



# NARG NEWSLETTER

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## NARG Celebrates 20 Years!



Dinosaur is snacking on our celebratory cake.



Aaron Currier, NARG President,  
cuts the first slice of cake.

Twenty years ago, a small group of passionate amateur and professional paleontologists came together with a shared vision: to explore, excavate, and preserve the rich fossil heritage of North America. This vision gave birth to the North America Research Group (NARG) Paleo, a vibrant community dedicated to uncovering the secrets of ancient life. Our Mission Statement is: To encourage responsible stewardship of earth's paleontological resources; to promote scientific research, communication, and public education. As we celebrate this 20-year milestone, we reflect on some of the most exciting discoveries and contributions NARG has made to the field of paleontology.

### Crocodile Found in Crook County, Oregon

In 2005, NARG members found the fossils of a marine crocodile, *Metriorhynchus* on a private landowner's land near Suplee, Oregon. Nine NARG members excavated and prepared the fossils, then donated to the Thomas Condon State Museum of Fossils at the University of Oregon. Researchers there recognized the importance of the find as the most complete skeleton of *Metriorhynchus* found in Oregon and sent it to a crocodile expert at the University of Iowa for further study. The crocodile turned out to be a new species and was named after NARG, *Zoneait nargorum*. Its adaptations were described by Eric Wilberg at the University of Iowa in a [paper](#) in 2015. (See page 72 of the paper.)

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*NARG 20 Years, Continued from previous page*

### **The Whale Excavation from Coos Bay**

The Oregon coast has been a fruitful area for NARG's explorations, and the 2007 whale excavation in Coos Bay stands out as a significant achievement. This project involved the careful extraction of a 7 foot long fossilized whale skull, providing crucial data on marine life and environments during the Miocene epoch. The Coos Bay whale has since become a cornerstone of NARG's educational outreach. This excavation was documented in the article "[A Whale of a Tail by Bill Sullivan](#)."

### **Bernie the Thalattosaur**

In 2011, Gloria and Gregg Carr, a father-daughter team, discovered fossilized bone in a roadside near Suplee, Oregon. After a long process to receive state permission, 22 NARG members returned to the site to excavate as many concretions at the site as possible. Greg spent many hundreds of hours preparing the fossils and found many other bones from multiple thalattosaurs, as well as other species from the ancient marine site. This marine reptile from the Triassic period, named Bernie, provided a rare glimpse into the life of creatures that roamed the seas over 200 million years ago. Bernie's excavation and subsequent research have been a highlight in NARG's history, showcasing the group's dedication to meticulous fieldwork and scientific rigor. The prepared specimens were sent to the University of Alaska for further study. The findings were published in the Eric Metz's Master's [Thesis](#) and expected in a future journal article

### **Excavations in Mitchell, Oregon**

Mitchell, Oregon, has been another focal point for NARG's fieldwork. The region's rich fossil beds have yielded numerous specimens, including ancient mammals and other vertebrates, dating back to the Oligocene and Miocene epochs. These excavations have not only expanded our understanding of prehistoric life in the Pacific Northwest but have also fostered a strong sense of community among NARG members and local residents. A recent paper by University of Oregon professor emeritus, Greg Retallack, acknowledges NARG for their field work in a recent [paper](#) describing the specific dig sites as a pterosaur guano deposit.

### **The Majestic Spike-toothed Salmon**

One of NARG's most thrilling discoveries was the identification of the spike-toothed salmon (*Oncorhynchus rastrosus*). These formidable fish, which swam in North American waters millions of years ago, were characterized by their impressive size and fearsome fangs. NARG's work in uncovering and studying these specimens has provided invaluable insights into the ecology and evolution of ancient aquatic ecosystems. A recent [paper](#) from April 2024 (see page 17) acknowledges NARG and member, Greg Carr, for our work in excavating and preparing new salmon fossils.

### **A Legacy of Passion and Discovery**

As we celebrate 20 years of NARG Paleo, we recognize the passion of our members, past and present. Members, from children to 80+ years, love paleontology. We have members who love dinosaurs, paleobotany, geology, vertebrate and invertebrates. One of our strengths is that we are generous in sharing and teaching members and visitors about paleontology. Where else would you be able to learn about air-scribe techniques from a man with specimens at the Smithsonian? Or search for fossils beside people who have discovered marine reptiles from the days of the dinosaurs? In what other club could you walk with members in tide pools looking for extinct whale and dolphin skulls? From the discovery of awesome fossils like the spiked-tooth salmon and Bernie the thalattosaur to groundbreaking research and community outreach, NARG has made a lasting impact on the field of paleontology.

Looking ahead, we are excited to continue our mission of exploring, excavating, and preserving North America's fossil heritage. Here's to the next 20 years of discovery and to the countless adventures that await!



## NARG Participates in FossilFest in Newport

On February 10, NARG members showed up at the Hatfield Marine Visitor Center for FossilFest 2024. The event was sponsored by SeaGrant Oregon and Oregon State University. NARG was the primary participant and several members brought fossils, taught lectures, identified fossils, and answered general questions about paleontology. Renee Fowler, the Hatfield Visitor Center Assistant Manager & Volunteer Coordinator, is responsible for organizing FossilFest and says she is thrilled with NARG's continued participation.

As usual, Dan O'Loughlin was there bright and early to set-up tables and NARG displays. Aaron Currier was at the identification table and had many interesting fossils (and people) come through. Kent Gibson brought several tables of his marine fossils and had many people stop by to see them and hear about how he searches for them. Weylin Charland had another table set-up where he had a nice collection of labeled marine fossils. He had a steady stream of visitors stopping to ask questions too.



Dan O'Loughlin and his family set-up and tear-down NARG materials. Dan also manned the NARG information table all day.



Weylin Charland was a first-time displayer at the event. He labeled and organized a diverse selection of the coast fossils he has found.



Kent Gibson's display tables were a popular spot.



Dave Ellingson proudly displays some of the ice-age fossils found in the Willamette Valley.



Aaron Currier had a steady stream of visitors he helped with fossil identification.



