myFOSSIL

News from the FOSSIL Project Vol. 4, Issue 3, Fall 2017

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FOSSIL PROJECT UPDATES FALL 2017

By Bruce MacFadden and Sadie Mills

Transitions and New Members of the FOSSIL Project Team

We wish Eleanor Gardner the best in her new position as Outreach & Engagement Coordinator at the University of Kansas Biodiversity Institute & Natural History Museum. Eleanor, who departed Gainesville in August, left the FOSSIL Project on solid ground after developing an extensive project management manual and tidying up many loose ends. During her time on the project she was the primary contact with many of our members. We thank Eleanor for everything that she did for FOSSIL during her almost two and a half years with us. We are certain that Eleanor will prosper in Kansas, and we look forward to continued collaborations with her.

Eleanor Gardner

About the FOSSIL Project, Eleanor noted: "I gained a lot, both personally and professionally, by working with such a vibrant community of amateur and professional paleontologists." She remains connected to the community through the myFOSSIL website and looks forward to seeing some FOSSIL friends at GSA 2017 in Seattle!

Sadie Mills

Sadie Mills, Project Coordinator

Sadie, who started last month, is responsible for the myriad of day-to-day activities that keep the project moving in the right direction. She also serves as a liaison to clubs and their members.

A native of Arizona, Sadie received her B.S. in Ecology & Evolutionary Biology and B.A. in Anthropology from the University of Arizona. She more recently completed her M.S. in Environmental Studies at the University of North Carolina Wilmington. Prior to completing her graduate studies, Sadie worked as an environmental educator in Maryland, Georgia, and Virginia. Sadie is particularly interested in improving science literacy,

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and is excited to help the FOSSIL Project build a science community focused on paleontology.

About the FOSSIL Project, Sadie notes: “It is wonderful to see professional and amateur paleontologists working together, and I am looking forward to learning from both groups over the coming year!”

Richard Bex, Graduate Assistant

Richard Bex

As a graduate assistant, Rich conducts social media research related to the community of practice between amateur and professional paleontologists. Rich earned his B.A. in Environmental Geoscience at West Virginia University, his M.Ed. in Secondary Education at Lehigh University, and is currently pursuing his PhD in Curriculum and Instruction at the University of Florida. Prior to arriving at UF, Rich taught Earth & Environmental Science and Astronomy at Mooresville High School in Mooresville, North Carolina.

Rich has always loved geology, and is passionate about communicating, teaching, and learning about the different fields within Earth Science. He has enjoyed working with FOSSIL because it has incorporated all of these interests. For his PhD, Rich aspires to do research in authentic inquiry, as well as in state-of-the-art technology and visualization resources specifically related to Earth & Space Science. Ultimately, Rich aspires to work as a professor in Science Education to help improve Geoscience education and prepare teachers to use modern methods of teaching Earth & Space Science.

Jeanette Pirlo, Interim Project Coordinator and Graduate Assistant

Jeanette Pirlo

Jeanette has been working on various projects in the museum over the past year, and serves as Bruce MacFadden’s Research Assistant. She also has been actively involved with many aspects of FOSSIL. Jeanette served as the Interim Project Coordinator in August 2017 after Eleanor left and before Sadie started in the position.

Currently a PhD student in the University of Florida’s Biology Department working with Dr. MacFadden, Jeanette is a native of California. She received her B.S. in Marine Biology from the University of California Santa Cruz (Go Slugs!). As an undergraduate, she assisted in math instruction at Pajaro Valley High School, California. Over the past year at Florida she has been involved in several paleo-related activities, including the 2016 Panama GABI trip, and in 2017 the Aurora Fossil Festival, Ghost Ranch New Mexico GABI Summit, and the Nebraska badlands trip. She also planned and executed the 2017 FOSSILs4Teachers! professional development in August. Her primary paleo interests are fossil sharks, though she is relatively new to the field and is still open to other interesting projects. Jeanette currently is working with Bruce on digitizing fossils from Belgrade, North Carolina. Jeanette is also very interested in public outreach and is particularly passionate about getting fossils into children’s hospitals.

MacKenzie Smith

MacKenzie Smith, Graduate Assistant

In his role as a graduate assistant, MacKenzie helps create content for FOSSIL social media, moderates two forums on myFOSSIL, and is developing a new YouTube series on fossil collecting. Read more in his article for this issue that describes his background and research interests in paleobotany.

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Michael Le, Social Media Intern

Michael Le

As the FOSSIL Project's Social Media Intern, Michael creates engaging content for FOSSIL's Facebook and Twitter audiences. He is also helping FOSSIL develop an Instagram account, and is assisting with the production of new FOSSIL YouTube videos.

Originally from Sunrise, Florida, Michael is an undergraduate marketing major at the University of Florida. He thinks the FOSSIL mission of promoting learning within a community of both professionals and amateurs is a noble cause, and has enjoyed learning more about the profession and hobby of paleontology. After he graduates, Michael hopes to work within the clothing industry as a content creator or social media manager. He believes his work with FOSSIL is helping him build important skills for his future career.

Activities and Upcoming Events

Listed below are activities that we have recently completed, or that are currently scheduled until the end of 2017. Please also consult our FOSSIL event calendar at: https://www.myfossil.org/events/

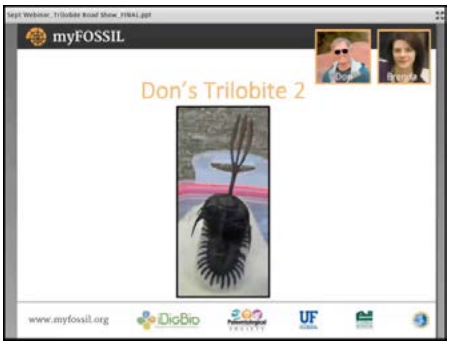
August 13 - 18, Nebraska fossil collecting

The team in Nebraska

A dozen members of the Florida Museum staff, graduate students, and citizen scientist volunteers from our vertebrate paleontology division collected more than 500 specimens from the Nebraska badlands north of Crawford, Nebraska. We collected from the White River sequence, including the Chadron and Brule formations on U.S. Forest Service lands under the auspices of a permit issued to the Florida Museum. UF graduate student Sean Moran used this field time to further develop plans for his PhD project. The fossils collected during this trip are safely back in the lab; they are currently being cleaned and identified as part of the curation process.

September 20, FOSSIL Roadshow Webinar I-- Trilobites

We hosted the first of this five-part series in partnership with the Dry Dredgers Fossil Club of Cincinnati, Ohio and myFOSSIL member Matthew Croxton of Fort Myers, Florida. Our expert for this webinar was Dr. Brenda Hunda of the Cincinnati Museum Center. This hour-long, online event was attended by more than 50 participants, including a class from the Raymond Alf Museum in California and students from Matthew Croxton's middle school science classes. Recordings of our webinars are available on myFOSSIL at https://www.myfossil.org/video-tutorials/



FOSSIL Project Roadshow

October 19 (Thursday, note day change), FOSSIL Roadshow Webinar II

The second episode of the FOSSIL Roadshow webinar series will take place in Dallas, Texas. Dr. Merlynd Nestell and the Dallas Paleontological Society will share Pennsylvanian Fossils of North Texas.

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October 21 - 25, Geological Society of America Annual Meeting, Seattle

Several FOSSIL-related events and activities are planned for this national, professional GSA meeting. In partnership with the Northwest Paleontological Association, we will be hosting a FOSSIL booth in the Exhibitors Hall. We are also co-sponsoring travel for some presenters in the following symposium, which is being co-organized by Eleanor Gardner.

Session T64. Citizen Science in Paleontology: Harnessing Public Interest to Advance Research and STEM Education (Sunday am, October 22), organized by Laura C. Soul, Terry A. Gates, and Eleanor E. Gardner. At this symposium, "paleontologists, educators, and non-academic contributors will discuss best practices for citizen science as a viable means to achieve high quality paleontological research, and to create a valuable experience for citizens that facilitates STEM learning" (taken from the meeting program).

