in Colorado. To do so, they collected three sediment samples from the top layer of the Lykins Formation and one sample of sediment from the Jelm Formation, which overlies the Lykins Formation. The specific amounts and the locations of the sampled formations are noted in Hagadorn (1).

The radiometric dating revealed that the zircons in the four samples showed little or no evidence that the sediments were locally derived. (Evidently, this evidence eliminated the Ancestral Rocky Mountains as the parent rock source.) In addition, rounding and collision marks or pitting on the zircon surfaces suggested a history of complex, multiple stages of transport. Zircons from both formations showed substantial age variations, suggesting the grains of the sediments may have been recycled by multiple sedimentary processes and/or derived from multiple primary sources.

Analysis of the detrital zircons in the three samples from the top of the Lykins Formation revealed the minimum age for the parent rocks (the source of the sediments) ranged from 295 to 254 million years (my), and the maximum age ranged from 400 to 330 my. The one sample from the overlying Jelm Formation revealed a minimum age for the parent rocks at 223 my and a maximum age of 300 my.

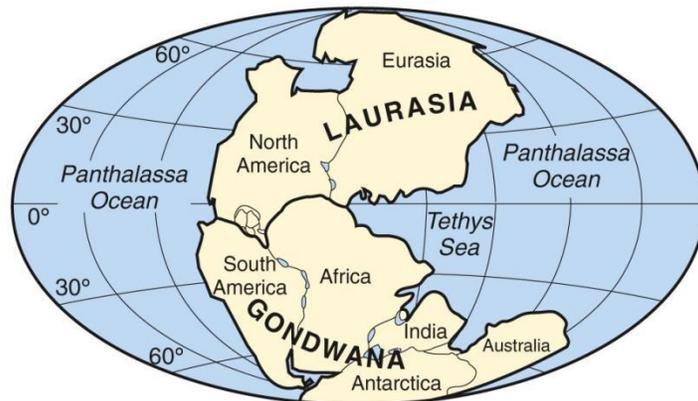
As a result of the above findings, and with knowledge of the geology of North America, researchers hypothesized that, *"the sediments of the lower Lykins Formation were deposited during the Early to Middle Permian, and its uppermost strata were deposited during the Early to Middle Triassic, leaving open the possibility that the boundary interval between these epochs may be present within the Lykins Formation"* (1, pg.89). (Note: Permian Period about 299-252 mya; Triassic Period about 252-201 mya). Researchers also hypothesized that the primary source for the majority of the Lykins sediments was the Appalachian and Caledonian Mountains. Researchers recognize these hypotheses are imperfect, and they expect to refine them with additional analysis. The source of the sediments, how they were transported, and where deposition occurred will be discussed below.

The geology of the Appalachian and the Caledonian Mountains is very complex. Plate tectonics and several mountain building orogenies were responsible for the early formation of these mountains, followed by long periods of erosion. The orogenies were a sequence of events reflecting the fact that different parts of the consolidation of these mountains occurred at different places at different times. The Grenville was the first orogeny, one billion years ago in the Precambrian Eon. The next three orogenies occurred during the Paleozoic Era: the Taconian, the Acadian, and finally, the Alleghenian, which together formed the supercontinent of Pangea.

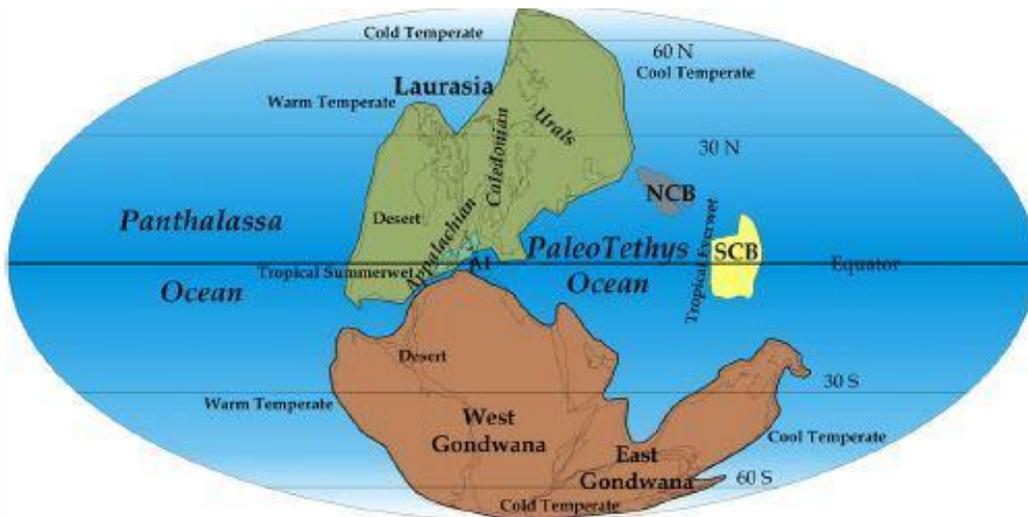
About 320-300 mya, two large continental plates, Laurasia (North America and Europe) and Gondwana (Africa, South America, Antarctica, India, and Australia) collided, creating the supercontinent, Pangea (aka Pangaea). At the collision site, located along the east coast of what was at that time the North American continent and the northwest coast of what was at that time the African continent, geologic features of earlier orogenies were incorporated into a new orogenic belt, the Appalachian/Caledonian Mountains. This mountain