**Newport FossilFest 2024, Continued from previ-**

Dave Ellingson, NARG member, also attended but was there to represent the Willamette Valley Pleistocene Project. Dave is a science teacher at Woodburn High School. He leads an annual dig for Ice Age fossils at the high school grounds. He was excited to share about some of the big ancient bison finds from this year.

Joe Cantrell had a nice set-up at FossilFest and took rendered photos of visitor's fossils. Joe is an exceptionally gifted photographer and has a set-up that takes photo "slices" of 3-D objects. Then a computer puts the images together to show very beautiful detail. One gorgeous fish vertebrae fossil made a great display!



Joe Cantrell came to FossilFest and used his camera set-up to take images of some beautiful fossils.

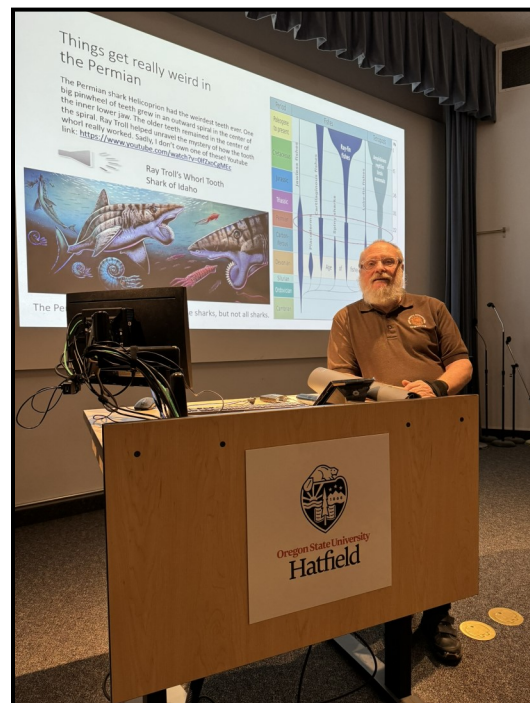


An fish vertebrae fossil Joe Cantrell made from multi-stacking many photographs.

Greg Carr gave two presentations at FossilFest. He shared about the spike-toothed salmon that NARG excavated, and he prepared. He also talked generally about where to search for fossils in Oregon.

Don Litchfield, friend to NARG and the owner of The Naughty Nautilus, had a beautiful display of some of his fossils. He had many of his large nautiloids along with information about their life cycles and locations.

One of the best things about FossilFest is getting out onto the beach. Winter is the best time to find fossils at the coast, and FossilFest usually corresponds to some great low tide times. I was able to find a weathered whale vertebra and watch a fantastic sunset as well. So FossilFest was a success again this year!



Greg Carr was the speaker at the event.



## What I Find through the Lens

Joe Cantrell

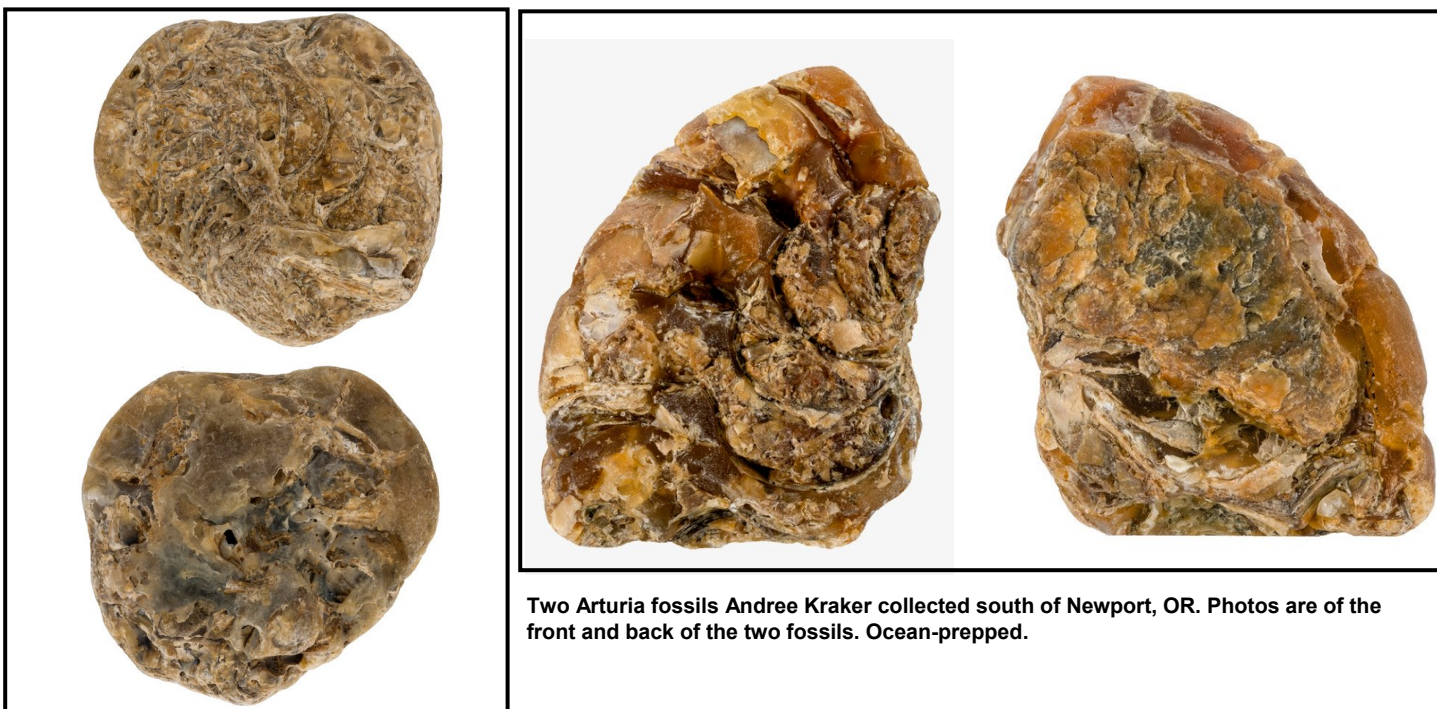
This is a macro photo of a piece of fossilized coral. It is one given to me by Dan O'Loughlin, "To see what you find in there," and it turned out...amazing. My usual disclaimer: I take no credit for this; I just report what I find through the lens.