November 3 - 4, iDigBio Summit and National Fossil Day, Gainesville

On Friday evening, November 3rd (4:30 pm to 6:00 pm), the FOSSIL Project will sponsor an open, public lecture, "The Digital Atlas of Ancient Life," by Jonathan Hendricks of The Paleontological Research Institute. Dr. Hendricks is a Paleontological Society Distinguished Lecturer and his talk is being co-sponsored by the iDigBio project. Fossil club and society members are invited to attend this lecture in-person at the Harn Museum of Art in the University of Florida Cultural Center. Those unable to attend will be able to view a recording of the lecture, which will be posted under the Resources tab of the myFOSSIL website.

On Saturday, November 4th (10:00 am to 3:00 pm), the Florida Museum will be celebrating National Fossil Day. This free, public event will bring together fossil clubs and enthusiasts from around Florida. There will be many family-friendly activities including a fossil dig pit and microfossil screen wash activity

The events listed above are, to the best of our efforts, confirmed. In addition, we are also hoping to do the following activities to round out this year's schedule.

November 15, FOSSIL Roadshow Webinar III

Location and theme coming soon!

December, TBD, FOSSIL Roadshow Webinar IV

Location and theme coming soon!

FEATURED PROFESSIONAL: GEORGE PHILLIPS

Editor's Note: This issue we feature George Phillips, Curator of Paleontology at the Mississippi Museum of Natural Science in Jackson, Mississippi. George was kind enough to respond to questions submitted by newsletter editor Shari Ellis.

George Phillips at the Oren Dunn Museum's annual Geology Day. The kids found part of a mastodon (or mammoth) rib in the creek behind their home in Tupelo, Miss.

I read an article in The Clarion-Ledger that your interest in paleontology came about when you were about 12 years old and one of your family's farm hands found a variety of artifacts and fossils in a creek near where you lived. Can you talk a little more about that?

His name was Charles James, but everyone who knew him well called him "Soul." He excelled at finding things in general—from misplaced wrenches to the best shade tree for lunch (during field work) to ancient objects lying out in the furrows or in creek beds. Once I was told the antiquity and significance of what Soul was finding, it didn't take long to spur my interest, and searching for artifacts and fossils during intermittent work breaks soon became a way to occupy 'idle time'—opportunities for which my brother and I might otherwise find mischief.

The article also suggests that you went to college to pursue an undergraduate science degree after a few years of other kinds of work. I'm thinking this means that you might have been a little older than the typical undergraduate student? What advice would you give anyone interested in pursuing a career in paleontology?

And more mature—let's not forget that. My family had a diversified enterprise that centered around grain farming and food service, but when it went belly-up in the early 1990s, the family dispersed, almost all of us headed 'back to school' in one form or another. With few obvious exceptions, I don't think it's ever too late to change careers, although this often involves an academic commitment. I often jokingly tell people that I decided to become a paleontologist when I failed at everything else. However, I learned a lot about life and other jobs prior to finding my 'path' in paleontology. I suppose I never took it seriously, at least not initially. "People get paid to do that?" I suppose I am now living the dream of that dinosaur-obsessed 4-8 year old demographic, but also trying to answer questions about the past, particularly as it pertains to where I grew up here in Mississippi.

I understand that you grew up in Mississippi and now you are a curator at the Mississippi Museum of Natural Science working on the same fossil material that first got you interested in paleontology. Is that unusual—for someone to be able to return back to their "stomping grounds?"

Although I had originally planned to pursue a PhD in the classical stratigraphic section of the Western Interior, I was getting older and poorer after the MS, and the family and friendly ties to my home state, familiar and comforting surroundings, and my research interests in the geology of the Gulf Coastal Plain (which is loaded with fossils) were substantial, plus a rare job opening made my return to Mississippi inexorably logical.

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Given that the goal of FOSSIL is to link amateur groups with professionals, what are your thoughts about the role of amateurs in the science?

One cannot overemphasize the importance of avocational groups, or individuals, to the natural sciences. From astronomy to biology to geology, the realm of the life sciences and physical sciences is populated with inventors, innovators, and discoverers who have made substantial contributions to their respective interest, and, as amateurs, they didn't get paid for doing it, but actually incurred expenses, privately funding their inventions and discoveries—often for the betterment of collective knowledge and public good. The MMNS Paleontology program could not have accomplished what it has in terms of collections and research without the assistance of amateurs and volunteers contributing their time, resources, and discoveries to furthering the documentation of extinct organisms and ancient ecosystems. In addition, many individuals and civic groups (e.g. rock & gem clubs) involved in avocational pursuits in the natural sciences are also active in extracurricular education, disseminating knowledge to the otherwise uninformed by giving presentations at schools and providing activities or demonstrations at events. I would gather there are lot of self-taught adults or fossil club members who know more about the local prehistoric life than your average 6th grade teacher, thus the former becomes an additional, or supplemental, source of scientific information.

Many of our Fossil Clubs and Societies are very committed to education and work hard to engage youth. I read that you were mentored as a teen by a professional paleontologist you befriended and his wife. Based on your experience, do you have any advice to share about effective ways to get children and teens interested in paleontology and collections?

I was lucky, and access to mentors and organized mentoring programs for kids is uncommon. Museums (and academic extension offices) are always thinking of ways to assist the public with educational programming and events, including more one-on-one activities. The forces working against this process are, these days, perennial and too numerous to mention, but boil down to operating budgets. When funding is poor, the schools always cut travel (e.g. to museums) first; many parents work full time (and then some); and museums, who serve to assist the schools with interactive learning, are often dependent on scarce and competitive grants to accomplish such ends, not to mention always understaffed.

George Phillips, paleontology curator with the Mississippi Museum of Natural Science, describes a fossil found by this group of BioBlitz attendees Sept. 13, 2014, on the grounds of the museum. The BioBlitz event brought together students, teachers, community members and scientists to inventory the area's biodiversity and spark interest in ecology. (Photo by MSU Ag Communications/Kevin Hudson)

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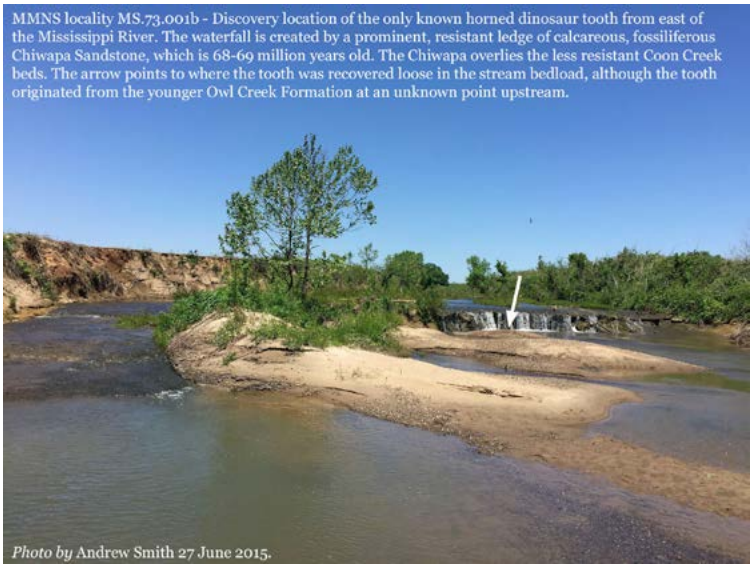
One of our many annually occurring events here at MMNS is NatureFEST, which consists of a single 'open house' day in early April (although it takes a week or two of prep time), where the public is allowed access to the Research & Collections wing. Our biologists, and yours truly, interact with families, individually and in larger groups, showing them what it is we do in our respective programs. There is also the university-directed BioBlitz event, as well as the junior naturalist program. MMNS also accommodates shadowing and, for older kids, the student intern program—albeit when time and staffing allow. We also have several field trips each year available to juniors 13 years of age and up. There is nothing like actually finding a fossil to stimulate an interest in paleontology beyond the fascination first kindled in a children's book or Nat Geo program on dinosaurs.

What is a typical work day like for you? What are some of your favorite parts of your job? Your least favorite?

The day begins with attention to administrative requests and policy issues, which, although not significant in number, must be addressed first thing. Then on to answering e-mails and social media queries, which are often populated with requests for fossil identifications. After that, I address any correspondence having to do with the many research- and collections-related projects I have going on at the moment. After that, if there are no visitors or educational programs on the schedule, the day becomes a three-way struggle between my obligations to collections maintenance, official duties (meetings, admin orders, etc.), and research writing—the last item almost invariably losing to the other two. But, it is the nature of the beast! As with any job that is enjoyable, which this one most certainly is, the stuff you don't like to do is the price you pay for the stuff you love to do, and one of the greatest rewards being the occasional trip to the field!

