myFOSSIL

News from the FOSSIL Project

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FOSSIL Project Updates

by Bruce MacFadden & Eleanor Gardner

Recent Activities

We have been working with the Dry Dredgers (and, in particular Jack Kallmeyer), Cincinnati Museum Center, and Paleontological Society to plan the 2016 Cincinnati Mini Conference to be held on June 3 - 5, with an optional trip to Big Bone Lick State Park in Kentucky on June 2. We are pleased to announce that the Paleontological Society has become a meeting sponsor. They will present a town hall-style discussion about amateurs and the PS. Thanks to support from the PS, the FOSSIL Project will be providing scholarships for travel to the meeting for five students and five K-12 teachers interested in paleontology, see http://community.myfossil.org/cincinnati-2016-mini-conference/

We are continuing to work with partner, AtmosphereApps, to improve the myFOSSIL community website, http://community.myfossil.org. This includes a photo gallery and upgrades to navigation. The web site is growing slowly but surely in the right direction. We now have more than 160 members, with more joining every week. We are also pleased to announce that the Birmingham Paleontological Society has officially joined the FOSSIL network.

Kent Crippen represented FOSSIL at the 2016 NSF (National Science Foundation) meeting for all projects funded in the AISL (Advancing Informal STEM Learning program) with a poster about the FOSSIL project. Sessions at the meeting included the latest research on learning in informal settings, as well as strategies for supporting citizen science and best practices for diversifying participation through outreach. The research by the FOSSIL project on using social media and activities like the paleoblitz and mini-conferences to support our growing community was well received and generated much interest among meeting participants.

Ronny Leder released a new tutorial on myFOSSIL (digitizing your collection). Read more on page 21.

FOSSIL sponsored a talk by paleobotanist Sarah Allen of FLMNH at the February meeting of the Florida Fossil Hunters club. Sarah gave a presentation on her work on Hell Creek plant fossils at the Blue Rim site in Wyoming. The club members reported that Sarah was a wonderful speaker and they highly encourage everybody to check out her website to learn more: http://www.flmnh.ufl.edu/museum-voices/bluerim/

On March 12, Victor Perez and Betty Dunckel participated in the *Can You Dig It?* Program at the Florida Museum of Natural History. Presented by the University

Inside this issue:

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continued from page 1

of Florida Department of Geological Sciences and Florida Museum in collaboration with the Gainesville Gem and Mineral Society, this annual event promotes the science of geology and paleontology. Over 2100 visitors of all ages participated in the program. This year the FOSSIL Project partnered with the Florida Museum's Vertebrate Paleontology range to create a fossil identification game. The game engaged visitors in identifying fragmentary fossils by matching them with the complete specimens we had on display. This game was especially popular because we let the visitors keep the fossil fragment after they'd successfully identified it.

Victor Perez helping young friends ID fossils at *Can You Dig It?* Photo © Kristen Grace

Also on March 12, but in Watsonville, California, Bruce was involved in a local fossil display table at the Santa Cruz County Science and Engineering Fair. The table was a partnership with the nearby Seacliff Cliff State Beach (Christina Cecchettini) and Santa Cruz Museum of Natural History (Felicia Van Stolk), and we also were fortunate to have Jeanette Pirlo, a UCSC undergraduate student, helping with the exhibit and interacting with the public. We displayed vertebrate and invertebrate fossils collected from the local beaches and environs and discussed these with the families that attended the fair. Over the four hours we reached a few hundred individuals as they stopped by to view and discuss the fossils.

Christina Cecchettini, Bruce MacFadden, Felicia Van Stolk, and Jeanette Pirlo at the Santa Cruz County Science and Engineering Fair

March 18 - 20, 13 members from fossil clubs across the south participated in our first PaleoBlitz organized by Victor Perez and Ronny Leder. Blitz participants spend two days cataloging specimens at the Florida Museum of Natural History, visiting Gordon Hubbell's collection, and collecting at a private creek site in Florida. Read more about the inaugural Blitz on page 22.

On March 31-April 1, we participated in the GSA (Geological Society of America) Southeastern Section Meeting held in Columbia, South Carolina. The FOSSIL project hosted a theme session on "Synergistic Paleontology" designed to promote collaborations between amateurs and professionals as well as highlight the contributions of amateurs. Eighteen talks and six posters were presented in this symposium, with a mix of about 30 to 45 students, amateurs, and professionals in the audience, many of whom had not previously heard about the FOSSIL project.Interestingly, more than half of the presentations

continued from page 2

were made by amateurs.On the second day many of us attended another symposium describing new research advances about fossil vertebrates in the SE U.S. There was lots of time for informal discussion after the talks, as well as during the posters and related social events. We thank all of the folks in attendance for their participation and hope that we can sustain this level of activity and interest at future GSA meetings.

Cindy Lockner and Bonnie Cronin

George W. Powell, Jr.

List of upcoming events and contact information:

TBA—The FOSSIL project team plans to launch a webinar series of topics of interest to amateur and professional paleontologists. Webinars are on-line videoconferences typically presenting a topic by a leader and with real time participation from participants. There will be no charge to attend the seminars and you can pick and choose which ones you want to attend. We will be distributing an e-survey soon to gather community input and ideas.

TBA –A fossil preparation-focused PaleoBlitz is being planned for later this year. The first PaleoBlitz received a very positive response (and many applications), so we've decided to offer another one. Stay tuned for more information!

June 3 - 5, Cincinnati Mini-conference, see above.

September 23, Denver, CO, FOSSIL-sponsored short course to be held prior to the Geological Society of America Annual Meeting.