## Some Spe-shell Arturia Fossils

Andree Kraker and her husband, Scott, joined NARG a few years ago. Andree would admit that she joined because of her husband's interest in fossils and rocks, not her own. However, she has enjoyed going on club field trips, volunteering at FossilFest, and being part of the group.

The Krakers have a home in Newport and enjoy collecting at the coast. In February, Andree was searching south of Newport when she found several Arturia fossils. These are an extinct, coiled nautilid species, related to modern-day squid and octopi. Andree was happy because these were the first fossils she herself had found. Additionally, they are not easy to identify, so she was excited to find out she was actually learning some paleontology when she recognized them.



Two Arturia fossils Andree Kraker collected south of Newport, OR. Photos are of the front and back of the two fossils. Ocean-prepped.



# Bleaching Petrified Wood

Bruce Thiel

Did you know that you can bleach certain types of petrified wood by soaking in household bleach? Here is a slab Bob Manley cut from a piece found in the Cascade foothills. The blueish center portion was pitch black and partially carbonized before he soaked it in bleach for several days when it lightened to this nice shade of blue. If one holds it in the light just the right way, one can see that the outer brown-blackish rim and bark were hard enough to polish to a nice shine. The center blue carbonized part has more of a dull matte finish.



The photo on the left below is a yard rock I've had for about 10 years, found in a WA creek. It looks bigger in the picture because of the angle but was about 10" wide by 18" long. I've always wondered how it would look inside and wanted to have it cut into slabs. Curt Todd, who does custom cutting and polishing in SE Portland, has a large 36" diameter diamond saw that was able to cut it. You can see his work at [www.RockOnEssence.com](http://www.RockOnEssence.com).



The photo on the right above is the same rock after it emerged from Curt's diamond saw, a couple of hours later. His saw is in a tank of mineral oil that sprays on the blade. As you can see the petrified wood is very black inside. I was disappointed as I was hoping it would be full of beautiful colored agate grain. After looking at the cracks and flaws, we cut another thicker 3" slab, as the piece was hollow in the back and might fracture.

Here on the right is the thicker slab after it was covered in Kitty litter for couple days to soak up the mineral oil. That was followed by a several days soak in a tub of water containing a generous portion of Dawn liquid to further dissipate the oil. After it dried you can see some of the growth rings.



Below is the thinner end-cut piece that you can see on the left side in the saw picture above. After soaking it in



a tub of undiluted household bleach for a week, the black center bleached out to a nice blueish tint. One must be extra careful handling undiluted bleach, with rubber gloves, eye protection and take precautions against splashing as you submerge and turn the slab. Bob has found that if you leave it soaking too long, the blue will bleach out entirely and it will become white and not look as pleasing. The bleached portion is only surface-thin and can be ground off with a hand grinder. There are edges and saw lines that I should have ground down and smoothed, before trying the bleaching treatment, before it can be polished, so it may have to be re-

bleached after I grind it down, but I still have the second slab to experiment with.



# At OMSI: Tyrannosaurs and Oregon Paleontology too

Tara Baker



Theo, Tad, and I just happened to visit OMSI on the day of the eclipse. Check out the safety glasses on T. rex in the background.

In April, I took my two godsons, age 6 and 9, to the OMSI "Tyrannosaurs - Meet the Family" exhibit, open until September 8. The kids and I had a good time. I loved the wealth of scientific information and insights into the latest paleontological discoveries about tyrannosaurs. The kids loved the hands-on exhibits, like digging for dinosaur bones. Here are some key scientific highlights:

## Evolution and Diversity

The exhibit explores the evolutionary journey of tyrannosaurs over 100 million years, showcasing how factors like natural selection, continental drift, and climate change facilitated their transformation from small carnivores to massive apex predators like *T.rex*. [1][2] It also highlights the incredible diversity within the tyrannosaur family, with various species adapted to different habitats and ecological niches. [1]

[2]

## Rare Fossil Specimens

We saw some rare and significant fossil specimens, including real *T.rex* bones like a partial upper jaw with teeth, a juvenile femur, a pubic bone, and a fused nasal bone. [2][5] The massive, nearly complete "Scotty" *T.rex* skeleton is also on display, one of the largest and most intact *T.rex* fossils ever discovered. [1][5]

## Feathered Dinosaurs

Challenging traditional depictions, the exhibit has models and reconstructions of feathered tyrannosaurs, reflecting the latest evidence that these dinosaurs likely had feathers or proto-feathers for insulation. [1][5] The kids thought these models were crazy and didn't know some dinos had feathers. The models showed evolutionary links between the dinosaurs and modern birds.

## New Species Discoveries

Recent tyrannosaur discoveries from China, like Dilong and Guanlong, were showcased, representing some of the oldest known feathered relatives of *T.rex*. [2][5]

## Oregon Paleontology Highlighted

The last section of the exhibit was arranged by OMSI and highlighted discoveries in Oregon paleontology. Bernie, the Thalattosaur, was there, as well as the spike-toothed salmon. Plant leaves and nuts were displayed from the John Day Fossils Beds National Monument. A large Miomastodon skull from the John Day was also on display. I thought it was fantastic to have such a great amount of Oregon fossils presented, showcasing the vibrant paleontology discoveries happening here. For photos of some of these, please turn the page.



The kids enjoyed all the touch and play exhibits.