Your discovery of the tooth of a ceratopsid horned dinosaur in the Owl Creek Formation made the news! Can you describe that day?

One of my favorite subjects, one for which there is decent exposure in Mississippi and much research interest globally, is the study of the lattermost part of the Cretaceous Period, specifically the sediments, and their fossiliferous contents, deposited just before the K-Pg boundary and shortly thereafter during what is known as the 'recovery period' of the early Paleocene. Although my graduate research was on Pleistocene freshwater turtle communities, my principal research efforts these days are focused on the composition of benthic (bottom-dwelling) marine macroinvertebrate communities of the uppermost Cretaceous and what they were replaced with in the ensuing Paleocene. The Owl Creek Formation and superjacent Clayton Formation contain much information regarding this story in northeast Mississippi.



MMNS locality MS.73.001b - Discovery location of the only known horned dinosaur tooth from east of the Mississippi River. The waterfall is created by a prominent, resistant ledge of calcareous, fossiliferous Chiwapa Sandstone, which is 68-69 million years old. The Chiwapa overlies the less resistant Coon Creek beds. The arrow points to where the tooth was recovered loose in the stream bedload, although the tooth originated from the younger Owl Creek Formation at an unknown point upstream.

Photo by Andrew Smith 27 June 2015.

That particular day in July of last year, I was on the hunt for Cretaceous crabs, showing a new volunteer—a local rockhound—how to spot the small, mostly partial carapaces in modern stream deposits. We were in a creek bed where I'd made a couple of previous but unsuccessful attempts to also find the K-Pg boundary in the muddy, vegetated walls of the channel. An adventure that began with just the two of us became a small, impromptu outreach program when we encountered two boys and their dad and uncle rockhounding the creek bed from the other direction. The men were out treasure-hunting, primarily for 'arrowheads,' not knowing much about what it was they were looking for but

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determined nonetheless. The kids were just along enjoying the outdoor adventure. We decided to engage the juniors, who we soon discovered were considerably more garrulous and eager to learn than the men, who barely offered eye contact at first. After less than an hour of explaining a variety of the stream-eroded fossils we were finding all around us, we left the grateful family outing and headed in the direction of my work truck. We hadn't progressed more than 100 feet or so, when stopping just below a waterfall, where we'd looked only briefly on our way to better exposure, my eyes locked on to a curiously shaped object at the very top of the first point bar below the fall.

I knew right away it was a herbivorous dinosaur tooth, but my lack of expertise in distinguishing among the various ornithischian tooth types was limited to having some working familiarity (at that point) with only two groups—hadrosaurs (duck-billed dinosaurs) and ankylosaurs (nodosaurs, specifically). Upon making it back to the vehicle, I posted pictures on social media advertising it as an "ornithopod" tooth, although not a hadrosaur. Within the time it took for us to satisfy our thirst and load up the truck, a social media alert came across my phone. Checking the phone one more time before we proceeded, a colleague from the University of Alabama—Dr. Lynn Harrell—had chimed in with sufficiently greater knowledge about dinosaurs than I. Within a half hour, not long after we arrived at our next collecting opportunity, he had connected me with ceratopsian expert Dr. Andrew Farke at the Raymond M. Alf Museum. After briefly discussing the obvious significance of the discovery with Andrew, and after my sidekick and I finished sampling the last station for the day, I headed home with the unwritten portion to my contribution to the ceratopsian paper slowly taking form in my head. And the rest, as they say, is history—or paleontology, in this case.

Is the tooth your favorite fossil discovery or do you have others?

George digging out a block of trace fossils—burrows—from the uppermost Cretaceous Prairie Bluff Chalk along the Alabama River

Grinning, I can modestly say, "It's alright." It certainly has garnered quite a bit of attention. Although I do not consider dinosaurs my particular area of interest or expertise, my role here at MMNS, as curator of the state fossil collection, requires that I know at least a little bit about every macrofossil group—vertebrate, invertebrate, and plant—within our state's borders. This general knowledge about a diversity of groups is necessary in order to address issues like significance, rarity, conservation, research potential, availability, educational potential, etc. for each fossil discovery reported to our offices. I work and publish on a variety of organisms with my only restriction being that the topics somehow relate to Mississippi's past—a requirement for funding. I've published very little on the subject (two full-length papers thus far), but I am especially fond of a family of Late Cretaceous lamp urchins (Cassiduloida: Faujasiidae) that are, although not restricted to Mississippi, preserved in greater diversity and abundance here in the Gulf Coastal Plain than anywhere else in the world. Most species inhabited environments, like beaches and carbonate banks, now occupied by modern sand dollars and sea biscuits (respectively), which didn't appear in any form until 6-9 million years after shore- and bank-dwelling lamp urchins became extinct.

To learn more:

Farke, A., Phillips, G. 2017. The first reported ceratopsid dinosaur from eastern North America (Owl Creek Formation, Upper Cretaceous, Mississippi, USA). PeerJ. doi: 10.7717/peerj.3342

Read Brian Switek's Scientific American article on the discovery of the dinosaur tooth.

AMATEUR SPOTLIGHT: ROSS FARGHER

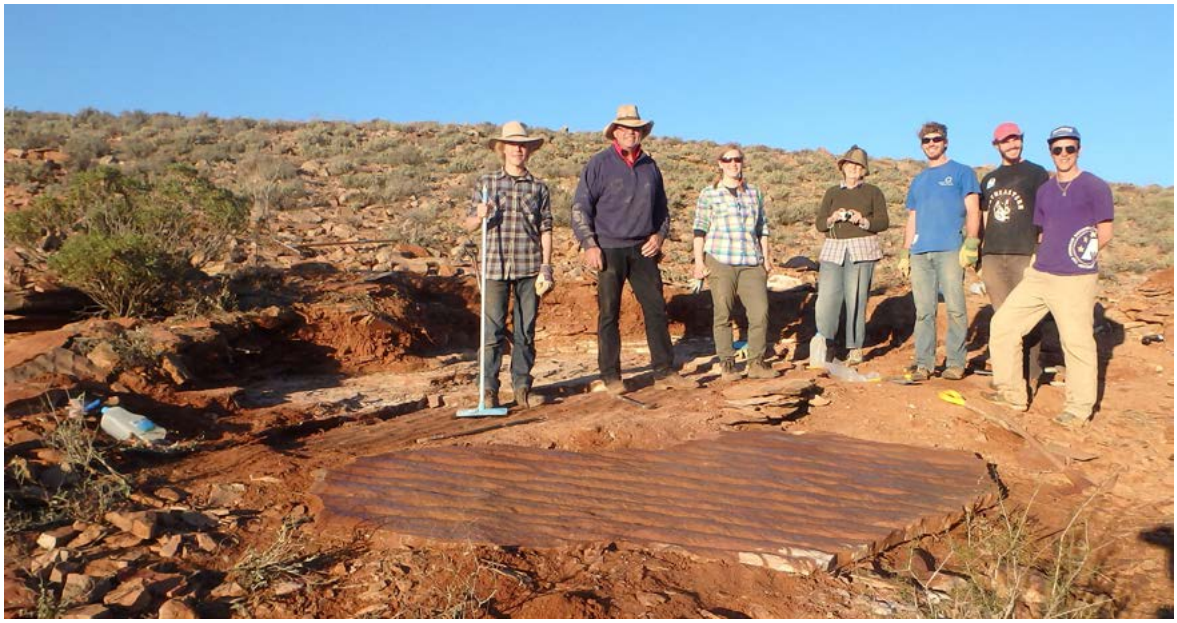
Editor's note: This issue we feature 2017 Strimple Award Winner Ross Fargher of Nilpena Station, South Australia. Ross was nominated for this award by Mary Droser of the University of California, Riverside and Jim Gehling of the South Australian Museum in Adelaide.

by Mary Droser

Ross Fargher Photo credit: Jim Gehling

Over 15 years ago, Dr. Jim Gehling and I stood on Ross Fargher's veranda at Nilpena Station in South Australia and while Ross played with a red back spider with the toe of his boot, we asked if we might work on the fossils exposed on his property. We proposed to excavate beds and planned to leave them basically in place as there have been issues with fossil looters on his property in the past. We thought then, naively, that it would be a few years. In the years since, we have been able to excavate nearly 40 fossiliferous beds – well over 300 square meters of Ediacaran Seafloor, we have exposed tens of thousands of fossils, described many new taxa and a patch of the Fargher property has become an extraordinary locality for Ediacara fossils and one of the best localities for fossils of any age in the world. It is now a National Heritage site. All of this is because of Ross Fargher and not simply because he granted permission. It is all that he has done after that day - his unyielding dedication to all aspects of the overall project – which he does without any financial gain or investment but simply because he is interested and keen about these fossils. Importantly, for the field of paleontology, he is dedicated with both his time and energy, to the preservation and conservation of these fossils.