The FOSSIL Project plans to offer a half-day short course called "Facilitating effective STEM learning and public engagement in paleontology" prior to national GSA 2016. This short course is intended for professionals (including graduate students), amateurs, and K-12 teachers. We will explore best practices for engaging both formal and informal STEM learners with paleontological data. Topics to be covered include: (1) contributing to and benefiting from digitization efforts of fossil collections; (2) incorporating fossils into the design of curricula that satisfy the Next Generation Science Standards; (3) fostering engagement and learning by amateurs; and (4) using social media to mobilize the community. Laptops are required and digital cameras are recommended. Contact fossil@flmnh.ufl.edu for more details as they come together. Please also see the GSA 2016 website: http://community.geosociety.org/gsa2016/home

March 19 – 21, 2017, GSA sectional meeting (combined northeast and north-central) in Pittsburgh, PA. Based on the success of the 2016 GSA Southeastern Section Meeting, we are considering hosting another FOSSIL symposium focused on amateur and professional collaborations. Although anyone interested is welcome, we are hoping to reach out and engage our FOSSIL partners in this region. Preliminary information at http://www.geosociety.org/sections/

FEATURED PROFESSIONAL: HEATHER MOFFAT

Editor's Note: This issue we feature Heather Moffat, Executive Director of the Santa Cruz Museum of Natural History

When did you first become interested in paleontology? Were you a fan as a young child?

I first became fascinated with paleontology as a college freshman. When I started college, I wanted to be a kindergarten teacher. My first year I took a dinosaurs and extinct mammals class figuring it would make me very popular with my future kindergarten students. What I didn't anticipate was what it would spark in me. After taking that course, I changed majors to geology/paleontology and grabbed onto every field experience I had the opportunity to have. Before college, most of my science experiences had been classroom-based (textbook-oriented) with very few experiments or interactions with nature. My geology and paleontology courses opened a whole new and exciting world to me: they were my first exposure to field work and to the realization that science was dynamic and ever-refining. It was so exciting to learn to read fossils/rocks and to know that I could contribute to our understanding of the history of life.

Heather as an undergraduate at the Museum of the Rockies

Can you describe the path that led you to your current position as the Executive Director of the Santa Cruz Museum of Natural History?

After college, I completed two master's degrees which focused on paleontology and sedimentology and was on my third year of a Ph.D. when I realized that, while I liked research, I most enjoyed the teaching part of my days (as a teaching assistant in science lab courses). I also recognized that I missed working with younger students. Around that time, a position opened for an educator at the Raymond M. Alf Museum of Paleontology. It seemed like it would be a great fit. The museum had very few established educational programs, and I was given the opportunity to create and implement a wide variety of programs for visitors of all ages. It was a job that enabled me to combine my science expertise with my love of teaching in order to spark an interest in paleontology in audiences of all types. I grew the public programming offerings and became the museum's first Director of Education.

Following my six years at the Alf Museum, I became the Director of Education at the Santa Barbara Museum of Natural History. This was an exciting opportunity for me to lead a team and to create and implement educational programs connecting a much larger audience to a broader range of science topics. Within my first year there, my position expanded to also include overseeing the programs at the museum's sister institution, the Sea Center, and then it grew again to include responsibility for all exhibits at both facilities. As Director of Education and Exhibits, I realigned the museum's guiding principles to focus on anchoring their educational programs in nature and led the effort to create experiential learning spaces in their indoor and outdoor areas. It was a wonderful eight years of connecting the community to the natural world through exciting exhibits and a wide range of engaging programs.

In February 2015, I was hired to lead the Santa Cruz Museum of Natural History. I feel as though all of the experiences I gained along the way – as a researcher and collector, educator and exhibit developer, fundraiser, manager and community partner - have prepared me for this position. I deeply believe in our mission so it has been an honor to have the responsibility of crafting the vision which enables our Museum to connect people with nature and inspire stewardship of the natural world.

continued from page 5

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

One of my favorite parts of my job is that there is no "typical" day. My schedule and focus changes relative to the current and upcoming projects we have at the Museum. As the director, I spend a large part of my time in meetings. I regularly meet with my staff to ensure their projects are progressing well. I also spend a significant amount of time meeting with various community leaders about collaborations and with current and prospective donors to discuss the Museum's mission and specific programs that they may wish to support. We are a small museum with limited staff so my day may also include working on a grant proposal, discussing tide pool animals with visitors at our live touch pools, or even rolling up my sleeves and repainting an outdated exhibit with other staff.

Do you have any advice for our readers (both fossil organization members and professionals) about effective ways to get children and teens interested in paleontology and collections?

What has worked best for me is to do what worked on me personally: to engage them in nature doing real field work. Hands-on opportunities which put the young person in the role of naturalist not only show them that science is a dynamic field with much to still discover, but that they are capable of making great observations, asking great questions - being a scientist. Similarly, first hand experiences with collections is the ideal way to introduce students to them. There is nothing like bringing young students into a collections room and letting them make "discoveries" with each drawer they open. Every object is unique and has a story to tell.

Heather today at the touch pool at the Santa Cruz Museum of Natural History

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

Amateurs have always played an important role in paleontology and their impact on museums is equally profound. Our museum was founded 110 years ago on the collection of a local amateur malacologist. She grew up along the cliffs of Santa Cruz, exploring the tide pools and the fossiliferous cliffs and collecting specimens throughout her life. Her interest and expertise on the region's natural history, particularly its mollusks, was renowned. By deeding her collection to the city, she established Santa Cruz's first museum so that others in the community could learn from her treasures. Her passion for studying and collecting specimens led to the founding of an institution which has inspired generations of Santa Cruzans to explore the unique natural history of our region.