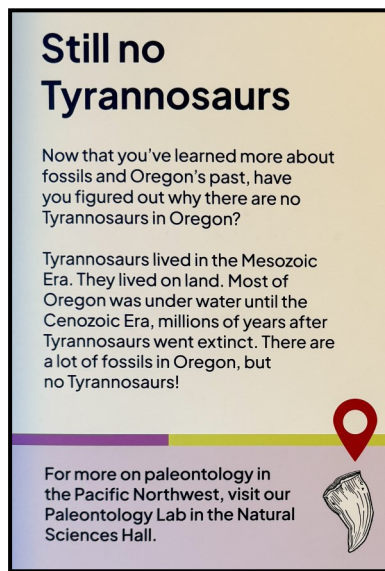


## OMSI, Continued from previous page

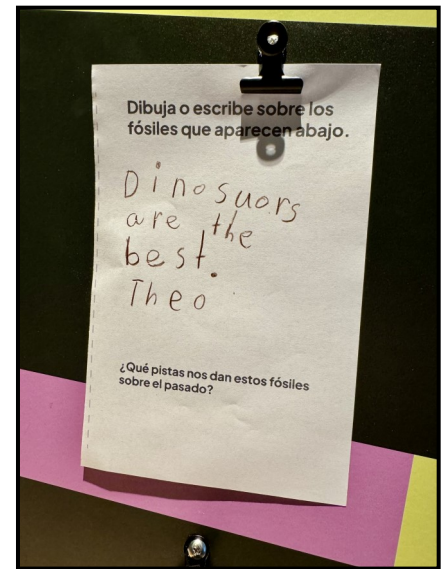
## Oregon Paleontology Highlighted



Bernie, the Thalattosaur



Signage from Oregon Paleontology section



My godson, Theo's, comment at the exhibit.

## Disappointed as a Women Interested in Paleontology

I was disappointed in the over-all displays because I did not see a single woman paleontologist featured. There were two displays showcasing paleontology researchers, one entitled "Bone Hunters," and the other "Discovering T. Rex: 32 Years of History." While 15 historical and current researchers were described, they were all men, and all white men at that. I was bothered by the lack of representation of women.

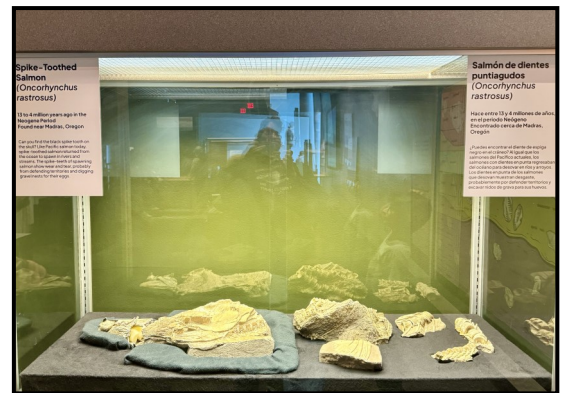
Through rare specimens, life-sized skeletons, interactive technology, and the latest scientific findings, the exhibit offers an in-depth look at tyrannosaurs' origins, anatomy, behavior, and place on the tree of life, advancing our understanding of these iconic prehistoric predators.[1][2][5]

## Citations:

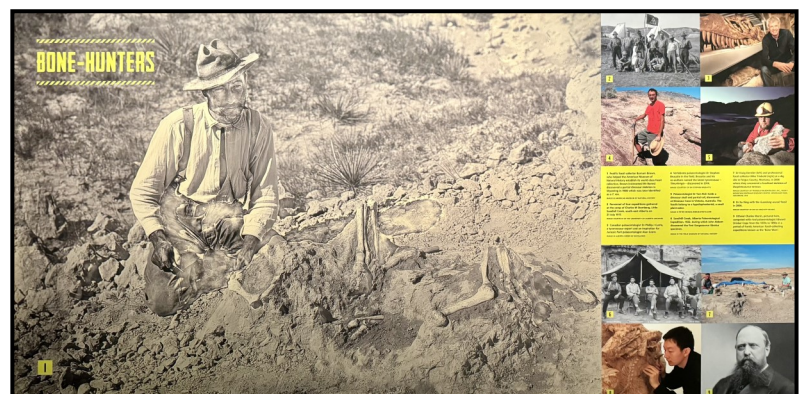
- [1]<https://www.thelackamasprint.net/featured-story/omsis-tyrannosaurs-exhibit-redefines-the-dinosaur-experience/>  
 [2]<https://www.southeastexaminer.com/2024/03/omsis-dinosaur-exhibit/>  
 [3]<https://www.oregonlive.com/living/2024/03/omsis-tyrannosaurs-meet-the-family-exhibit-is-now-open.html>  
 [4] <https://omsis.edu/exhibits/tyrannosaurs-meet-the-family/>  
 [5] <https://omsis.edu/articles/tyrannosaurs-meet-the-family/>



Miomastodon skull from John Day Fossil Beds



Spike-toothed salmon display



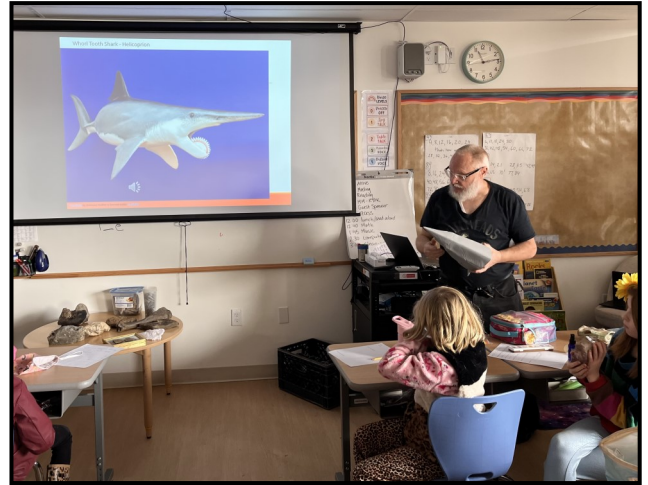
Example of a display panel showing historical and modern-day paleontologists. All men.



## “Know How to Recover Found Fossils”

In January, NARG was contacted by the Program Coordinator at the Emerson School, a Portland elementary school that uses project-learning methodology. A 2<sup>nd</sup>-3<sup>rd</sup> grade class had chosen to study fossils for their next 8-week project. They requested a speaker to come share knowledge and excitement for the topic.

Greg Carr visited the Christina Schelske's classroom in February. She said Greg did a great job teaching about fossils and answering questions. “We absolutely loved his visit,” she wrote. She shared the following pictures of Greg with the kids, their thank you letter, and their fossil project wall.



