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<https://fourcornersgeologicalsociety.org>

FOUR CORNERS GEOLOGICAL SOCIETY

November 2023

NOVEMBER 2023 MEETING

SPEAKER: **BETHANY BURKE, Austin, TX**

TITLE: **Mosasaurus:
Unearthing the Ocean's Prized Predators**

DATE: **Thursday November 16, 2023**

TIMES: 5:00 - 6:30 pm: FLC Senior Posters and Discussion
5:30 - 6:30 pm: Dinner and Complementary Drinks
6:30 pm - 7:30 pm: Society Business / Presentation
7:30 - 7:45 pm: Raffle to raise money for students

Zoom link is: [LINK to Meeting](#)

Zoom starts at 6:30 pm

LOCATION **Vallecito Room, Student Union Building**
Fort Lewis College. Dinner served @ ~ 5:30 - 6:30 pm.

COST: * \$20/person. **MEMBERS: Please RSVP by Noon Tuesday, Nov. 14th.** ** **PLEASE go to the website** to pay (preferred) or RSVP online (planning to attend). Catering requires advance notice & bills us.
<https://fourcornersgeologicalsociety.org/event>
* **STUDENTS & FACULTY ONLY:** You need to RSVP by email to Dr. David Gonzales at gonzales_d@fortlewis.edu. Some students will be sponsored. All faculty (FCGS members) will be sponsored.



Abstract:

Mosasaurus: Unearthing the Ocean's Prized Predators

Ms. Bethany Burke: Vertebrate Paleontologist and Science Communicator

Wiped out by the K-Pg extinction 66 million years ago, mosasaurs served as the ultimate exploration of fully aquatic predation for the order Squamata. Mosasauridae thrived in Cretaceous waters as apex predators, similar to carnivorous dinosaurs ruling the land. However, mosasaurs were marine lizards and not part of the dinosaur lineage. Related to modern varanid lizards like the Komodo dragon, mosasaurs represented the last group of large marine reptiles. The fossil record of these marine leviathans reveals a story of rapid evolution, impressive diversity, widespread distribution, and environmental success.



Despite their [mosasauridae] historical significance, out of the 12,000 known extant reptile species, only a mere 100 are classified as marine reptiles. This raises the question: If mosasaurs were so successful, what sets them apart from modern varanids to the extent that reptiles have been unable to fill the niches they left behind?

The purpose of this presentation is to correct common misconceptions about mosasaurs for those with a general interest. At the same time, it aims to emphasize the importance of mosasaurs in the marine vertebrate record for individuals with a specific interest in marine life, providing in-depth information on their lineage, anatomy, and environmental data.



Detail work on a fragile fossil in CO

“I have wanted to be a paleontologist since I was 3 years old, and I’m so thankful my dream has come true. Being a field paleontologist is the adventure of a lifetime. I’m excited to have this opportunity to share my experiences and knowledge with the community at Fort Lewis College! I love nothing more than a captive audience that wants to talk about mosasaurs!” - Bethany Burke