"Amateurs have always played an important role in paleontology and their impact on museums is equally profound. Our museum was founded 110 years ago on the collection of a local amateur malacologist. She grew up along the cliffs of Santa Cruz, exploring the tide pools and the fossiliferous cliffs and collecting specimens throughout her life. Her interest and expertise on the region's natural history, particularly its mollusks, was renowned. By deeding her collection to the city, she established Santa Cruz's first museum so that others in the community could learn from her treasures." Heather Moffat

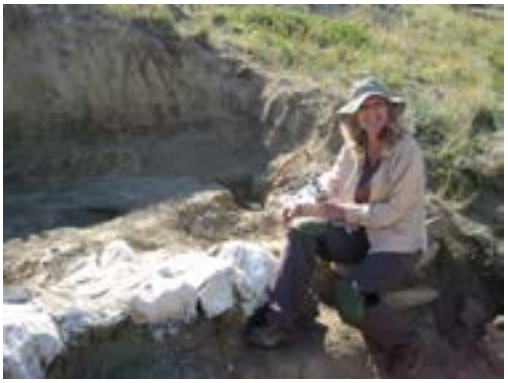
To learn more, visit http://www.santacrusmuseum.org/

AMATEUR SPOTLIGHT: CINDY LOCKNER

Editor's Note: This issue we highlight Cindy Lockner who serves on the governing boards of both the Florida Fossil Hunters and the Florida Paleontological Society, Inc.

Tell us a little bit about yourself.

Thank you for the opportunity to speak with you today. I consider myself a paleontology, geology, and outdoor enthusiast. I currently serve as a Board Member with the Florida Fossil Hunters (http://www.floridafossilhunters.com/) and the Florida Paleontological Society, Inc. (http://floridapaleosociety.com/) I assist in fossil preparation and restoration with The Academy of Natural History Preservation in Rockledge, Florida, and am a volunteer with the Two Medicine Dinosaur Center (http://www.tmdinosaurcenter.org/). One of the Oreodont skulls I recently prepared was placed in the De Soto National Memorial Jr. Paleontologist Educational Kit, which is part of the National Park Service "Junior Rangers Program." I am also a member of the Sierra Club, National Parks Conservation Association, and the National Wildlife Federation.



Cindy Lockner volunteering in Montana with the Two Medicine Dinosaur Center

How did you first discover your passion for fossils?

My parents once told me that from the time I could walk, I was digging in the dirt. When I was just ten years old, my class took a field trip to the National Museum of Natural History in Washington, D.C. Walking through the Fossil Hall was amazing, and I didn't want to leave. I was in awe at the size and beauty of the specimens. Having an admiration for animals and appreciation for nature, I couldn't wait for the time when I would be able to look for and find fossils on my own. Instead of buying lunch, I spent my money on a rock from the gift store. Although not a fossil, it would serve as a memento of the day, and be a source of inspiration – that someday I too would dig for fossils. I still have that rock in my collection today.

How long have you been collecting fossils?

I collected my first fossil (a trilobite), 21 years ago in Pennsylvania. Since moving to Florida, I joined the Florida Fossils Hunters and Florida Paleontological Society and started collecting with these wonderful groups on their field trips. I also enjoy collecting dinosaur fossils in Montana. While I love digging for and collecting fossils for my personal collection, I prefer to volunteer and collect fossils for museum collections, where they will be studied and displayed for others to enjoy.

Volunteering at Thomas Farm with David Steadman, Curator of Ornithology, FLorida Museum of Natural History

How do you identify/organize your fossils--which texts or other resources do you use, or which professional paleontologists do you consult?

Organizing my collection is a work in progress. For my Florida fossils, I use the book titled, *The Fossil Vertebrates of Florida*, and have consulted with Dr. Richard C. Hulbert, Jr., Collections Manager and Coordinator of Program of Vertebrate Paleontology at the Florida Museum of Natural History. For my dinosaur fossils, I consult with Dr. David Trexler, Paleontologist at the Two Medicine Dinosaur Center.

continued from page 7

When did you begin volunteering with the Florida Museum of Natural History? At which sites / on which projects have you worked?

I began volunteering with the Florida Museum of Natural History in 2011. I have worked at several sites, including Thomas Farm, Boca Ciega Millennium Park, and most recently, Montbrook. To date, I have discovered over 400 fossils as part of my volunteer efforts, which are cataloged in FLMNH's vertebrate collections database. I really enjoy volunteering, especially out in the field, and have logged in over 300 hours in total volunteer work with the Florida Museum of Natural History. It is a unique opportunity to dig alongside and learn from FLMNH faculty such as Dr. Hulbert and Dr. David Steadman, Curator of Ornithology. I recently wrote about my experience as a volunteer with FLMNH, in an article co-authored with Paul Roth, President of FPS, which was featured on the National Park Services' web site. I believe volunteering is an incredible educational experience which helps to strengthen museum collections and advance research. It provides amateurs, like me, an opportunity to discover, preserve, and protect fossils for future generations to see.

Volunteering at Montbrook, UF's most recent dig site, where she found an alligator skull

What is your collection like? How many specimens are in your collection?

I've never actually counted them, but my collection is broken down into three categories. The Florida specimens are mostly teeth from the Peace River, including multiple species of shark, ray, and gar fish. I also have a collection of dugong ribs, turtle shells, a Glyptodont scute, a whale inner ear bone, an alligator osteoderm, sting ray dermal plates, and a giant armadillo vertebra. In addition to the Florida fossils, I have a dinosaur collection including several Therapod teeth, coprolite, and several dinosaur skull replicas. My third collection is rocks, minerals, and petrified wood. I enjoy the fluorescent and phosphorescent minerals – they are a lot of fun to watch as they transform into different colors under ultraviolet light. Nature really is amazing.

Parahippus leonensis- right upper M1 or M2--Just one of Cindy's FLMNH contributions

What is your most favorite fossil that you discovered? Why?

My favorite Florida fossil that I have discovered as a FLMNH volunteer is a juvenile Gomphothere tusk. Finding a fossil is an incredible experience to me. I am the first and only person that has ever touched that animal. I think about its life, what it might have encountered, and wonder how it met its demise. My favorite personal fossil I have discovered in Montana was a Tyrannosaurus tooth with some of its root intact.

Please tell us about what prompted you to get involved and help lead the Florida Fossil Hunters' annual "Women in Paleontology" day. What are your plans for future Women in Paleontology events?