range, which may have had elevations on the scale of today's Himalayas, existed along the suture line of the two continents, and ran through the equatorial heartland of Pangea. At that time, the mountains extended into what is now Scandinavia. Wignall (2) refers to this new orogenic belt as the Central Mountains of Pangea. To learn more about Pangea, please read Wignall (2). The subject matter is very interesting!

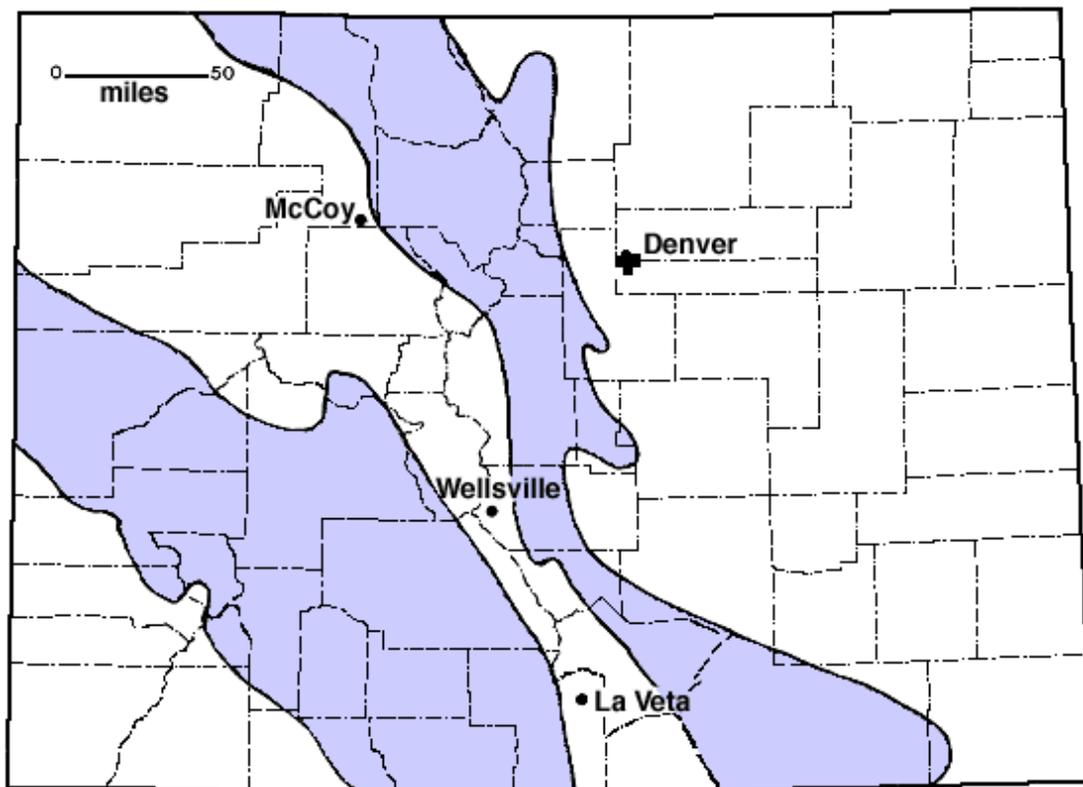
In response to the collision of Laurasia and Gondwana, two mountain ranges, Frontrangia and Uncompahgria, were faulted upward in what was at that time central and western Colorado. Saltwater basins existed between and west of these mountains. By the end of the Permian, 252 mya, these mountains, which were originally 10,000 feet in elevation, were eroded into small hills. Because Frontrangia and Uncompahgria were located in roughly the same place as the present day Rocky Mountains, they are known as the Ancestral Rockies (Williams (4)). Please refer to the three figures below regarding Laurasia and Gondwana, the Appalachian and Caledonian Mountains, Uncompahgria and Frontrangia.



The supercontinent Pangea: Laurasia and Gondwana  
[www.NubianPlate.com](http://www.NubianPlate.com), Southeast Region—African/Arabian Tectonic Plates



Pangea: the Appalachian and Caledonian mountains ([www.GondwanaResearch.com/hp/name/pdf](http://www.GondwanaResearch.com/hp/name/pdf))



Ancestral Rockies: eastern landmass is Frontrangia; western is Uncompahgria.  
[www.kgs.ku.edu/Publications/Bulletins/169/Chronic/index.html](http://www.kgs.ku.edu/Publications/Bulletins/169/Chronic/index.html)

Over tens of millions of years, the Appalachian/Caledonians were heavily eroded. Rain, snow, ice, and subsequent flooding of rivers and streams deposited sediments west of the mountains in arid areas. Huge continents, including Pangea, have vast areas in their interiors that are too far from the sea to receive moisture. Add a Himalayan scale mountain range to the picture, and very little moisture reaches the inner areas of the huge continent. As a result, deserts existed on the lee side of the Appalachian/Caledonian Mountains.