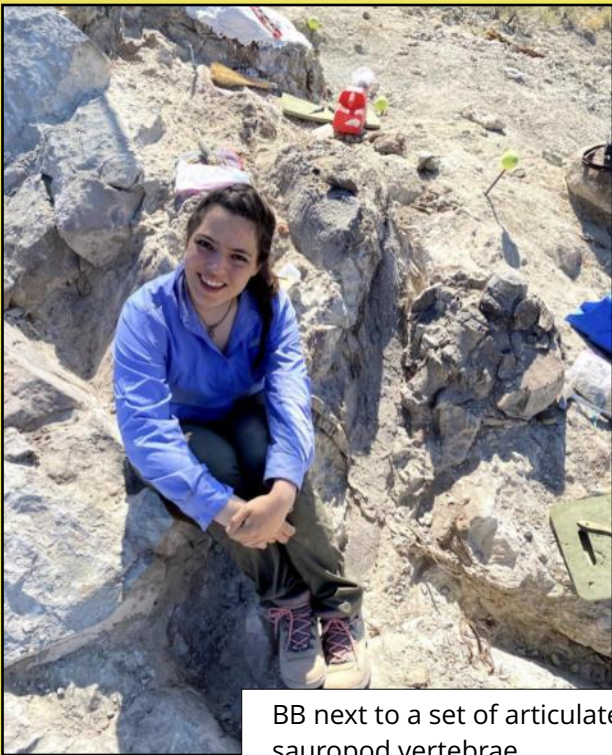


Our Speaker:

Ms. Bethany Burke

Bethany Burke is a vertebrate paleontologist and science communicator from Austin, Texas known for enthusiastic talks for children aged 3 to 17 and her series of college lectures on mosasaurs of Texas. Bethany is known online as BKBones, her children's paleontology educator persona (think The Magic School Bus's Ms. Frizzle, but only with dinosaurs.)

Graduating from Southwestern University in Georgetown, Texas with a communications degree after a successful thesis defense, Bethany went on to earn her certifications in advanced fossil preparation and techniques, with additional distinctions in replica making and field paleontology techniques. After spending her first dig season in Colorado on a two-week trip in 2021 for college credit, Bethany went on to secure a coveted field and research intern position at The Montana Dinosaur Center for four months in the summer of 2022. In 2023 Ms. Burke was named Primary Investigator and Lead Researcher for paleontology museum Texas Through Time's marine reptile research site. The site is TTT's first officially established research location, and Ms. Burke will be responsible for all of the museum's hallmark Texas marine research going forward. Her current investigation focus is on the so far unidentified plesiosaur species from the site, as well as the site's nearly complete Tylosaurus skull. Ms. Burke's upcoming publications will be coming out under her married name, Bethany K.B. Franklin.



BB next to a set of articulated sauropod vertebrae

Ms. Burke has been featured as a guest lecturer at over 50 libraries in Texas, several Texas higher learning institutions, as part of the Texas Through Time paleo lecture series, as a guest on Dr. Brian Curtice of Fossil Crates' Paleontology outreach program Paleo Portals, as a Keynote Guest on Rockhound Talk Live, and as docent and paleontology consultant at The Heritage Museum of the Texas Hill Country in Canyon Lake, Texas.

[ZOOM LINK HERE](#)



B.K. BONES! Our November Presentation

FLC Geology Club President Lacy Miller and BB on a dig in 2021.



Doing the splits on top of a jacket containing a tyrannosaurus because it was so difficult to undercut the sandstone!



BB and her baby stegosaurus puppet Roofus at one of her speaking engagements for children.



BB on top of partially articulated plesiosaur skeleton



BB in green, using heavy machinery with paleontologist Abi Lukacic of Texas Through Time on the Aguja Formation, Texas

“PREZ SEZ” by Chris Heine

Hello FCGS Members!



Global Warming... Cause & Effect.

Let's take the politics out of the discussion. I think most, if not all of us agree that human generated greenhouse gasses contribute to global temperature rise. So what came first, the chicken or the egg? I'm talking about the population of the planet as it relates to global temperature. From 1950 till 2020, the average global temperature has risen eight tenths (.8) of a degree (a range of .3 to .9 depending on who you read) but this article says eight tenths. This coincides with a global population increase over the same time from 2.5 billion people to 7.84 billion. Along with the population growth, came the comforts of 'home' post WW2, automobiles, home heating and air-conditioning, shopping malls, air travel and other energy requiring comforts. Coal, oil and gas have been vilified as the bad boys since they are the main supplier of energy (electricity and liquid petroleum products). The problem is you can't have it both ways, comforts of home and the push for only renewable energy. From the referenced article below "Each human being has a legitimate claim on a sufficient and fair amount of Earth's resources. **But with a population approaching 8 billion, even if everyone adopted a relatively low material standard of living like the one currently found in [Papua New Guinea](#)**, it would still push

Earth to its ecological breaking point. The "average person" on Earth consumes at a rate over 50% above a sustainable level. The average person in the United States uses almost five times more than the sustainable yield of the planet.