Many years ago when I met with the school guidance counselor on what classes I should take to prepare for college, I expressed interest in the field of paleontology, but was discouraged from pursuing because the counselor told me that "girls don't really get in that field," and I would be better served looking at something else. It was disappointing, but I trusted that it was good advice and I moved on to another career. That was thirty years ago, but I want young girls to know that whatever they want to be – they can be. And if it's in the field of paleontology, they now have local resources available to them.

continued from page 8

Women have contributed to the field of paleontology for a long time, but most names are not widely recognizable. For example, did you know that it was a woman, Marion Brandvold, who discovered the first baby dinosaur bones recognized from North America and the first to be found in a nest anywhere in the world? Even the Florida Museum of Natural History's most recent dig site, Montbrook, was discovered when the wife of the land owner and their 5 year old granddaughter found a fossil sticking out of the sand.

Our next Women in Paleontology event is Saturday May 7th, 2016 at the Orlando Science Center from 10am-4pm. I hope you will join us in this noteworthy event that provides a platform for professional women in paleontology and the earth sciences, to share career opportunities with girls and young women, and everyone is welcome.

Cindy preparing fossils at the Academy of Natural History Preservation

My future plans for the Women in Paleontology event would be to get more involvement from schools and the Girl Scouts of America. I would love for girls to be able to earn a Paleontology badge. I would also like to conduct an annual girls field trip, where they would hunt for fossils, get assistance identifying the fossils, and then bring the fossils to the Women in Paleontology event where they would have their own table to share their experience with others, and be paired up with female mentors from the University of Florida. My larger vision is to expand this event nationwide.

Do you have any recommendations for other fossils clubs/societies who are trying to get children & teens interested in paleontology? What is your favorite memory from an outreach event?

Always be promoting. I talk about fossils all the time to anyone that will listen, and encourage them to join their local fossil clubs. Find out if your current members have any exposure to youth, and if so, if they would be willing to conduct educational fossil discussions. Bonnie Cronin of the Florida Fossil Hunters conducts an amazing monthly Kids' Fossil Blast, which is an educational talk and fossil display. Children love to touch and feel fossils as they're learning about them. I will be speaking at an upcoming library outreach event on fossils in Maitland, Florida on May 25, 2016.

My favorite memory from an outreach event was at last year's Women in Paleontology event. A young girl stopped by my display table and was excited to see the different fossil specimens. She told me that while she really liked my fossils, she really loved marine animals, so I took her over to the table that had those items displayed, and where she would be able to talk to a marine biologist. When we told her that she could help at the table by holding and passing around different specimens, she could hardly contain herself with excitement. The smile on her face was just priceless. She ended up talking her very supportive father into staying at the event the entire day.

To learn more:

Read Cindy's article with Paul Roth and David Steadman on Thomas Farm on the National Park Service website

CLUB CORNER: NORTH COAST FOSSIL CLUB

by Glen Kuban, Vice-President, North Coast Fossil Club

In July of 1982, Dr. Shya Chitaley, a Paleobotanist at the Cleveland Museum of Natural History, founded "The Fossil Society." In 1997, some members of the Fossil Society formed a new club called the "North Coast Fossil Club" and became independent from the museum.

Today, the North Coast Fossil Club (NCFC) is an active group of about a hundred fossil collectors and enthusiasts of all ages and backgrounds. The objectives of NCFC are to:

1. Encourage the closer association of persons interested in fossils,
2. Promote the responsible collection, preparation, and study of fossils, and
3. Foster education in paleontology, geology and related subjects.

We usually meet on the third Saturday of each month at 10:00 a.m., at the Parma Snow Branch of Cuyahoga County Public Library. Typical meeting programs include speakers or workshops on various topics relating to paleontology or geology, and "Collectors Corner" - where members bring in and share information about specimens matching a particular theme for that meeting.

Prepped Fexicalymene

During the collecting season (usually March through October) we usually organize a field trip for the fourth weekend of each month. Most field trips are day or weekend ventures to collecting sites in various parts of Ohio or surrounding states, although we sometimes venture farther afield.

Beth K celebrating a nice Phacops trilobite find at a Devonian quarry [in NW Ohio].

continued from page 10

Every January we hold an annual banquet and display contest. Members bring in their own fossil collections and artwork to compete in several different categories, while enjoying a delicious potluck meal, and testing their luck for raffle and door prizes donated by club members, along with one or two grand prizes provided by the club. Afterward, the public is invited to our "Fossil Road Show," where visitors can view our fossil displays and have their own mysterious fossils identified by our members.

Glen Kuban's "exhibit only" collection for the 2016 banquet/display contest, showing fossils collected on various club trips.

Each July we hold a picnic that includes live and silent auctions. NCFC provides the brontoburgers and paleo franks, while members bring in side dishes and desserts.

Glen's "Fossil chocolates" at the annual party, made from rubber molds of actual fossils.

Every December we have our Chitaley Paleobotany Presentations, where members are invited to give talks on any topic relating to fossil plants. Members vote on the best presentation, with the winner receiving a fossil prize.

NCFC publishes a quarterly newsletter called the Fossilphile that features stories on recent field trips, meetings, news items, display and preparation tips, humor, a calendar of upcoming events, and more.

For more information, including details on how to join NCFC, please visit our website at ncfclub.org

Read about Dr. Chitaley on Wikipedia

EDRIOASTEROIDS OF CINCINATTI

by Kyle Hartshorn and Jack Kallmeyer, Dry Dredgers

Pair of *Isorophus cincinnatiensis*, official city fossil of Cincinnati, Ohio. Originally described by Roemer in 1851, *I. cincinnatiensis* is one of the most common edrioasteroids in the Cincinnatian. Jack Kallmeyer collection.

In the spring of 2002, attendees of Cincinnati's annual gem, mineral, and fossil show, GeoFair, cast their ballots to elect an official city fossil. As the votes were tallied, an unlikely winner emerged: the edrioasteroid *Isorophus cincinnatiensis*. Looking for all the world like an upside-down starfish on a scaly pincushion, this plucky upstart had unseated a local favorite, the trilobite *Flexicalymene*, as well as three other contenders of varying phylogentic heritage. The mayor proclaimed *Isorophus* the victor, but more than a few wondered: what, exactly, is an edrioasteroid and why did it deserve to be the official city fossil of Cincinnati?