There are many "special" aspects of Ediacara fossils. They are soft-bodied and thus rare. They also represent the earliest multicellular animals on the planet. This means that they are valuable and there is a HUGE black market for them. They are also preserved on the base of beds and in the past have required luck in that pieces of float are available or as we have done, for the first time, require massive excavation of beds. This combination of factors dictates a style and mode of fieldwork unlike what most of us are used to.



Ross with students standing over a rock they were able to move with his help. Photo courtesy of Mary Droser

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Nilpena Station is over 950 square kilometers. The localities with Ediacara fossils were discovered originally by Ross and he continues to look for them as he rounds up cattle or checks bores or susses out sites for movie locations (Rabbit Proof Fence, Tracks, The Rover and other notable movies have been made on his property). The localities are not on previous roads or tracks and many are on hillsides. Accessibility is issue number one. Ross pulled out his tracker and made us "roads". While we still have walks – we are able to drive in much of our equipment. Some of the beds that we wanted to excavate are under a great deal of overburden. Whenever asked, Ross gets his digger and helps to remove overlying soil or beds that are not part of the overall fossiliferous succession. We have had situations where we cannot figure out how to move a particularly large slab; Ross Fargher has never met a rock that he can't figure out how to move. He also has continually provided his ATV so that we can bring out very large rocks with fossils preserved in 3-D that could not be otherwise transported. He provides workspace and storage space for specimens and equipment.

The preservation and conservation of these fossils is extremely tricky. There is the short-term issue – keeping people off the property and there is the long-term issue – what do we need 20 years from now? Ross has been engaged in both aspects. We received a grant from the Australian federal government for security cameras. He installed these video cameras on the main gate that one has to go through to get to the localities. He is diligent at keeping people at bay and he keeps a close eye on the video feed for any movement – up until now, only kangaroos and cattle. He does not allow anyone on his property near the fossil localities unless we are asked and typically, unless we are present. He keeps fences in the area locked and in shape.

Ross, with his wife, Jane, are working tirelessly to find a long term solution to the preservation and conservation of the property. They are at a time in their lives that they would like to sell Nilpena. They could easily sell it to a local rancher with disregard of the fossils – this would, needless to say, be a paleontological disaster. Instead, they are taking the route to try and work with the government to come up with a solution that still works financially for them. This is not an easy road and yet, they are still willing to pursue it and have been doing so for years. They feel responsible for these fossils. I cannot believe how fortunate we are to have the Fargher's own Nilpena. Most people would not have even allowed us to excavate, much less help facilitate field work at every turn and then protect the locality and work to preserve it for the future.

> *"In summary, Ross Fargher's exceptional observation skills lead directly to the discovery of Ediacara fossils at Nilpena, a site previously considered to be barren of Ediacara fossils. The Ediacara fossils he discovered happened to be new to science, representing a new preservational facies. Not only was Ross able to observe such subtle evidence, but appreciated that his discoveries were likely to be important to science, and so took care to remember the localities. Ross and Jane Fargher appreciate the importance of not only the fossils but also the paleontological context represented by the Nilpena Heritage precinct. As such they are keen to see Nilpena managed for scientific research in perpetuity, if a suitable management authority can be found to ensure the heritage value of the property.*
>
> *The science of evolution and the origin of animals has greatly benefited from the observational skills, interest and efforts of amateur geologists like Ross Fargher in addition to his unpaid role as a manager and custodian of this world renowned Ediacara fossil site."***--Jim Gehling**

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Ross is not a typical Strimple nominee. Most have spent time in the field in some stream finding fossils with professionals or for professionals, some even co-authoring papers. Ross is unique. His dedication over the last 15 years is breathtaking. Absolutely, unequivocally we have one of the best fossil localities in the world entirely because of him. He is not on his hands and knees with a hand lens, but his contributions are much greater than that. He gives of himself and his time generously and with great humor. He is determined that these fossils be preserved and conserved for generations to come. How lucky we are!

About the Farghers by Ross Fargher

The Fargher Family has been grazing sheep and cattle in the Flinders Ranges for 5 generations stretching back to the 1850s. A fourth generation pastoralist, Ross Fargher has continued the family tradition running cattle on remote Nilpena Station, adjacent to the Flinders Ranges in the semi-arid north of South Australia - the sparse vegetation limits the carrying capacity to 1700 cattle across the property expanse of 200,000 acres.

While still operating as a Cattle Station, self-employed Ross has spent much of his time within the Film Industry providing Location and Production Services. Nilpena boasts an amazing diversity of Desert Landscapes well known to the industry. The much photographed Red Sand Dunes and substantial historic stone Station buildings, valuable relics of early European settlement, have featured in Rabbit Proof Fence and many other productions and commercials.

In the early 1980's, while mustering on the property, Ross observed evidence of rippled stone which he shared with research scientists. Nilpena is now home to the National Heritage listed Fossil Site. Conserved as an outdoor museum, the Nilpena Site is where NASA funded world-leading palaeobiologist Mary Droser from the University of California and a team of researchers from the South Australian Museum have exposed, excavated, flipped and reassembled large samples of fossil covered seafloors, in an in-situ excavation site considered by scientists from all over the globe to be one of the most intact & rich Ediacara fossil sites in the world. The Nilpena Site has produced findings not present at any other Ediacaran site.

For the past 17 years, Dr. Droser, her family, and research team have made an annual pilgrimage to Nilpena where they consider the station's rustic shearers quarters their summer residence; their combined enthusiasm is infectious.

New found knowledge has provided Ross a new perspective through which to view the world and provides him a diversion from running cattle. Ross finds it difficult to comprehend that long before livestock roamed Nilpena, this marginal country was once underwater and was home to an array of ancient creatures that scientists today say mark the dawn of animal life.

For the past 26 years Ross together with his wife Jane have owned and operated the multi award winning Outback Pub, the Prairie Hotel, located in nearby Parachilna, population 3.

The Prairie Hotel provides an eco-luxury experience to guests offering a unique perspective of Outback life with a contemporary urban style. The one of a kind Prairie Hotel bar offers the opportunity for guests to meet outback characters & travelers from all over the world – you never know who you might meet in Parachilna!

In 2009, the Prairie hosted Sir David Attenborough and his crew on their visit to South Australia, during the filming of First Life Series. Sir David continues to talk firsthand about his experience in South Australia .

Ross Fargher's commitment to the protection of fossils and the significance of the Nilpena site has been recognised in stone, with the naming of a new fossil, *Nilpenia rossi*. Palaeontologists, with the support of the local community, are now working on a combined effort to gain World Heritage Listing for specific sites in the region.

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Nilpenia rossi - the fossil named after Ross. Photo courtesy of Mary Droser

To learn more:

Read more about Nilpenia rossi in Droser, M. L., Gehling, J. G., Dzaugis, M. E., Kennedy, M. J., Rice, D., & Allen, M. F. (2014). A new Ediacaran fossil with a novel sediment displacive life habit. Journal of Paleontology, 88(1), 145-151. http://www.bioone.org/doi/full/10.1666/12-158

More on the locality being named a National Heritage Site can be found at can be found at: https://www.environment.gov.au/heritage/places/national/ediacara

More on Ediacaran fossils at the South Australian Museum

Ross with Bill Nye "the Science Guy." Photo courtesy of Amy Rust & Jane Fargher

CLUB CORNER: GAINESVILLE YOUTH FOSSIL CLUB

By Maggie Paxson

As a kid growing up in Gainesville, Florida, fossils were my weekends, after school activities, and special treats when I accomplished something in school. I spent a lot of time in the Gainesville creek system, exploring primarily Beville Heights and Rattlesnake creeks looking for shark teeth, dugong bones, and the occasional rare carnivoran bone fragment. From my ever passionate about science English professor father, I learned to identify all of the local ray plates and crocodile teeth, and spent countless hours searching for fossils anywhere I could get into without getting in trouble. This early fascination with ancient dead things sparked a life-long interest in biology, and helped guide me to a career I love.