<https://www.populationmedia.org/the-latest/overpopulation-cause-and-effect>

"When we use the term overpopulation, we specifically mean a situation in which the Earth cannot regenerate the resources used by the world's population each year. Experts say this has been the case every year since 1970 with each successive year becoming more and more damaging. To help temper this wildly unsustainable situation, we need to understand what's contributing to overpopulation and overconsumption and how these trends are affecting everything from climate change to sociopolitical unrest." For example, Gaza in 1950 had a population of 63,000, today the population is 778,000 and last year alone the population grew by 22,000. That is a good example of sociopolitical unrest possibly related to population growth... among other things (see David Attenborough quote).

The bottom line is, CO2 emissions are a global phenomenon. Shouldn't everybody participate in the CO2 reduction effort? Are China and India permitted to increase their use of coal, oil and gas for generating electricity because they are 'developing nations', while other countries jump through hoops, at great expense, to meet governmental imposed quotas? I can go on and on, but I'll leave it with the illustrations on the next page!

Best regards,

Chris



“PREZ SEZ” by Chris Heine



“Anyone who believes in indefinite growth on a physically finite planet is either mad, or an economist.”

— David Attenborough

SAVE THE DATES!

December 7, 2023: FLC Geo Students

2024

January 18: Kitty Milliken

February 22: Peter Vrolijk

March 28: Chip Head

April 18: FLC Student Presentations

May 16: Doug Bartlett



FCGS FIELD TRIP COMMITTEE NEWS

Field Trip Committee News and First Aid Training

Kim Gerhardt

The Field Trip Committee is pleased to wrap up the summer having brought you the Mesozoic of Durango in April, A Tour of Jurassic Lake T'oo'dichi (Morrison Fm.) in September and Red Mountain & Historic Ironton in October. Getting our boots on the rocks is where we all started. We often remember a geologic concept learned on the outcrop long after we've forgotten the final bullet points of a talk.

We're already planning an ambitious field trip season for 2024. First up is re-scheduling the cancelled Chama River Float Trip with F.L.O.W. for early summer. Unfortunately, the July 2023 trip was dropped due to low water during the extended dam repair on El Vado Lake. Other possible multi-day trips include a spring trip to the Harding Pegmatite near Taos, and examining the Cedar Mesa Fm. along a transect from Hite to Bluff, Utah.

We also have several options for short, local trips including replica T-rex dinosaur bone assembly sessions at FLC during the winter months, the Cretaceous Menefee Fm. to Cliff House Sandstone section between Durango and Mesa Verde, the Entrada Sandstone in Hidden Valley, and trenching a meander bend in the Animas followed by taking a sediment peel of the exposed side wall in late summer.

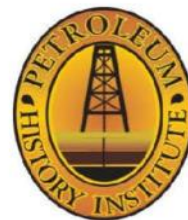
Join us! If you are interested in joining the field trip committee please talk to Jim Corken, Committee Chairman (rjcork@aol.com).

First Aid: Our field trips can take us to remote locations beyond the immediate response of a 911 call. Although we designate a Safety Officer who has had Wilderness First Aid training and carries a well-stocked first aid kit, the more of us who are trained the safer we will all be. We encourage as many of you as possible to take the basic class in CPR-AED & First Aid, followed by the next level Wilderness First Aid course. Course providers are listed below. The first level is offered regularly by Heart Safe LaPlata in Durango, but only Creeks to Peaks has posted a WFA training event for 2024 so far. We will let you know when other opportunities become available. Please see the list of potential providers below.