The answers lie in the Late Ordovician. Roughly 450 million years ago, much of the American Midwest was submerged in a shallow sea. The region we call Ohio, Kentucky, and Indiana was south of the equator, in the tropics or subtropics. The warm waters teemed with abundant marine life: thickets of bryozoans, submarine mudflats dappled with brachiopods, obtuse stromatoporoid mounds, coral not-quite-reefs, and swaying groves of crinoids. And scattered here and there, edrioasteroids: round little echinoderms encrusting whatever surface their larvae had glommed onto.

Like their distant relatives the starfish, brittlestars, sea cucumbers, and sea urchins, edrioasteroids possessed a calcite skeleton composed of numerous plates, a water vascular system, and pentaradial symmetry, with (usually) five ambulacra spiraling outward from a central mouth. These ambulacra were food-

"Plenty of cities have trilobites, corals, crinoids, and brachiopods. But only Cincinnati is known for its bonanza of exotic edrioasteroids."

continued from page 12

gathering organs, using mucous, cilia, and perhaps tube feet to sift small particles out of the passing currents. The oral surface also featured a gonopore (from which gametes were released), hydropore (an inlet to the water vascular system), and anal pyramid (from which waste was expelled). On the opposite side of the edrioasteroid, a ring of marginal plates and fleshy lower surface more-or-less permanently attached the animal to some solid substrate, suggesting an ecology similar to that of modern barnacles. Some were flattened or dome-shaped; others, globose or even stalked, with the oral surface perched atop an extended, scaly pedunculate zone.

Carneyella c.f. *pilea* on *Rafinesquina* brachiopod, with bryozoans, crinoid columnals (*Iocrinus*?) and small *Zygospira* brachiopods. Note multiple smaller edrioasteroids on the same shell. Scale bar: 10mm. Jack Kallmeyer collection.

Edrioasteroids range throughout the Paleozoic, from the Cambrian to the Permian, but the Late Ordovician was the acme of their diversity. Even judged against these contemporary occurrences, the Cincinnati region has one of the most diverse and prolific edrioasteroid faunas in the world, with six genera (*Carneyella, Cryptogoleus, Curvitriordo, Cystaster, Isorophus, and Streptaster*) and eleven species known. The class is well represented stratigraphically, with specimens found in almost every Cincinnatian formation, Kope through Whitewater. All are isorophids, a clade united by uniserial ambulacral floor plates, an uncalcified aboral region, and a well-developed series of maginal plates. A

continued from page 13

second major edrioasteroid lineage, the edrioasterids, is lacking in the Cincinnatian proper, but represented in the subjacent Lexington Limestone by *Edrioaster priscus* (Miller and Gurley, 1894).

Cincinnatian edrioasteroids are often found affixed to the shells of brachiopods, particularly the large, concavo-convex *Rafinesquina*, and bivalves, such as *Ambonychia*. Other, albeit less frequent, hosts include bryozoans, sponges, corals, and crinoid columns (the latter uniquely represented by Cincinnati Museum Center specimen CMC IP 26324). During periods of low sedimentation, edrioasteroids even colonized the solidified seafloor itself.

Streptaster vorticellatus on brachiopod shell fragment. Its large, peg-like ambulacral plates and conspicuous whorls make *Streptaster* one of the easiest edrioasteroids to identify. Scale bar: 10mm. Jack Kallmeyer collection.

Paradoxically, edrioasteroids can be difficult to find, but where found, they may be present in the hundreds, if not thousands. This peculiar pattern is likely a taphonomic artifact. Cincinnatian strata abound with brachiopod shell beds, hardgrounds, and other environments suitable for edrioasteroid colonization. However, the echinoderms' delicate thecae would have easily disarticulated after death, so only a rapid burial could guarantee preservation. Thus, where events such as storms or turbidity currents smothered entire seafloor communities alive, the resulting bedding planes can preserve many square meters of edrioasteroid-encrusted brachiopods. Close inspection of these beds can reveal interesting biotic interactions. For example, clusters of edrioasteroids vying for space on the same brachiopod.

These edrioasteroid assemblages have sparked the interest of many researchers over the decades, including Bruce Bell, Colin Sumrall, David Meyer, René Shroat-Lewis, Carlton Brett, and others. Their efforts have long been aided by Cincinnati's local paleontological society, the Dry Dredgers. Members of this group are responsible for many an edrioasteroid in the Cincinnati Museum Center's collections. In the early 2000s, the Dredgers even hosted several "edrio digs", field trips dedicated to the systematic excavation of large, edrioasteroid-rich slabs for research and eventual donation.

continued from page 14

The Dry Dredgers were also instrumental in organizing the campaign to choose Cincinnati's city fossil, again in partnership with the Cincinnati Museum Center. Precisely why so many voters chose *Isorophus* may never be known, but its victory was appropriate. Plenty of cities have trilobites, corals, crinoids, and brachiopods. But only Cincinnati is known for its bonanza of exotic edrioasteroids.

Cystaster stellatus on brachiopod shell, exhibiting the straight, robust ambulacra and star-like shape characteristic of the genus. Covington, Kentucky. Jack Kallmeyer collection.

RESEARCH: PLANT FOSSIL PROVIDES INSIGHT INTO EVOLUTION OF COCO-PLUMS

by Nathan Jud, Florida Museum of Natural History

The ongoing expansion of the Panama Canal provides an exceptional opportunity to collect fossils in the tropics where abundant vegetation often obscures outcrop. Since 2010, researchers from the University of Florida, the Smithsonian Tropical Research Institute, the New Mexico Museum of Natural History and beyond have collected, prepared, cataloged, and studied thousands of fossils from exposures along the Canal.