A Gainesville creek popular among fossil hunters.
Photo credit Maggie Paxson

As a high school science teacher, I have spent the past six years attempting to pass on this passion to the next generation. A few years ago, I heard about a research experience for teachers run by the Florida Museum of Natural History that brought middle and high school science educators to Panama to look for fossils in and around the Panama Canal during the recent canal expansion. Through meeting Dr. Bruce McFadden, I was once again inspired to use paleontology in my classes and try to pass along a love of all things dead, mineralized, and mysterious. Two years after traveling to Panama, I find myself with a renewed love of paleontology, multiple lessons that incorporate fossils (both real and 3D printed), and a cohort of fellow educators who share my interest and are eager to collaborate.

It was from one of these teacher research experiences that the Gainesville Youth Fossil Club was born. After a week in the high desert of New Mexico, Leigh Larsen of Buchholz High School and I found ourselves reminiscing on our various field experiences and contemplating how incredibly valuable these opportunities would be for our students. In a field that's bogged down with state mandated testing, challenging graduation requirements, and a lack of student engagement, a youth fossil club seemed like a perfect way to introduce students to a charismatic field that could inspire a further love of science and other STEM fields.

The goal of the Gainesville Youth Fossil Club is twofold: One, we seek to engage students in a way that is accessible to diverse learning styles. Research consistently shows that when given the opportunity to do science as it done by professionals, students are able to better grasp science content, are more likely to retain information, and become more naturally curious about the subject they are studying. We wanted to give students a chance to engage with science content in a unique way; already my after school fossil club has turned into a bi-monthly class on evolution, competition, ecology, and comparative anatomy. By doing simple activities like searching through creek media for micro fossils and shark teeth, students are able to collect artifacts of the ancient past and further their understanding of paleoecology and evolutionary change over time all while kinesthetically interacting with real science tools.

Second, we wanted to showcase STEM careers and fields in a way that made students feel like they could achieve eventual degrees and jobs in the field. Too often, scientists are portrayed as old, white, men, and many of our students view careers in science and engineering as "not for them." By introducing our students to diverse role models and demonstrating that paleontology (and for that matter all science) can be done by anyone, we hope to encourage a group of kids who otherwise might not pursue science related fields.

Though the Gainesville Youth Fossil Club is still in its infancy, our aspirations for the group are large. Already we have founded sister chapters at Gainesville High School, where I teach, and at Buchholz High School, also in Gainesville. We have been in contact with several other area teachers who are considering starting up their own chapters at their respective institutions.

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Fossils recently collected by members of the Gainesville Youth Fossil Club. Photo credit Maggie Paxson.

Gainesville has such rich paleontological resources and a community of scientists, educators, and amateur fossil collectors who are all enthusiastic about sharing the love of extinct organisms with kids. We are currently working on setting up our first collecting trip to the same creek I frequented as a kid, and are so incredibly excited to pass the love of fossils on to the next generation! As our club grows, we hope to see more area schools involved in the project, including younger students and middle school kids who research shows are at a key age for remaining engaged in science curricula. This year, we plan to teach our students the basics of fossil collection and preparation, visit the Florida Museum of Natural History, and link our local findings with geologic time and a deeper understanding of how organisms evolve and change.

Our club might yet be small, but already other teachers have shared anecdotes of students proudly sharing their finds during a drama rehearsal or in math class, and a parent at our recent back to school night happily relayed the enthusiasm with which her ninth grade son recited Megalodon facts at the dinner table one night after fossil club. Through paleontology, we hope to engage a group of students who otherwise might not remain interested in science, and cannot wait to see where this youth fossil club takes us next!

For more information on the Gainesville Youth Fossil Club, follow us on Twitter @ GNVYouthFossils or on Facebook @GNVYouthFossilClub, or contact Maggie Paxson at paxsonma@gm.sbac.edu

Maggie Paxson

FEATURED FOSSIL: RARE EXTINCT LAND MAMMAL FROM BELGRADE, NORTH CAROLINA

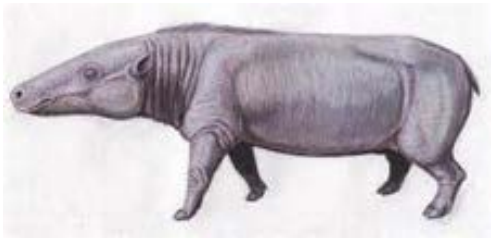
By Bruce J. MacFadden

Photo credit Emily Mason

Many of us have had the wonderful opportunity to collect fossils from the Belgrade Quarry, located in eastern North Carolina. This quarry preserves an interesting sequence of mostly Cenozoic marine vertebrate and invertebrate fossils. Although many of the fossils are common, for example the ubiquitous shark teeth and giant oysters, sometimes rare fossils are discovered that are scientifically important. Such is the case with the two associated upper teeth of an anthracothere, an extinct group of mammals that had previously been unknown not just to Belgrade, but to the entire eastern U.S. This fossil was collected by nine-year-old Aidyn Byrd (see photo to the right) from sediment piles excavated during the mining operations at Belgrade. Bradley Dixon (see photo), a resident of eastern North Carolina, was in the field with Aidyn at Belgrade and realized the significance of this find. He then brought it to our attention thanks to Linda McCall, President of the NC Fossil Club. Bradley notes that "we are excited to have discovered such a rare set of molars!"

Right upper tooth, probably the 1st molar, and fragment of adjacent tooth, of the anthracothere collected from the Belgrade Quarry, North Carolina. The white scale bar (lower right) represents 5 mm (Jeanette Pirlo photo). 3D images of this fossil and others from Belgrade are available at: https://www.myfossil.org/ac-media/

The fossil depicted here represents an anthracothere, an extinct group of even-toed hoofed mammals (Artiodactyla) related to modern pigs, cattle, deer, sheep, and bison. Anthracotheres are immigrants from Eurasia that invaded North America during the Eocene. This fossil is still being studied to determine its scientific name and interrelationships, but it certainly is one of the youngest (late surviving) members of this group found in North America. It almost certainly came from a distinct unit called the "Belgrade Formation" (Ward, Lawrence, & Blackwelder, 1978) which has otherwise yielded other very rare land mammals, such as extinct horses and rhinos. The structure of the tooth, with its short crown height and complex chewing surface, indicates that it was probably primarily a leaf-eater (browser), and not a grazer like modern bison, for example. Anthracotheres are also interesting because recent evidence indicates that they are related to hippos and ancestral whales.



Anthracothere reconstruction (image source: www.livescience.com).