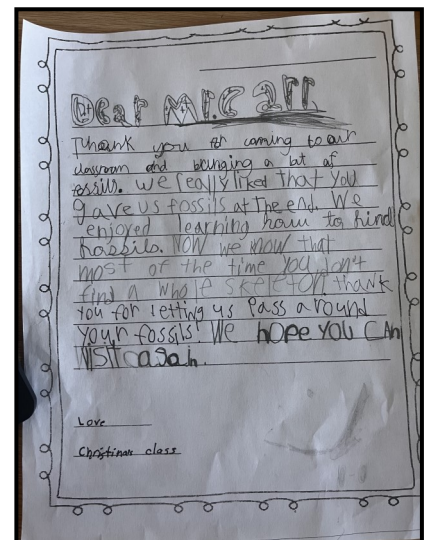
Dear Mr. Carr,

Thank you for coming to our classroom and bringing a lot of fossils. We really liked that you gave us fossils at the end. We enjoyed learning how to find fossils. Now we know that most of the time you don't find a whole skeleton. Thank you for letting us pass around your fossils! We hope you can visit again.

Love

Christina's class

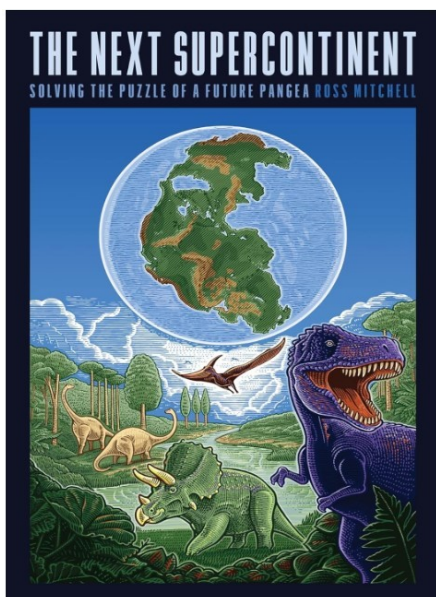
Greg has been a wonderful advocate for paleontology through his educational activities in classrooms and through his work at OMSI.





# Supercontinents Past and Future

Harold Hinds, Jr.



A review of Ross Mitchell, The Next Supercontinent: Solving the Puzzle of a Future Pangea (Chicago: The University of Chicago Press, 2023).

My association with the idea that continents in the past existed in different configurations and locations began with Charles Hapgood's 1958 The Earth's Shifting Crust. Albert Einstein wrote the forward to Hapgood's book, and so Hapgood's thesis deserved serious attention: basically Hapgood stated that ice built up at the poles, and given earth's spin, the earth's surface periodically slid over the mantle, relocating the poles and continents. Today, Hapgood, trained as a historian, is regarded as something of a quack and his thesis as pseudo-science. Mitchell does not cite him.

Mitchell, a geophysicist and an expert on the supercontinent cycle, primarily focuses on the scientific advances that have led to our current understanding of plate tectonics and the assembly and breakup of supercontinents. Despite the complexities and technicalities of Mitchell's subject, his text is remarkably understandable even by the general public. It's highly recommended.

Basically, Mitchell's volume is a history of science approach to scientists' current understanding of a succession of past supercontinents (Pangea, Rodinia, Columbia), and the "Next Supercontinent." Pangea, undoubtedly, will be the most familiar to readers. "Pangea is the most famous, most recent, and the most studied supercontinent. And surely, most everything we know about more ancient supercontinents uses what we know about Pangea" (p.9). And he adds "Yet we still don't know everything about Pangea" (p. 9). In particular, "why Pangea took its particular shape and ultimately how it [was] assembled" (p.10).

Mitchell introduces and explains the following ideas and/or discoveries which have led to our current understanding of Pangea's assembly and breakup: Alfred Wegener's configuration of Pangea and possible processes and evidence for continent movement; study of the ocean's Second War and after revealed the secrets of plate tectonics; paleomagnetism revealed evidence of the Atlantic Ocean's spread and of continent drift; "orogenic belts [remnants of old mountain belts worn down by weathering and erosion] within Pangea are sites where ancient oceans opened and closed, e.g., ancient Appalachian and Caledonian mountain belts; and seismology revealed "the upwelling and downwelling of mantle convection" (p. 48) and two massive mantle convection cells underneath the Pacific and Atlantic.

Mitchell then explores and explains what came before Pangea, the supercontinent of Rodinia. The key ideas and evidence, as for Pangea, are presented, more or less, in historical sequence. They are as follows: Dan Evans identified the keystone, "the continent that holds the puzzle together.....Laurentia [the ancestral North American continent]" (p. 128); the distribution of ancient mountain belts approximately 1.1 billion-years-old found in every continent except West Africa and which "represented the kinds of collisions that might lead to the foundation of a supercontinent" (p. 75); an international effort under the direction of UNESCO's International Geoscience Programme in 1999 "designed and approved to study Rodinia" (p. 82); computer advances that allowed the compilation of "vast data sets that were all keyed into precise geographic locations and on a spherical Earth" (p. 83); advances in radiometric dating; and collection of multiple paleomagnetic samples on each continent which disclosed that continents had moved and how far.

Then Mitchell analyzes a paradox: the maximum rate of continental drift (20 cm per year) is far too slow to explain that "the two back-and-forth latitude shifts of Australia...had only taken a few million years each" (p. 110). Why? "It's complicated. But the basic idea is that the dynamic motions of plumes and slabs are constantly redistributing mass within the planet...[which causes] the planet to tip via wander in search of a new

*Supercontinents, Continued from previous page*

stable spin axis" (p. 113). When a tipping point is reached it triggers wander and "the entire solid shell of the planet (including the thick mantle!) moves in unison" (p. 114). Thus "plate tectonics and polar wander are... the two ways that continents can move" (p. 114). Although Hapgood is never cited- perhaps his belief that a medium, Elwood Babbitt, could contact the dead, including Jesus, disqualified Hapgood from serious consideration--but Hapgood and Einstein were partly correct, even if, for the for the wrong reasons!