Over the course of the last several years, some of the most exciting finds have been the variety of large-bodied mammals with North American affinities such as horses, camels, rhinos, and beardogs. However, as Panama emerged during the early Miocene it was something of a foreign land to the animals of North America – fossils tell us that the tropical forest was composed almost entirely of South American plants that dispersed across the Central American Seaway long before North and South America were connected.

Fossil wood and fruits are common along the Panama Canal today, and one of the most common fruits in the Cucaracha Formation are those of *Parinari* (coco-plum). The fossils are technically endocarps (the inner-most layer of the fruit) and they are somewhat like a peach-pit with two seeds. These fossil endocarps are among the oldest records of the genus, and the family Chrysobalanaceae as a whole. Chrysobalanaceae comprise one of the 20 most abundant families of tropical trees and they are found throughout the tropics. *Parinari* is one of the most common members of the family, and roughly half of all *Parinari* species are native to tropical South America today. Their fleshy fruits are consumed and dispersed by a wide variety of mammals and birds, including parrots, bats, elephants, tapirs, people, and many others.

Modern *Parinari* from Panama

In a recent paper, postdoc Nathan Jud, along with PIRE research assistant Chris Nelson and former graduate student Fabiany Herrera formally described the Parinari fossils from the Canal and named the new species Parinari panamensis. With this foundation, they also reviewed the fossil record of the family and the biogeographic history of these important trees. To study the fossils they sliced the permineralized fruits and then made thin sections in order to examine the anatomy under the microscope with transmitted light.

Several lines of evidence suggest that Parinari originated in Africa, but about half of the species alive today are native to tropical South America. Until now, it was not clear whether arrival and diversification of Parinari in the Neotropics was a recent phenomenon, or whether there has been a long time for this diversity to accumulate. The oldest evidence of Chrysobalanace worldwide are late Oligocene pollen fossils (~23-25 million years old), but it is difficult to distinguish the different genera. Now the presence of the genus Parinari in the Cucaracha Formation along the Panama Canal provides a minimum date of 19 million years ago for the arrival of Parinari in the Neotropics. Parinari has probably been diversifying in South America over the last 19 million years.

continued from page 16

This story provides an interesting contrast with an earlier study by Fabiany Herrera and colleagues who showed that another common fossil fruit, Sacoglottis (Humiriaceae), originated and diversified in the Neotropics, but it also dispersed across the Atlantic Ocean, and one species is native to West Africa today. In both cases, the dispersal across the Atlantic was recent enough that it must have occurred via oceanic dispersal long after the breakup of South America and Africa during the Cretaceous Period. Jud, Nelson and Herrera also compiled all reports of megafossils from the literature that have been attributed to Parinari or other members of Chrysobalanaceae and evaluated each one for age and reliability. These data now serve as a framework for dating major events in the evolutionary history and dispersal history of not only Parinari but the whole family Chrysobalanaceae.

Chris Nelson, Research Assistant

Although the tropical forests of Panama were quite different from the forests further North in what is now Mexico, the U.S., and Canada, the abundance of fruit and browse appears to have suited the North American mammals well, and they may have been pleased to consume and help disperse plants like Parinari.

Parinari endocarps showing two cavities for seeds. The two lines on the left image indicate the level of the transverse section shown by the two imaged on the right. The endocarp wall is thick and tough, but the seed-cavities have a light-brown woolly lining seen in the upper right image. Another distinctive feature is the two germination plugs that open up to allow the seedling escape the protective endocarp and grow when the time is right. These are marked by arrows in the two images on the right.

PALEO ARTIST: LENA COLE

Editor's Note: Our artist this issue is a Ph.D. student in the School of Earth Science at The Ohio State University. Her research focuses on the evolutionary history of Echinoderms.

Lena Cole

Can you describe the path that led you to become a paleo artist? For example, did you have an early interest in ancient life? What was your undergraduate major? Was there one opportunity that shaped your career choices?

Paleoart is a hobby I have primarily approached from the direction of a scientist rather than an artist. I grew up in rural Alaska where I developed a life-long passion for everything related to natural history. I drew and painted living organisms whenever I had the chance, but my long-term interest was in studying evolutionary and organismal biology. When I started college as a biology major at James Madison University, I stopped doing art altogether. Later, my interest in paleontology began when I was given the opportunity to research a fossil stromatoporoid reef while still an undergraduate. The concept of studying evolution through deep time was remarkable to me, and led me to switch my major to geology with a focus in paleontology. When I first took invertebrate paleontology, drawing fossil specimens for lab rekindled my love of drawing. Over the last few years, I've gradually gotten back into drawing with an emphasis in paleoart and scientific illustration. I've started using paleoart as a form of educational outreach, and hope to keep doing paleo illustrations for a mixture of scientific, educational, and entertainment purposes.

What skills does one need to become a successful paleo artist?

I feel there are two important sides to paleoart: scientific accuracy and creativity. The scientific accuracy part is important because these aren't just fantasy animals, they were once-living creatures. The creativity side is also important because to bring an extinct animal to life through paleoart you need to include many imagined details that aren't preserved in the fossils. The trick is to imagine those details in such a way that the organism is scientifically accurate yet compellingly detailed and realistic.

Shark Teeth © by Lena Cole

If someone wanted to pursue paleoart as a possible career, what advice would you give them?

Paleoart is a form of scientific illustration, so learning the science behind your subjects and studying both living and extinct animals is important. Knowing the anatomy, ecology, habitat, behavior, and functional morphology of fossils is important for scientific accuracy. Studying living organisms can also be extremely helpful for referencing both environmental settings and physical details like hair, scales, and shells.

What do you like best about paleoart?

I love that paleoart can almost look like fantasy art, but it's all real! Bringing long-extinct organisms to life through paleoart is a great way to get people excited about paleontology, geology, evolution, and other aspects of science.

continued from page 18

What is most challenging about being a paleo artist?