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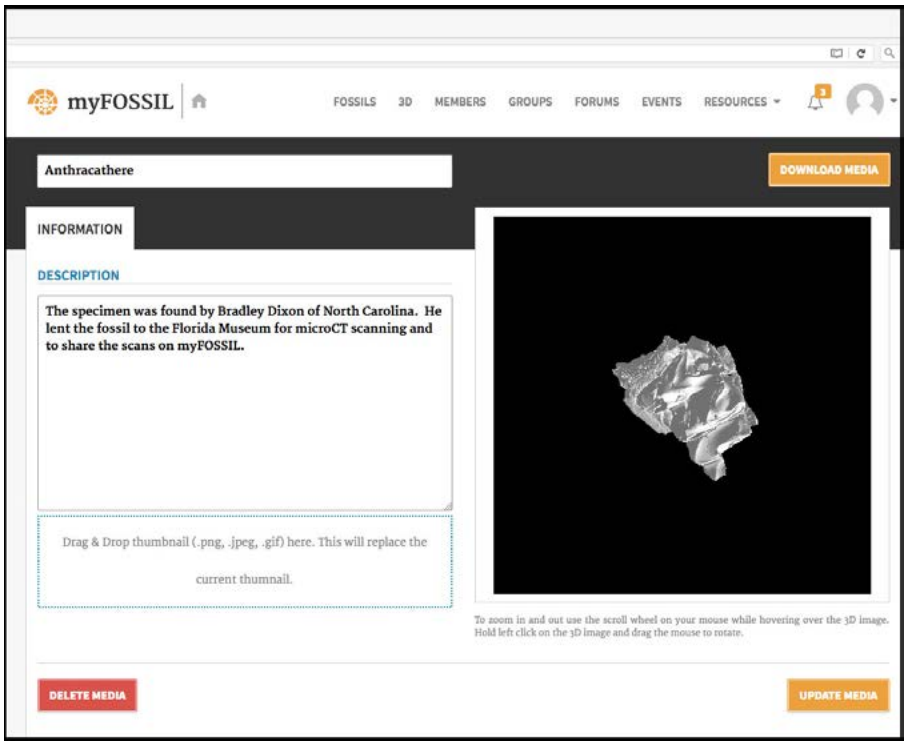
We borrowed this specimen and our preparator Jason Bourque put it back together. Jeanette Pirlo then scanned the fossil at the micro CT scanning facility at the University of Florida. This resulted in a high-resolution digital file that can be displayed on the computer, or even replicated on a 3D printer. The original fossil will soon be safely returned to the owner, with our thanks and appreciation for sharing this fossil for scientific research and study.



We are also pleased to report that the 3D fossil gallery is “open for business” on myFOSSIL.org. 3D images can be uploaded (although see the limits to file size) and viewed. This site is primarily intended as a place where 3D images of your fossils (not images of catalogued specimens in research collections) can be archived as digital files. The link to the myFOSSIL 3D gallery is: https://www.myfossil.org/ac-media/

References

Ward, L., D. R. Lawrence, and B. W. Blackwelder. 1978. Stratigraphic revision of the middle Eocene, Oligocene, and Lower Miocene—Atlantic Coastal Plain of North Carolina. Geological Survey Bulletin 1457-F. Available for free on-line at: https://pubs.usgs.gov/bul/1457f/report.pdf

RESEARCH: INTRODUCING PALEOBOTANY GRADUATE STUDENT MACKENZIE SMITH

Greetings FOSSIL friends,

My name is MacKenzie Smith. I have just started my paleobotany PhD program here at the University of Florida and I am one of your new social media team members!

I was OreGrown (born and raised in Oregon) and have been collecting fossils since I was 6. Prior to my undergrad, I helped designate the Metasequoia as the state fossil, became a member and volunteered with the North America Research Group and helped refine state collecting statutes. During my undergrad at Oregon State University I majored in zoology, minored in geology and described a new species of fossil fern, *Osmundacaulis whittlesii*, from the Cretaceous Haida Formation (ca. 100 Ma) of British Columbia. Additionally, I was the learning assistant for OSU's paleobiology class my junior and senior years which included helping preserve and document the mammoth, bison and other Pleistocene bones found under Reser Stadium. Upon graduation, I volunteered at the Oregon Museum of Science and Industry as a vertebrate fossil preparator and interpreter and worked at OSU by managing the fossil brachiopod collection of the late Dr. Art Boucot.

Currently at UF I am working with my advisor, Stephen Manchester, on describing what we think is a new species of butternut from the mid-Miocene of Washington. Butternuts are related to walnuts and today live in eastern Asia and northeastern North America but have a paleontological distribution that included Europe and western North America. My thesis will be on an undescribed locality of the Eocene aged Clarno Formation of central Oregon. This formation is known for its exceptional preservation of fruits, seeds and mammals in various members. It is also one of the main formations preserved within the John Day Fossil Beds National Monument though the locality I am focusing on is on private property. The scope of my project will be to 1. Provide a date for this locality, 2. Identify the plants and fish preserved there, and 3. Put this locality in a regional and temporal context. It should be a lot of fun!

MacKenzie Smith near Newport, Oregon with *Anadara devincta* (clam) fossils of the mid-Miocene Astoria Formation

In terms of FOSSIL, I am in charge of the Saturday (#SocietySaturday & #ScienceSaturday) and Monday (#MammalMonday & #MuseumMonday) posts. I am also running two forums on myFOSSIL.org: one on paleobotany and the other on Pacific Northwest paleontology. Make sure to check them out! I will also be spearheading a project on revamping our YouTube channel by starting a series on how to collect fossils aimed primarily for people interested in fossils, but who have never collected. We hope that this series will show people where to go, what to look for and how to collect both legally and in a way that is useful for researchers. Additionally, we hope to provide links to paleontological resources in each state including museums, societies, parks and managed sites. So far we do not have a schedule but we hope to release our pilot video before the end of October.

I'm so happy to be down here at the University of Florida and working on FOSSIL's social media team! If you have any questions or suggestions please feel free to email me at mackenziesmith@ufl.edu. See you finding fossils in the field!

MacKenzie Smith

To learn more:

Read an interview with MacKenzie here.

Smith, M. A., Rothwell, G. W., & Stockey, R. A. (2015). Mesozoic diversity of Osmundaceae: Osmundacaulis whittlesii sp. nov. in the Early Cretaceous of Western Canada. International Journal of Plant Sciences, 176(3), 245-258. http://www.journals.uchicago.edu/doi/abs/10.1086/679352

EDUCATION: FOSSILS4TEACHERS!

By Danielle Brennan

For the past several years, I have been teaching fossils to students ranging from 5th graders all the way up to seniors in high school. Every year, I teach science and I tailor my fossil presentation to meet the standards of the specific science course and age I am working with. However, I have never formally developed a thorough lesson plan on fossils or been given the opportunity to collaborate with other teachers and fossils experts until the 2017 FOSSILs 4 Teachers Professional Development (PD) that was put on by the FOSSIL Project and the Florida Museum of Natural History (FLMNH) in August of 2017. This PD was by far one of the best workshops I have had the opportunity to attend.

Day 1: FOSSIL and FLMNH Paleontology staff and fossil hunters from all over the U.S. laid out an array of fossils for teachers to browse through. The goal was for the teachers to develop lesson plans around the fossils they could choose and take home to use in their classroom. For many, this was an overwhelming experience, with most teachers having very little fossil knowledge and no direction of where to begin. Then, teachers were given the opportunity to go around and talk to the fossils hunters and staff about the fossils they had brought. This opened the door to communication and knowledge exchange. Throughout the day, we would have key speakers share knowledge of how they had used fossils to educate or just provide the basics of what a fossil was and how they form. Towards the end of the day, teachers and fossil hunters were given the opportunity to go on a behind the scenes tour of the museum's paleontology collections. We got to see how fossils were prepped and stored. It was amazing to see just how many fossils the Florida Museum has. By the end of day one, most teachers had a general idea of what they were going to develop a lesson on.

Danielle Brennan sorts fossils with other participants during the FOSSILs4Teachers professional development organized by the FOSSIL Project and the Florida Museum. Photo credit: Jeff Gage, Florida Museum

Day 2: What an exciting day! Teachers were able to go around the room and begin gathering fossils they wanted to use for developing their lesson and in their classroom. Around lunchtime, the group participated in a matrix sorting activity. Matrix was brought in from the Lee Creek Mines in Aurora, North Carolina and from a location in lower Alabama. The matrix from Aurora was so different from the matrix in Alabama. Both matrices were rich with fossils, but there was much more of a variety of fossils in the Aurora matrix. Many of these fossils were smaller in size than those from Alabama, but what an awesome opportunity to compare fossils from one location to the other! At the end of this day, teachers had a solid idea of what the topic of their lesson plan was and how they were incorporating the use of fossils. The actual writing up of the lesson plan began.

Day3: We listened to talks on how to make and use field notebooks, fossil impacts on students, and diversity in the field of paleontology. The rest of the day was devoted to finishing the lesson planning and creating a poster. This was

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much needed time to sit down and get our official thoughts written down and finalize our lesson plans. This took all day and then some.

Final Day: We presented our lesson plans in the form of a poster. I thought this was a really neat way to share what we had developed. There were so many amazing lesson plans developed--many of which I plan to use in my classroom as a unit for my marine science classroom this year. I am hoping to continue to work with the Vertebrate Paleontology department at the Florida Museum and the FOSSIL Project to put these lessons into an easy to follow format for all teachers to access.