Next, Mitchell tackles Columbia, Rodinia's supercontinent precursor. Key ideas and discoveries were the following: the existence of about 1.7 billion-year-old ancient mountain belts suggested the assembly of a pre-Rodinia supercontinent; the central piece of the puzzle was Siberia, "around which the other continents were configured" (p. 128); the application of detrital zircon provenance, dating "zircons as a way of finding where... sediment had come from" (p. 140), can in turn determine where the building blocks of a megacontinent originated; a great abundance of anorthosite (which "form from melt at the very base of the crust, near the top of the deep mantle," p. 146) could only occur if a supercontinent lay over a mantle upwelling at a time when the earth was hotter than either the Pangea or Rodinia supercontinents.

Was Columbia the Earth's first supercontinent? Mitchell thinks not, and presents "some of the very good reasons for why the amalgamation of Columbia might have been the birth of the supercontinent cycle and the first of its kind" (p. 155). Basically no evidence has been discovered that Columbia had a predecessor.

Finally, Mitchell believes there will be a supercontinent after Pangea: "the supercontinent cycle shows no signs of stopping" (p. 186), e.g., Australia is on a collision course with Eurasia, "maybe as soon as 30 million years hence" (p. 185).

Mitchell envisions the next supercontinent. Initially the continents will drift to the low point between the two major mantle upwellings, under Africa and the Pacific. The key means: wander, the "tumbling of the solid crust and mantle around the outer core" (p. 214). The low point (mantle downwelling) is West of Africa 90°. Then once somewhat aligned up along a zone recurring 90° West of Africa (p. 207), the continents will move along this axis to form Amasia (America plus Asia): Australia will dock with Eurasia; India has already joined Eurasia; "the closure of the Caribbean Sea...[will] unify the Americas; and "the closure of the Arctic Ocean... [will] merge the Americas with Eurasia" (p. 231). Finally, the closing of the Indian Ocean will add Antarctica to Eurasia (p. 234). Mitchell admits that "this picture will invariably be adjusted in the coming years of continued research" (p. 238).

In Mitchell's concluding remarks he notes that his 2012 article in Nature that linked the supercontinent cycle to mantle convection was his major contribution to supercontinent research. He adds "I am under no illusion that the theory has been adequately tested- it certainly has yet to be disproven, but neither can I claim it has been validated by any sense of consensus yet" (p.246-7).

I might add that, as mentioned above, Hapgood and Einstein were at least partly correct for the wrong reason. Continental migration could be partly explained by "the whole solid shell of the planet (crust and mantle together)...[rotating] around the liquid outer core" (p.112). The means wasn't buildup of the polar ice caps, but that "plate tectonics and mantle convection are constantly redistributing the mass of earth" (p. 112).

If you are interested in a clear, concise, and entertaining explanation of earth's supercontinents, past and future, Mitchell's volume is highly recommended and available in our library.



## What's In a Name?

Bruce Thiel, a NARG member, is an amateur paleontologist and exceptional fossil preparator. He has had the honor of having two remarkable species named after him - a clam called *Pleurophopsis thieli* and a bird named *Olympidytes thieli*.

### *Pleurophopsis thieli*

*Pleurophopsis thieli* is a species of vesicomyid (saltwater, bivalve) clam that lived during the late Eocene to early Oligocene epochs, approximately 28-34 million years ago. Its fossils were discovered in the Lincoln Creek Formation and Makah Formation of western Washington State, USA. This clam is distinguished from its relatives by its smaller size, longer, and flatter shell shape. (1)

The species was formally described in 2023 by researchers Kiel et al., who named it in honor of Bruce Thiel. They named it in honor of Bruce in recognition of his help with fieldwork related to this project.(1)

### *Olympidytes thieli*

*Olympidytes thieli* is an extinct genus of Plotopteridae, a family of large, flightless marine birds superficially similar to modern penguins but more closely related to cormorants and gannets.(3) It lived during the late Eocene or early Oligocene, around 28-34 million years ago, in what is now the state of Washington and Japan.

The first specimen attributed to *Olympidytes* was a partial postcranial skeleton collected by Bruce Thiel in 2012 from the Late Eocene to Early Oligocene sediments of the Lincoln Creek Formation. In 2016, these remains were identified by researchers Gerald Mayr and James L. Goedert as belonging to a new genus and species of plotopterid, which they named *Olympidytes thieli*, based on the holotype specimen collected by Thiel. The genus name "*Olympidytes*" refers to the Olympic Peninsula where the paratype was discovered, and the species name "*thieli*" honors Bruce Thiel in the collector and donor of the holotype (4)

Bruce Thiel's contributions to paleontology, both as a skilled fossil preparator and as a dedicated collector, have been recognized and immortalized through the naming of these two remarkable species after him. His work has played a crucial role in expanding our understanding of the diverse life forms that inhabited the Pacific Northwest region millions of years ago. It is an honor to have him as an integral member of our club.



Bruce Thiel gave Kelsie Abrams, Burke Museum Fossil Lab Manager, a tour of his basement prep lab before she her talk at the NARG May meeting



Reconstructions of the fossilized bird bones named after Bruce.



[Illustration](#) of the Family Plotopteridae. *Olympidytes* could have looked similar to these large marine, flightless birds.

**Editor's Note:** Mackenzie Smith has been a long-time member of NARG, ever since he was 11 years old. He now serves as a Board Member and Advisor for NARG. He graduated with his Ph.D. in Paleontology from University of Florida late last year. The following is a abstract and Acknowledgement of NARG from his dissertation. We are listed right before his ducks. You can access the entire August 2023 publication at this [link](#).