Right now, it's finding time to work! I'm currently a paleontology PhD student, which takes up most of my time. Other than that, the hardest part for me is getting started on new projects, because I easily spend as much time researching a subject and planning a project as I do on the drawing itself.

Do you have work that you are most proud of?

One of my favorites right now is a painting of a fossil ammonite done in watercolor. The watercolor paint is great for capturing the opalescence of the shell.

Ammonite © by Lena Cole

How long does it typically take to complete a project? What is the process? Do you get feedback from scientists while you are working on things? Do you sometimes have to start over?

It can take me anywhere from a few hours to a few days to finish a project and usually involves background research, collecting references images, and doing test sketches before I actually get to drawing, inking, and painting. I have found that spending a lot of time beforehand researching my current subject helps me get the finished work correct the first time. I have worked on some projects for other scientists which is a lot of fun because I get to be a bit more creative and then they give me feedback on the types of reconstructions they envision.

Where might people be able to view your work?

I recently started an educational paleoart blog at www.alpenglowstudios.wordpress.com and will be designing a Facebook page and an Etsy profile soon!

To learn more:

You can find Lena's paleoart blog here

Lambeosaurus © by Lena Cole

EDUCATION: ROWAN UNIVERSITY PURCHASES QUARRY FOR RESEARCH AND EDUCATION

by Shari Ellis

Whenever I ask paleontologists—pros or amateurs—the key to getting children and youth interested in the science, the answer is always to get them out in the field and actually collecting fossils. Rowan University, a public institution in New Jersey, is taking the advice to heart. They recently purchased a nearby quarry that experts regard as the best site east of the Mississippi River to learn about the Cretaceous period when dinosaurs walked the Earth.

Sixty-six millions years ago, the 65 acres now known as the Rowan University Fossil Park was at the bottom of a shallow sea. The layers that formed encase many fossils including marine snails, brachiopods, bryozoan colonies, shark teeth, bony fish, sea turtles, marine crocodiles, and mosasaurs. Of particular interest is the fact that the skeletons of the largest creatures are found almost completely intact, which suggests they all may have died suddenly and at the same time.

This amazing site was almost lost to all who love paleontology. The Inversand Company had been mining manganese greensand from the pit for 80 years. The sand, called "marl," was widely used in water treatment plants, but with environmental regulations the quarry became unprofitable. As a result plans were made to fill in the pit and possibly develop the area with apartments and a shopping center. Fortunately for paleontology, the economic recession of 2007 put those plans on hold.

Enter Dr. Kenneth Lacovara, an internationally recognized paleontologist from Drexel University. Lacovara wanted to preserve the quarry as a dig site and museum; Inversand supported the idea and helped Lacovara and his fellow paleontologists by diverting water away from the valuable fossils – but eventually this became economically unviable. The local township wanted to buy the quarry, but lacked the necessary funds. Meanwhile, Lacovara led a team of international researchers who discovered a new species of titanosaur they named Dreadnoughtus schrani in the Patagonia region of Argentina.

Rowan Web PageBack in New Jersey, Lacovara met with Rowan University president Dr. Ali A. Houshmand. Housmand wanted Lacovara—who was himself a graduate of Rowan University back when it was known as Glassboro State College—to return to his alma mater and become dean of a new school of earth sciences. Lacovara agreed—if Rowan would purchase the quarry.

Since 2012, Lacovara has hosted community dig days at the park in partnership with the local township's Economic Development Council. To date, nearly 10,000 individuals have hunted for fossils in the park. The park also hosts school groups and other community organizations. Plans for the future include the establishment of a science center focusing on STEM (science, technology, engineering, math) education.

To get on a waiting list for future dig days, contact Michelle Bruner from the township's economic development office at mbruner@mantuatownship.com or call (856)-468-1500, ext. 122.

To learn more:

http://www.rowan.edu/fossils/

Read more about the fossil park in the New York Times http://www.nytimes.com/2016/01/05/science/behind-a-shopping-center-in-new-jersey-signs-of-a-mass-extinction.html?_r=0

Follow Dr. Lacovara on Twitter: @kenlacovara

LET'S DO IT: myFOSSIL MINI-VIDEO TUTORIAL SERIES

by Ronny Leder

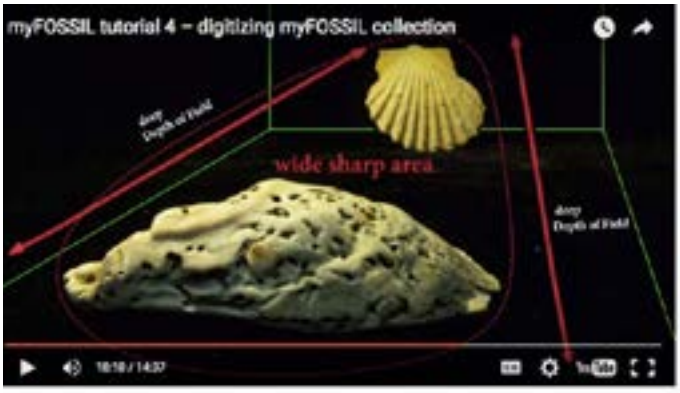
"I would like to image my fossil but there are still some parts covered in mud, how should I clean it?"

"I found a beautiful fossil leaf but don't know how to make a good photo because it's so dark that my camera won't be able to resolve the details. What can I do?"

Questions like these revealed a need for a series of video tutorials to describe paleontology practices and encourage sound curation of fossils in all collections. Since this is our daily business and we have access to colleagues worldwide with different expertise, we would like to create and share resources with the myFOSSIL community to further their knowledge and, in turn, help increase ours.

Our video series can be found at http://community.myfossil.org/video-tutorials. Topics to date include "how to": sign in on the myFOSSIL website, upload a fossil image to myFOSSIL, clean fossils, and image or digitize fossils. We want to foster the sharing of fantastic finds, encourage active participation in this community, and maybe raise new problems we can investigate together.

New videos are forthcoming with more specific content like the preparation of fragile fossils and fossil leaves and the preparation of fossils embedded in concrete matrix. However, we would like input from you--the community. What topics would you like us to cover in this series?