I would like to thank the University of Florida, the Paleontology Department at the Florida Museum of Natural History, and most importantly, the FOSSIL Project, for continuing to educate teachers on fossils. Thank you for bringing amateur and professional paleontologists together to work with teachers to develop lesson plans for the classroom. This was a fabulous learning experience.

To learn more:

Find Danielle's lesson and others at https://www.myfossil.org/category/k-12/

SURVEY OF BEARS EARS NATIONAL MONUMENT

Editor's note: ReBecca Hunt-Foster, District Paleontologist for the Canyon Country District of the BLM in Southeastern Utah, encouraged interns and other scientists working with her in the summer of 2017 to write articles for us. This is one of three articles we received. We thank ReBecca and the authors for their contributions and encourage all scientists and students to consider the FOSSIL Project as an outreach opportunity.

By M. Allison Stegner, Post-doctoral Research Scientist

Allison Stegner assisting with the excavation of Dytrophaeus, San Juan County, Utah. Photo credit: ReBecca Hunt-Foster, 2016

Southeastern Utah has been an internationally important region for paleontology as far back as the 1800's, and the designation of Bears Ears National Monument (BENM) is an opportunity to reflect on the unparalleled fossil resources in this area, and to devote new efforts to understanding and protecting those resources. I have studied Quaternary vertebrate sites in the area now known as BENM for half a decade. This June, I began work as an intern paleontological resource assistant for the Bureau of Land Management, conducting surveys of regions in BENM that are characterized by outcrops which are known generally to be fossiliferous, but which have received little research attention to date. By and large, these are the most remote corners of BENM where fossil prospecting requires long drives on bad roads, and miles (both horizontal and vertical) of hiking and clambering over boulders, scree slopes, and arroyos.

Sedimentary geology, uplift, and erosion have converged in southeastern Utah to create a landscape in which exposed outcrop is progressively younger as you proceed eastward from the Colorado River toward the Colorado-Utah border. In the Permian Cutler outcrops on the western side of BENM, we have the potential to find burrows, petrified wood, trackways, and vertebrate bone from various fishes, sharks, and amphibians. While the southern corner of BENM is dotted with Triassic Chinle, further north, Chinle is one of the predominant outcrops: the iconic Wingate cliffs along the Indian Creek corridor are aproned by substantial Chinle slopes. In the Chinle of BENM we find amphibians, dinosaurs, phytosaurs, traces from aquatic life, and delicate plant fossils. We find bivalves, as well as dinosaur bones and tracks in Jurassic Navajo, Kayenta and Morrison formations of BENM. The regions we know best are, not surprisingly, closest to highway 191, that extends from Crescent Junction (east of Green River, Utah), down to the Arizona border, and near Highway 95, which connects Blanding and Hite by way of the Comb Ridge. These areas produce new fossils and new localities every year. However, because these regions have been the focus of past and on-going research, my surveys this summer have concentrated on three regions that have not been well-studied: the Permian (Cutler) and Triassic (Moenkopi and Chinle) outcrops south of the Dark Canyon/north of Natural Bridges National Park; the Chinle outcrop near Cathedral Butte, west of the Abajos and east of the Canyonlands NP Needles District; and the Cutler and Chinle outcrops that skirt Beef Basin and the north edge of the Dark Canyon Plateau.

I have also been scouting for Quaternary sites collected by packrats. The taphonomy of these sites is a little unusual: mammalian and avian carnivores eat small vertebrates, and identifiable bone fragments from those meals are deposited into carnivore scats and pellets. Packrats then gather these scats and pellets in their nests, and over time the nests are buried by wind-blown sand. Certain Paleozoic and Mesozoic outcrops are prime real estate for packrats and for the preservation of their middens. In BENM, the Slickrock member of the Entrada (Jurassic), Navajo Sandstone (Jurassic), and the White Rim and Cedar Mesa members of the Cutler formation (Permian) weather in a way that often creates large alcoves, caves, or overhangs where packrats like to live, where mammalian carnivores and avian predators like to roost, and where eolian deposition is rapid. These are the kinds of sites where middens accumulate lots of bone and where they are protected for thousands of years. So BENM is an eccentric mix of productive Quaternary deposits in addition to the renowned Permian through Jurassic outcrops.

There are three primary reasons that the BLM, on our—the public's—behalf, is invested in detailed surveys of the fossil resources in BENM: protection and mitigation, public engagement through outreach, and new research. Protection of fossil resources is explicitly mandated by several laws, the Paleontological Resource Protection Act in

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particular. Needless to say, BLM can more effectively and efficiently protect valuable fossil sites when they are known beforehand. Illegal collection of vertebrate bone and other fossils, like petrified wood, on federal lands is a pervasive issue (n.b., it is always illegal to collect vertebrate bone and fossil eggs from public lands, but invertebrate and plant fossils can be collected for personal use and enjoyment according to certain generous regulations which can be found at https://www.blm.gov/programs/cultural-heritage-and-paleontology/paleontology/rules-for-casual-collection). Casual damage to fossils is also a non-negligible issue; for example, walking, driving, or riding over fossil-bearing outcrop can easily damage exposed specimens and tracks. Yet another aspect of protection and mitigation is that, by knowing where there are fossil localities, the BLM can anticipate and redirect future development—like new roads, campgrounds, and permitting for other uses, from stock ponds to well pads—away from fossils.

Triassic petrified wood in Bears Ears National Monument. Photo credit: Allison Stegner, 2017

Public engagement is a major component of BLM paleontology. In the Canyon Country District, there are 7 public fossil sites, like the Mill Canyon Tracksite, Mill Canyon Bone Trail, Poison Spider Tracksite, etc. Some of these sites have been known for years, while others have only recently been discovered. For example, the Mill Canyon Tracksite was found by in 2009 by a local Moab resident, then excavated and developed into an interpretive site that opened in 2016. Yet another trackway south of Moab is now being used as a site where high school and college students can learn paleontology methods by actually cleaning and photographing tracks themselves.

In southeastern Utah, the BLM also brings paleo on public lands to the community, through visits to schools, programs for kids at the public libraries and extracurricular programs, and events like the Moab Festival of Science and National Fossil Day. In 2016, we organized several science career days for high schools in Grand and San Juan Counties, highlighting geoscience careers in rural communities. New surveys of BENM relate directly to public outreach because surveys may identify new sites that are appropriate as public interpretive sites, or for teaching. In addition, being able to describe to local communities the wealth of fossils, especially newly-discovered fossils, is a way to foster appreciation and interest in public lands that goes beyond politics: people of all ages and backgrounds are excited by fossils.

Finally, surveys reveal new research opportunities. Where localities are known but unexcavated, researchers from museums and universities are partnering with BLM to collect and study specimens (e.g. the Dystrophaeus Quarry: read more at https://www.facebook.com/Dystrophaeus). In my own research on packrat middens in BENM, I use the fossilized bone and plant material to answer questions about biodiversity conservation today. Middens provide a window into the past that allows me to quantify and qualify the ways in which the modern fauna of BENM is similar, and different, from the fauna that persisted here for the last 10,000 years. New localities—whether they were deposited millions of years ago or thousands of years ago—tell us about the history of life and help us to better anticipate our future: anticipating and planning for the future is, of course, central to land management.