- Heart Safe LaPlata (<https://www.heartsafelaplata.org/>), at the Fire Station in Bodo Park, offers training for both levels: CPR-AED & First Aid (\$95) and Wilderness First Aid (\$175). The latter is only available upon request.
- National Outdoor Leadership School (NOLS) offers Wilderness First Aid in various locations and times for \$300-\$400. Upcoming classes for 2024 will be posted soon. (<https://www.nols.edu/en/coursefinder/courses/wilderness-first-aid-WFAC/>).
- The San Juan Mountains Association (SJMA, <https://sjma.org/>) runs occasional WFA classes. Their 2024 schedule is not yet posted.
- Creeks to Peaks Rescue Education: <https://creekstopeaksrescue.com/course-list/wfa-courses> , is offering WFA in Durango over April 27-28, 2024, price \$275.
- Southwest Rescue offers classes in the Four Corners region. None scheduled yet on their website: <https://southwestrescue.com/courses/>



FCGS NEWS YOU CAN USE



CALL FOR PAPERS

ABSTRACT DEADLINE: February 29, 2024

PETROLEUM HISTORY INSTITUTE

2024 ANNUAL SYMPOSIUM AND FIELD TRIP

May 20-22, 2024

Canmore, Alberta, Canada



Investors and other interested parties at the Dingman #1 wellsite, Turner Valley, 1914

REGISTRATION AND EVENING RECEPTION

Monday, May 20, 2024

PRESENTATIONS – ORAL AND POSTER – Tuesday, May 21, 2024

Proceedings to be published in the 2024 volume of *Oil-Industry History*



The theme for the Symposium is
*Exploration in the Canadian Rocky
Mountain Foothills: From Drilling
the Bumps to Deeper Insights.*

Papers on all aspects of the history of
the petroleum industry in Canada and
around the world are welcome.

We look forward to hearing from you.

**FIELD TRIP TO BOTH TURNER VALLEY
AND THE MUSEUM OF MAKING –**
Wednesday, May 22, 2024

HEADQUARTERS HOTEL – Chateau Canmore
Hotel info and event registration form will be posted
soon at www.petroleumhistory.org

ABSTRACTS BEING ACCEPTED NOW

Please send to Dr. Clinton Tippett at
clintontippett88@gmail.com

QUESTIONS?

Contact Rick Green: yrgreen1@telus.net



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REGIONAL NEWS

Western Museum of Mining and Industry Events 225 North Gate Blvd, Colorado Springs, CO 80921

1) Art and Science of Mining

The Western Museum of Mining and Industry's rotating exhibit is hosting The Art and Science of Mining now through December. This exhibit showcases artworks that draw inspiration from the mining industry. Visitors can see the exhibit with regular museum admission.

2) To Power A City: Coal Mining In Colorado Springs

Tuesday, November 14, 2023; 4 pm MT; In-person

Speaker: Matt Mayberry

This month's lecture will examine the history and development of coal mining operations in present day Colorado Springs. It will look at the unique conditions of local coal production, how the coal was used, and explore the demographics of industry workers in this industry.

These lectures are FREE for museum members and only \$5.00 for guests. Please feel free to call 719-488-0880 if you have any questions. For more information, go to <https://wmmi.org>

GeoEvents

Compiled by Pete Modreski (pmodreski@gmail.com), USGS, Retired

Fri.-Sat.-Sun., November 17-19, **Denver Area Mineral Dealers Gem and Mineral Show**, 10-5 Fri. & Sat., 10-4 Sun., Jefferson County Fairgrounds, Exhibit Hall, 15200 W. 6th Ave., Golden. No admission charge.

Data Science Entrepreneurship & Innovation Fair

Tuesday, November 14, 2023; 5 to 7 p.m.; In-person

Colorado School of Mines, Student Center, Ballroom A, 1620 Maple Street, Golden, CO 80401

Don't miss out on the Data Miners - Data Science Entrepreneurship & Innovation (E&I) Fair and the opportunity to connect, learn, and share insights within the dynamic world of data science.