# Climate and Diversity of Early and Middle Eocene Floras from Middle Latitudes of the Northern Hemisphere

Mackenzie Allan Smith

## Abstract

I examined the paleoclimate and floral biodiversity of the early to middle Eocene with an emphasis on the greater northwest of the US. Looking at pollen assemblages from the Clarno Formation (Oregon) I found using a Mantel test that geographic distance does not explain the differences in pollen distribution between three sites: the Nut Beds, White Cliffs Jr. and Red Gap. Each site had a different dominant taxon: monosulcate psilate at Nut Beds, Unidentifiable Betulaceae at White Cliffs Jr. and Juglans at Red Gap. Using a scanning electron microscope, I also found grains from Onagraceae, which was not previously known from the Nut Beds. These differences may be explained by time or community assemblage. Regardless, they show several habitats for this space and time. Using 119 dicot leaves, I inferred the mean annual temperature for the Nut Beds using the Climate Leaf Analysis Program and leaf margin analysis to be 19.8 and 20.00 degrees Celsius, respectively. These temperatures provide evidence that the locality is closer to 48 Ma rather than the commonly cited 44 Ma date. Precipitation estimates were too low to be considered valid. During the process, I tried to identify all leaves and found representatives of Thelypteridaceae, Elaeagnaceae and Rhamnaceae, which had previously not been recognized 13 from the Nut Beds. I looked at the Kishenehn flora (Montana), for which I inferred a mean annual temperature between 8.91-12.10 degrees Celsius using the Bioclimatic Analysis/Mutual Climate Range Technique, (coexistence approach). This is the most diverse Lutetian (47.8-41.2 Ma) lacustrine deposit and contains the oldest Thlaspi and exceptionally well preserved Spirodela. Lastly, I found that beta-diversity was lower during the Lutetian compared to modern times by comparing the mean and range of Sorensen-Dice coefficients from the Lutetian to 1000 randomly generated modern coefficients, which shows there is overall more heterogeneity in the modern world.

## Acknowledgements

I would like to thank my parents, David and Tami Smith as well as my girlfriend, Dr. Xiaoqing Zhang [*Ed.'s note: Married since September 18, 2023*] for their love and support. I would also like to thank my advisor, Dr. Steven Manchester for his guidance and support during my time at UF. Additional thanks for support goes to my committee (Dr. Jon Bloch, Dr. Mark Bremner and Dr. Todd Palmer), my labmates, roommates, teachers and the North America Research Group. Finally, my ducks, particularly Marigold and Selva.



**Editor's Note:** We have some fantastic crab fossil preparers in our group. This paper from late 2023 mentions Bruce Thiel, Bob Manly, and Greg Gentry in the acknowledgements, as well as NARG.

## The Early Eocene Decapod Crustacean Fauna of the Lookingglass Formation, Oregon

Gustafson, Eric. The Early Eocene Decapod Crustacean Fauna of the Lookingglass Formation, Oregon. The Bulletin of the Museum of Natural History of the University of Oregon. Museum Bulletin No. 31. December 2023.

### Abstract

The Tenmile Member of the Lookingglass Formation (Lower Eocene) of southwest Oregon produced a diverse marine invertebrate fossil fauna including at least eleven genera of decapod crustaceans. This is the earliest Cenozoic crab fauna known from the Pacific Northwest and is one of the earliest on the west coast of North America. The fossiliferous sediments are generally fine-grained mudstones without much compaction, with evidence suggesting a low-energy environment in relatively shallow water and a mild warm climate. The abundance of complete crabs at some localities is exceptional and suggests repeated mass mortality caused by environmental conditions. Modern relatives of several of the taxa are burrowers. The fossils are often well-preserved in concretions. Preservation in concretions preferentially involves decaying crab corpses; other taxonomic groups are underrepresented in concretions. The fauna includes an unusual number of raninid crabs, in three genera (*Raninoides vaderensis*, *Rogueus orri*, and *Doraranina manleyi*) of which the latter two genera are only known from this formation. A scyllarid, *Llajassus caesius*, is one of a very few of this group known as fossils. Dominant in numbers is the euryplacid crab *Orbitoplax weaveri*, with specimens numbering in the thousands. Other crustaceans include the ghost shrimp *Ctenocheles hokoensis*, *Panopeus baldwini* (the largest crab in the fauna), *Eriosachila orri*, *Palaeopinnixa rathbunae*, and rare examples of *Archaeozius occidentalis* and *Marycarcinus hanna*. The abundance of specimens allows examination of several taxa as populations rather than individuals as is frequently the case in fossil crabs.

### Acknowledgements

This study was made possible by the combined efforts of many people. I was assisted in the field by Vic Favier, Susan Marasci, and Eric C Gustafson. Vic, Susan, and Dave Atwater put in many hours curating the thousands of specimens. Other collectors—earlier workers such as M.A. Kooser, William Orr, and Ross Berglund, and more recent collectors such as Bruce Thiel, Bob Manly, and Greg Gentry, the latter all part of the North America Research Group (NARG) of Portland—contributed greatly in donations of specimens. Bruce Thiel and Bob Manley provided some fine fossil preparation, often on very difficult specimens. Facilities, supplies, and other support have been generously provided by the University of Oregon Department of Earth Sciences. Greg Retallack and Edward Davis have been particularly supportive. Ron Eng supplied information about the Burke Museum collections. I thank other researchers in the field of crustacean paleontology for their assistance, comments and criticisms, and inspiration, particularly Rodney Feldmann, Torrey Nyborg, and Carrie Schweitzer. Reviews by Rodney Feldmann and Elizabeth Nesbitt considerably improved the manuscript. Finally, my wife Jessie has shown amazing patience in supporting my research efforts, even when such projects took many years. I shall forever be in her debt.

**Editor's Note:** Jim Goedert is a NARG advisor and long-time amateur paleontologist. He has been working with the Burke Museum and universities on his collection. This recent paper from April 2024 showcases a fossilized partial whale skull he discovered in Washington state. NARG donated funds to help with the preparation and study of this important fossil. Below is the abstract from the paper and the acknowledgement that lists NARG.