To learn more:

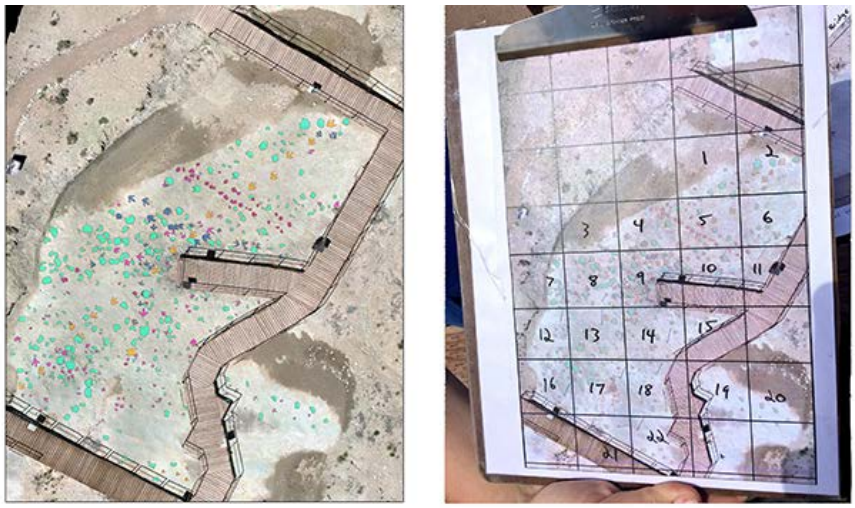
Allison wrote a blog for the Society of Vertebrate Paleontology that goes into more detail about Quaternary fossils in BENM: http://vertpaleo.org/Society-News/Blog/Old-Bones-SVP-s-Blog/July-2017-(1)/Packrat-Paleo-in-Bears-Ears-National-Monument.aspx

Barnosky, A. D., Hadly, E. A., Gonzalez, P., Head, J., Polly, P. D., Lawing, A. M., ... & Blois, J. (2017). Merging paleobiology with conservation biology to guide the future of terrestrial ecosystems. Science, 355(6325), eaah4787. http://science.sciencemag.org/content/355/6325/eaah4787

DIGITIZING DINOSAUR TRACKS

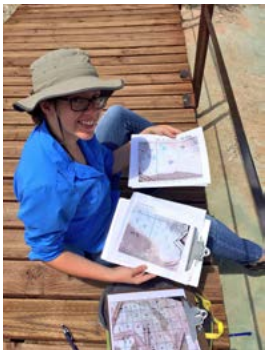
By Danielle Ward

My name is Danielle Ward, and I am a recent graduate from the University of Utah with a Master of Science in Geography. Over the course of this past summer, I've had the opportunity to work at the BLM Moab Field Office as a GIS intern through the Geological Society of America® GeoCorps and the BLM Direct Hire Authority Programs. My main project focused on the Mill Canyon Dinosaur Tracksite, located northeast of Arches National Park in Southeastern Utah. Discovered in 2009, the tracksite preserves over two hundred dinosaur tracks from six different kinds of dinosaur. The site opened to the public in 2016, however at the time of my arrival a map of the site, and all the tracks it contained, had yet to be created. Therefore, my goal for the summer was to digitize all the tracks and then create a map of the site that could be used to educate the public.



The map on the left is the Mill Canyon Tracksite with each different track color-coded by the track maker who created the tracks. The map on the right shows the grid checked to verify the identity of each track at the site.

To digitize the tracks, I used photogrammetric data taken by Neffra Matthews, a geographer working at the BLM national operations center, who collected in the data in 2015. Tracks were then digitized in Esri ArcMap using this data as a guide. Additionally, weekly trips out to the tracksite with BLM district paleontologist ReBecca Hunt-Foster were made in order to verify the accuracy of the map. The final product is a map containing every track in at the Mill Canyon Dinosaur Tracksite, which will go on display in spring 2018. Additionally, an interactive online version of the map will be hopefully be available to the public by the end of 2017.



Danielle Ward

Acknowledgements: This project would not have been possible without the Geological Society of America® GeoCorps Program and the Bureau of Land Management. The GeoCorps Program was developed by the National Park Service Geologic Resources Division (GRD) in 1996. The BLM partners with the Geological Society of America (GSA) to administer the Geocorps Program. Thanks to Moab BLM Paleontologist ReBecca Hunt-Foster for her guidance and help. Photogrammetry data was provided by Neffra Matthews.

JURASSIC WALKS AND TALKS

by Nathan Ong

My name is Nathan Ong, and I'm a third year Geoscience student at the University of Utah. I spent this summer working for the BLM Moab Field Office as their Paleontology Public Outreach intern. My job consisted primarily of running the BLM's Jurassic Walks and Talks Program. The program consists of free tours of five local paleontological sites (the walks) as well as free presentations at the Moab Information center (the talks).

Every weekend morning, the public would meet me at the site, wherein I would give them a comprehensive tour of each site's paleontology, geology, and history. There were five sites at which I worked: Poison Spider Dinosaur Tracksite, Mill Canyon Bone Trail, Mill Canyon Dinosaur Tracksite, Dinosaur Stomping Grounds, and Copper Ridge Dinosaur Tracksite. Each site offers a unique experience to the visitor, and several locals even made it their goal to accompany me on a tour of all five sites. This was my favorite part of the job because it allowed me show folks where fossils are found, and provide them with the geologic context that a map in a museum just doesn't capture.

Nathan Ong gives tours of the Mill Canyon Tracksite to visitors from the Moab, Utah, area.

In addition to these tours, I also gave evening talks at the Moab Information Center. For the talks, I filled a table with real fossils and gave visitors a short show-and-tell presentation about Moab region and its fossil finds. Many folks had questions about the history and science of the places that they visited, so the talks also consisted of a Q & A section where they could ask me about the geology and paleontology of the area. For many people, it was the first time that they could handle real fossils and chat with a professional in the field.

The walks and talks ran Friday-Sunday, but I also spent Mondays and Tuesdays in the office. By default, I spent my two weekly office days designing new activities and advertising materials for the program. This was definitely the more mundane part of my job, but it offered me a chance to design ads that needed to include the necessary information, while still being visually appealing. I also got the chance develop new educational activities for the program's evening presentations, which forced me to think critically about the lessons that I wanted to teach and how they could best be explained in a fun and engaging manner. Many of my office days were also spent doing a variety of oddball adventures that came up during the summer. For example, I got the chance to work at four active paleontological sites, and contrast how all four institutions ran their particular quarry. As a student who is looking to apply to grad school in the coming year, these experiences gave me some much needed perspective on the field as a whole.

Nathan shows visitors a set of ankylosaur tracks at the Mill Canyon Dinosaur Tracksite.

Overall, flexibility was a crucial requirement for this job. Although my main focus was the Jurassic Walks and Talks program, it seems like every day was a bit different from the last. I'd be explaining the chemistry of rock one day and repelling to a sauropod quarry the next. No matter what I was doing, it was sure to be a great time!

UPCOMING EVENTS

October 8, 2017 @ 8:00 am – October 14, 2017 @ 5:00 pm
Earth Science Week

October 14, 2017 @ 2:00 pm - 4:00 pm
Fossil Day at the Museum of Northern Arizona, Flagstaff, AZ

October 17, 2017 @ 8:30 am – 4:30 pm
Fossils of the Black Belt Field Workshop for K-12 Teachers, University of West Alabama, Livingston, AL

October 19, 2017 @ 7:00 pm – 8:00 pm EST
FOSSIL Roadshow Webinar 2: Pennsylvanian Fossils of North Texas (online)

October 21, 2017
Fall Fossil Festival, Waco, TX

October 22, 2017 @ 8:00 am - October 25, 2017 @ 5:00 pm
Geological Society of America annual national meeting, Seattle, WA

October 28, 2017 @ 8:00 am – October 29, 2017 @ 5:00 pm
Florida Fossil Hunters Fossil Fair, Orlando, FL

November 3, 2017 @ 4:30 pm - 6:00 pm
Paleontological Society Distinguished Speaker-Dr. Jonathan Hendricks, Gainesville, FL

November 4, 2017 @ 10:00 am - 3:00 pm
National Fossil Day at the Florida Museum of Natural History, Gainesville, FL

November 4, 2017 @ 1:00 pm - 4:00 pm
Curiosity Day Fossil Workshop at the Pensacola MESS Hall

November 4, 2017 @ 9:00 am – November 5, 2017@ 5:00 pm
Paleontological Society of Austin Fossil Fest, Austin, TX

November 5, 2017 @ 10:00 am - 4:00 pm
Cincinatti Museum Center Fossil Fest, Cincinatti, OH

November 8, 2017 @ 10:00 am - 2:30 pm
Homeschool Day at the Sam Noble Oklahoma Museum of Natural History, Norman, OK

November 15, 2017 @ 7:00 pm – 8:00 pm EST
FOSSIL Roadshow Webinar 3

December 13, 2017 @ 7:00 pm – 8:00 pm EST
FOSSIL Roadshow Webinar 4

More events

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