Reference 1, (Hagadorn), relates that very strong winds, originating in the east and southeast regions of Pangea, were largely responsible for the transport of sediments westward, including the sediments that would become the Lykins Formation. These winds were most likely the Northeast and Southeast Trade Winds existing at equatorial latitudes. In arid environments, as in deserts, strong blowing winds can easily pick up large amounts of sands, including zircons, and transport them over long distances until meeting a barrier like the Ancestral Rockies. Per Hagadorn, it took millions of years for the winds to deposit the Lykins sediments at lower elevations in arid to semi-arid environments on the east-southeast side of the Ancestral Rockies. The most complete section of the formation is the Red Mountain Open Space, located in Larimer County, where it reaches a thickness of 984 feet, 3 inches.

Three worn down segments of the Appalachian/Caledonian Mountains are recognized today as the Appalachian Mountains, the Caledonian Mountains, and the Anti-Atlas Mountains of North Africa. The Appalachian Mountains, located on the east coast of North America, extend continuously for nearly 2,000 miles from the Canadian provinces of Newfoundland and Labrador down to Central Alabama and range from 70 to 390 miles wide. The Appalachians are the oldest mountain range in North America. The Caledonian

Mountains, located in Great Britain, eastern Greenland, and northeastern Scandinavia, were originally contiguous with the Appalachians. The Ouachita Mountains of Arkansas and Oklahoma and the Marathon Mountains of Texas may have been continuous with the southern end of the ancient Appalachian/Caledonian Mountain range (Van Diver (3)).

One final topic is the Permian-Triassic (P/T) Mass Extinction, which began in the Late Permian Period, about 252 mya, and ended one million years later. The extinction is attributed to the after effects of the eruption of Siberian super volcanoes and natural gases escaping from the seafloor. Afterwards, it took millions of years for life on Earth and in the seas to recover. It is estimated that over 90% of marine species and over 70% of terrestrial species were wiped out, including a vast majority of oceanic reefs and terrestrial forests (Wignall (2)).

Researchers discovered that the Lykins sediments straddle the boundary between the Permian and the Triassic periods, providing additional data about the deposition of the sediments and the role Colorado played during the P/T extinction. Detailed studies of the fossils found in the sediments that straddle the P/T boundary are explained in Hagadorn (1).

Hagadorn (1), reports that studies are still being conducted on the Lykins Formation, and new research is expected to reveal new data. So, stay tuned!

#### References & Further Reading:

1. Hagadorn J., Whiteley, K. R., Lahey, B., Henderson, C., and Holm-Denoma, C., 2016, *The Permian-Triassic Transition in Colorado*: Denver, CO, Geological Society of America, Field Guide 44, pgs. 73-92. (To read, Google: James Hagadorn Publications: Denver Museum of Nature & Science)
2. Wignall, P., 2015, *The Worst of Times: How Life on Earth Survived Eighty Million Years of Extinctions*: Princeton, NJ, Princeton University Press.
3. Van Diver, B., 1990, *Roadside Geology of Pennsylvania*: Princeton, NJ, Mountain Press Publishing Co.
4. Williams, F., and Chronic, H., 2014, *Roadside Geology of Colorado, Third Edition*: Missoula, MT, Mountain Press Publishing Co.

Lake George Gem & Mineral Club  
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**The Lake George Gem and Mineral Club** is a group of people interested in rocks and minerals, fossils, geography and history of the Pikes Peak/South Park area, Indian artifacts, and the great outdoors. The Club's informational programs and field trips provide opportunities to learn about Earth science, rocks and minerals, lapidary work and jewelry making, and to share information and experiences with other members. Guests are welcome to attend, to see what we are about!

The Club is geared primarily to amateur collectors and artisans, with programs of interest both to beginners and serious amateurs. The Club meets on the second Saturday of each month at the Lake George Community Center, located on the north side of US Highway 24 on the east edge of town, sharing a building with the county highway shops. **In the winter, we meet at 10:00AM. From April through October, we meet at 9:00AM, to allow more time for our field trips.**

Our organization is incorporated under Colorado law as a nonprofit educational organization, and is a member of the Colorado, Rocky Mountain, and American Federations of Mineralogical Societies. We also sponsor an annual Gem and Mineral Show at Lake George, where collectors and others may purchase or sell rocks, minerals, fossils, gems, or jewelry. Annual membership dues (Jan. 1 through Dec. 31) are \$15.00 for an individual (18 and over), and \$25.00 for a family (parents plus dependents under age 18).

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