Hosted by the Mines Entrepreneurship & Innovation Interest Group in collaboration with the Department of Applied Mathematics and Statistics, this informal event will provide the chance to engage in conversations with Miners who are data science experts as they showcase their practices in a round-robin table setting. Moreover, you'll get the chance to network and make meaningful connections within Mines' data science community.

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REGIONAL NEWS

To register or get more info, go to

<https://weare.mines.edu/s/840/19/interior.aspx?sid=840&gid=1&pgid=8252&cid=15934&ecid=15934&authkey=RmWHBnhLxeM%2fDZWcSErbr4snDVPwy9uJmN2BMbnieGW%2bomXmP8%2bulQ%3d%3d#gsc.tab=0>

Denver Earth Resources Library Author Meet and Greet with Jon Rotzin
November 15th 2023, 4-7 pm, presentation at 5 pm; In-person
Denver Earth Resource Library, 730 17th St. Suite B1, Denver CO 80202

Jon will be discussing his latest book "The Explorer's Mindset: Lessons in Leadership in Applied Geoscience and the Energy Industry" This promises to be an engaging evening celebrating exploration and filled with career insights and share principles of exploration leadership using examples from Denver Based explorers. A sponsored Happy Hour will begin at 4 pm. Jon will speak at 5 pm.

This is a great opportunity to connect with Jon and his work in Denver!

To register, go to https://docs.google.com/forms/d/e/1FAIpQLSfih3NLNZw7KQt1yk-k581TJ3w300Z9R7B31IWcrWitk1Y9_Q/viewform

NGWA Hydrogeology of States Webinar Series: Mississippi
November 16; 2:00-3:00 p.m. ET; Virtual

Madison Kymes, hydrogeology team lead for the Office of Land and Water Resources with the Mississippi Department of Environmental Quality, will discuss:

- Mississippi's 18 major aquifers ranging in age from the Paleozoic to Holocene
- Updates to Mississippi's statewide groundwater monitoring network
- Examples of Mississippi's approach to address groundwater concerns, such as over-pumping and potential saltwater intrusion, throughout the state.

Early registration ends November 10th.

To register, go to <https://www.ngwa.org/detail/event/2023/11/16/default-calendar/23nov16web>

RMAG 2023 Core Workshop

Dolomite and associated pore systems the Rocky Mountain Region - Examples from the marine phosphoria rock A complex (Permian) and the lacustrine Green River formation (Eocene) - November 16-17, 2023; 9:00 am - 3:00 pm; In-person

USGS Core Research Center, Building 810, Denver Federal Center, Lakewood, CO

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REGIONAL NEWS

Instructors: Maxwell Pommer, Colorado School Of Mines/Premier Corex and Rick Sarg, Colorado School Of Mines

This two-day core workshop hosted at the USGS Core Research Center examines and discusses examples of dolomite and associated pore systems that formed in major late Paleozoic marine and early Tertiary lacustrine sedimentary systems in the Rocky Mountain Region. Cores as well as accompanying stratigraphic, petrologic, geochemical, and seismic datasets will be integrated into interpretation in context of regional geologic history. This is a hands-on opportunity to observe and discuss the character and origin of dolomitic strata in the Rockies, as well as its significance to subsurface fluid reservoirs.

Day one of the workshop focuses on dolomite in Phosphoria Rock Complex (PRC) (Middle Permian) across a marine ramp with evaporite, carbonate, chert, sandstone, phosphorite, and mudrock sedimentation in what is now Wyoming. Dolomite occurs predominantly in restricted marine environments during sea-level highstands with active carbonate sedimentation associated with evaporites and cherts, however it occurs across the depositional profile and systems tracts. Dolomite is interpreted to have formed largely through evaporative reflux and recrystallization of shallow-marine carbonate sediments, especially aragonitic sediments, in near surface environments. Dolomitization resulted in widespread preservation and generation of reservoir porosity (0.1 to 25.3%, mean of 9.5% in dolostones) and relatively enriched carbonate $\delta^{18}\text{O}$ up to 5.6‰ and $\delta^{13}\text{C}$ up to 7.3‰ VPDB. Through burial, minimal dolomite is precipitated and pore volume loss occurs primarily through mechanical compaction. Dolomite nodules, cements, and micrite in basinal environments are interpreted to have been influenced by microbial decay of organic matter via microbial sulfate reduction as indicated by relatively depleted carbonate $\delta^{18}\text{O}$ down to -12.5‰ and $\delta^{13}\text{C}$ down to -12.1‰ VPDB.