REPORT ON THE 2016 SPRING PALEOBLITZ

by Ronny Leder & Victor Perez

The weekend of March 18 – 20, a select group of amateur paleontologists came to Gainesville, Florida to experience the museum curation process. It was not just the time to look behind the scenes, but also to meet other likeminded people to share the joy of paleontology. Representatives from seven fossil clubs attended the event; these folks came from five different states to participate in this inaugural FOSSIL Project PaleoBlitz.

The main goal of the event was to teach best practices in paleontology through exposure to the entire curatorial process while refining the framework for future PaleoBlitzes. To achieve this goal, participants were shown the existing fossil collections at the Florida Museum of Natural History and then asked to identify and catalog the fossils from the Belgrade Mine in North Carolina. These fossils were collected by the FOSSIL Project team during the Aurora Fossil Festival in May 2015, and represent the first fossils from that locality in the FLMNH collections. Participants were also shown the prep lab and the latest 3D printing technology being used for education and outreach at UF.

Blitz participants: Mary Harbison, Robert Langford, Gail Fazzina, John Cartier, Michael Reagin, Bill Znidarsic, Paul Fazzina, Dave Hanes, Julie Niederkorn, Joyce Drakeford, Sue Coller, Joy Rushing and Victor Perez (Cathy Young is missing from the photo)

Participants were intentionally selected with a range of expertise and experience level. One of the main purposes for bringing this diverse group together was to investigate if and how they would work together. To do so, the participants were separated into four teams each with their own set of fossils to sort, identify and document. The outcome was a fruitful discussion, resulting in a very positive collaboration between all participants. The four groups collectively cataloged roughly 400 specimens and entered the data into a separate temporary database.

On the second day, they were introduced to a optimal private collection while visiting Dr. Gordon Hubbell's personal museum. Thanks to Dr. Hubbell who was so kind to allow us to have an inside view to his gorgeous collection of sharks, recent and fossil. Finally, participants were able to put their new acquired knowledge to the test while collecting in Gainesville's Possum Creek.

All and all it was a great time for everyone involved and there was unanimous consensus that this PaleoBlitz was a great success that certainly needs to continue. Stay tuned for announcements about the next PaleoBlitz!

continued from page 22

Touring George Hubbell's Museum© Jeff Gage

Fossil hunting in Possum Creek © Jeff Gage

Some of the fossil finds! © Jeff Gage

UPCOMING EVENTS AND OPPORTUNITIES

April 20 - 23 Annual Meeting of The Association for Materials & Methods in Paleontology, Colorado Springs, CO
Don't miss this awesome opportunity to learn about best practices for consolidants/adhesives, molding, casting, field work, plus much more! There will be a full day of 'Back to Basics' talks, followed by two days of workshops and oral presentations on a variety of fossil preparation and collections related topics. There will also be collections and lab tours of Florissant Fossil Beds National Monument and the Rocky Mountain Dinosaur Resource Center, along with field trip opportunities to other institutions! For more information, please go to http://www.paleomethods.org/

April 30 Geofair 2016 Cincinnati, OH
The 51st Annual Gem, Mineral, Fossil and Jewelry Show of Greater Cincinnati, April 30 10 am to 6 pm; May 1, 2016, 11 am to 5 pm SHARONVILLE CONVENTION CENTER 11355 Chester Road Sharonville, OH 4524 Hosted in association with the Cincinnati Dry Dredgers See more details here: http://www.geofair.com/

April 30 The Humongous Shark: Megalodon Aurora Fossil Museum, Aurora, NC
Join Aurora Fossil Museum's Director, Cynthia Crane, to learn more about this giant shark! This informative will be held in the Museum Learning Center building on Saturday, April 30, from 1-2:30pm.

May 7 Women in Paleontology Day Orlando Science Center, Orlando, FL

May 14 Family Science Discovery Day: The Ice Age Raymond M. Alf Museum of Paleontology, Claremont, CA
Come to the Alf Museum on Saturday, May 14, 2016 from 1 – 4 PM to learn about the beasts of the Ice Age. Meet our paleontologists and ask them your questions! Enjoy paleontology books at our Paleo Research Zone! Make your own ancient ice age crafts. . . .And more to be announced! Special Admission Fee: $3.00 per person, Kids 4 and under are free.

May 15 - 17 Southeastern Association of Vertebrate Paleontology Meeting, Martinsville, VA
This year's Southeastern Association of Vertebrate Paleontology (SeAVP) meeting will be co-hosted by the Virginia Museum of Natural History and Virginia Tech. The meeting will be held in Martinsville, VA. It will take place May 15th-17th (Sunday evening – Tuesday). Our hosts are Drs. Alex Hastings (VMNH), Michelle Stocker (VT), and Sterling Nesbitt (VT). This should be an exciting meeting! More details at http://www.vmnh.net/seavp

May 27 Aurora Fossil Festival, Aurora, NC
Come out and enjoy the 23rd annual festival! Museum events include displays by local and regional fossil organizations and clubs, paleontology lectures, educational activities, and displays. Saturday's museum events culminate in a live fossil auction with 100% of the proceeds benefiting the Aurora Fossil Museum. Hosted by the Aurora-Richlands Chamber of Commerce in partnership with the Aurora Fossil Museum. Check out the dedicated festival website, too!

June 3 -5 Joint FOSSIL / Dry Dredgers Mini Conference, Cincinnati, OH
Join us for a mini conference in Cincinnati, OH! FOSSIL and the Cincinnati Dry Dredgers are planning a great event for both amateur and professional paleontologists, taking place at the Cincinnati Museum Center on June 3-5, 2016. Check out our dedicated webpage for more information. Feel free to email the FOSSIL Project Coordinator, Eleanor Gardner, at fossil@flmnh.ufl.edu for more details.

Visit http://community.myfossil.org/events/ for more events or to add your own to the calendar!

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