Day two of the workshop focuses on dolomite in the lacustrine Green River Formation (GRF) (Eocene) across dynamic lake environments that resulted in deposition of carbonates, sandstones, mudrocks, and evaporites in the Uinta basin. In littoral and sublittoral environments with cyclic carbonate deposition, dolomite formed through recrystallization of precursor carbonate, especially in environments with abundant microbial carbonate sedimentation. These processes and accompanying near-surface diagenesis resulted in preservation and generation of porosity. In profundal environments which are widespread during periods of expanded lake, abundant dolomite formed. Microbial decay of planktic organic matter largely through methanogenesis in low-oxygen environments produced alkaline lake water, resulting in widespread dolomite precipitation and enrichment of carbonate $\delta^{13}\text{C}$ up to 15.8‰ VPDB independent of carbonate $\delta^{18}\text{O}$. Porosity hosted in organic matter occurs in thermally mature basinal mudrocks.

For more info or to register, go to

<https://www.rmag.org/index.php?src=events&submenu=Events&srctype=detail&category=Workshops%20%26%20Courses&refno=306>



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FOUR CORNERS GEOLOGICAL SOCIETY

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MEMBERSHIP RENEWAL or APPLICATION: June 1, 2023 to May 31, 2024



*Name: _____

*Address: _____ City: _____ State: _____ Zip: _____

*Email: _____ Phone: _____

*Employer: _____

Please Identify a Membership Category:

***Please check your interests:**

- Sedimentology & stratigraphy
- Structure & tectonics
- Mineralogy, petrology, geochemistry
- Igneous geology, volcanology
- Ore geology and hard rock mining
- Other mineral extraction
- Petroleum geology
- Geophysics
- Geological engineering
- Geomorphology
- Quaternary geology
- Hydrology & water resources
- Environmental geology
- Geography / GIS
- Other interest (see box)

| | | |
|-------------------------|------|--|
| Active Member | \$30 | Any person engaged in the practice or teaching of geology or who holds a Bachelor's Degree in geological science from a college of acceptable academic standards. Degree requirement may be waived if applicant has adequate professional experience. <i>*Highest Degree, Type and Year: _____</i> <i>*College / University: _____</i> |
| Associate Member | \$30 | Any person who is a graduate of a college of acceptable academic standards with major studies related to, or associated with, geology. Degree requirement may be waived if applicant has adequate professional experience. <i>*Highest Degree, Type and Year: _____</i> <i>*College / University: _____</i> |
| Student Member | Free | Any undergraduate or graduate student majoring in geology at a college of acceptable academic standards. <i>*College / University: _____</i> <i>*Year expected to graduate: _____</i> |
| Emeritus Member | Free | An Active Member of 65 years old or older who has been a member for 25 years including time spent in military service. <i>*Year emeritus status was awarded: _____</i> |
| Honorary Member | Free | An Active Member who has contributed distinguished service to the profession of geology and to the betterment of the FCGS. Determination is made by the FCGS Executive Committee. <i>*Year honorarium was awarded: _____.</i> |

Other Professional Interests or Comments and Concerns.

Are you interested in Volunteering? If so, what is your area of interest?

** Required information for new members. Current Members, please update.*

Please either print, complete and return this form with your check for dues made payable to: "Four Corners Geological Society" and mail to the address above or go online to fourcornersgeologicalsociety.org .