## The oldest mysticete in the Northern Hemisphere

Tsai, C-H, J.L. Goedert, and R.W. Boessenecker. 2024, **Current Biology** 34, 1794–1800 April 22, 2024  
<https://doi.org/10.1016/j.cub.2024.03.01>

### Highlights

- A new fossil mysticete is described from Washington State, USA
- This fossil represents the oldest known mysticete from the Northern Hemisphere
- The small body size contrasts with larger coeval whales in the Southern Hemisphere
- The coastal kelp ecosystem likely fostered the diversification of early whales

### Summary

Extant baleen whales (Mysticeti) uniquely use keratinous baleen for filter-feeding and lack dentition, but the fossil record clearly shows that “toothed” baleen whales first appeared in the Late Eocene. Globally, only two Eocene mysticetes have been found, and both are from the Southern Hemisphere: *Mystacodon selenensis* from Peru, 36.4 mega-annum (Ma) ago and *Llanocetus denticrenatus* from Antarctica, 34.2 Ma ago. Based on a partial skull from the lower part of the Lincoln Creek Formation in Washington State, USA, we describe the Northern Hemisphere’s geochronologically earliest mysticete, *Fucaia humilis* sp. nov. Geology, biostratigraphy, and magnetostratigraphy places *Fucaia humilis* sp. nov. in the latest Eocene (ca. 34.5 Ma ago, near the Eocene/Oligocene transition at 33.9 Ma ago), approximately coeval with the oldest record of fossil kelps, also in the northeastern Pacific. This observation leads to our hypothesis that the origin and development of a relatively stable, nutrient-rich kelp ecosystem in the latest Eocene may have fostered the radiation of small-sized toothed mysticetes (Family Aetiocetidae) in the North Pacific basin, a stark contrast to the larger Llanocetidae (whether *Mystacodon* belongs to Llanocetids or another independent clade remains unresolved) with the latest Eocene onset of the Antarctic Circumpolar Current in the Southern Hemisphere. Our discovery suggests that disparate mechanisms and ecological scenarios may have nurtured contrasting early mysticete evolutionary histories in the Northern and Southern hemispheres.

### Acknowledgments

We thank Green Diamond Resources, particularly Mark Golliet (Shelton, Washington office) for arranging permits and access to conduct research and make paleontological collections on their land. We also thank Gregory Wilson, Christian Sidor, Katherine Anderson, and Ron Eng (all UWBM, Seattle) for facilitating the loan of UWBM 109363 and allowing further preparation; Cheng-Han Sun for partial preparation and artwork restoring the Eocene kelp ecosystem; Olivier Lambert, Rachel Racicot, and two anonymous reviewers for constructive suggestions. C.-H.T. was financially supported by the Taiwan Ministry of Science and Technology (MOST 108-2621-B-002-006-MY3, 111-2621-B-002-006, 112-2621-B-002-005, now known as National Science and Technology Council, Taiwan) and public donations by the North American Research Group, Bestland Co., Ltd. (Tsukuba), and a fund-raising research account NTU FD107028.



**Editor's Note:** Jim Goedert is a NARG advisor and long-time amateur paleontologist. He has been working with the Burke Museum and universities on his collection. This recent paper from January 2024 showcases his finds from Washington state. Using fossil kelp holdfasts, researchers were able to describe an ancient kelp ecosystem. Below is the abstract from the paper. For an interesting five-minute interview with Ari Daniel of National Public Radio (NPR), follow this [link](#).

## Early Oligocene kelp holdfasts and stepwise evolution of the kelp ecosystem in the North Pacific

Kiel, S, Goedert, J, Huynh, T, Krings, M, Parkinson, D, Romero, R, and Looy, C.

### Abstract

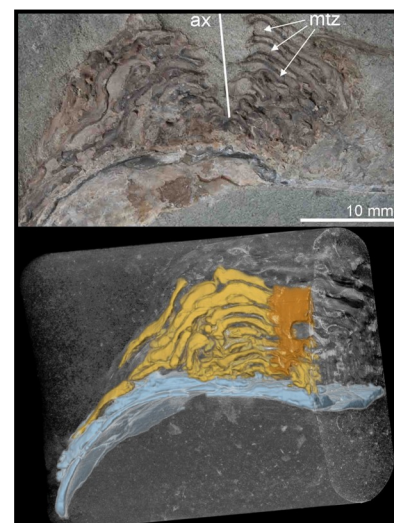
Kelp forests are highly productive and economically important ecosystems worldwide, especially in the North Pacific Ocean. However, current hypotheses for their evolutionary origins are reliant on a scant fossil record. Here, we report fossil hapteral kelp holdfasts from western Washington State, USA, indicating that kelp has existed in the northeastern Pacific Ocean since the earliest Oligocene. This is consistent with the proposed North Pacific origin of kelp associated with global cooling around the Eocene–Oligocene transition. These fossils also support the hypotheses that a hapteral holdfast, rather than a discoid holdfast, is the ancestral state in complex kelps and suggest that early kelps likely had a flexible rather than a stiff stipe. Early kelps were possibly grazed upon by mammals like desmostylians, but fossil evidence of the complex ecological interactions known from extant kelp forests is lacking. The fossil record further indicates that the present-day, multi-story kelp forest had developed at latest after the mid-Miocene climate optimum. In summary, the fossils signify a stepwise evolution of the kelp ecosystem in the North Pacific, likely enabled by changes in the ocean–climate system.

Kiel, Steffen & Goedert, James & Huynh, Tony & Krings, Michael & Parkinson, Dula & Romero, Rosemary & Looy, Cindy. (2024). Early Oligocene kelp holdfasts and stepwise evolution of the kelp ecosystem in the North Pacific. **Proceedings of the National Academy of Sciences of the United States of America**. 121. e2317054121. 10.1073/pnas.2317054121.



To the left: [The holdfast of a bull kelp on the beach in Pacific Grove, California](#). The holdfasts anchor the kelp to rocks and any creatures attached to the rocks — in this case, barnacles. Cindy Looy/UC Berkeley

To the right: [A fossilized holdfast](#) (top) with the axis (ax) where the stem, or stipe, would have attached. Arrows indicate the lobe-like meristematic transition zone (mtz) that divides into branching, finger-like haptera. At bottom is an X-ray reconstruction of the same 32-million-year-old fossil kelp holdfast colored to show the base (orange), holdfast (yellow) and the bivalve shell to which it attached (blue). Dula Parkinson, Berkeley Lab Advanced Light Source, and Tony



NARG and NARG member, Greg Carr, were mentioned in the acknowledgements of this recent paper about the spike-tooth salmon. From Greg Carr:

This paper covers the two specimens discovered in 2011, and the heads of these specimens recovered in 2012. I believe that Tim Fisher (NARG member) first found the articulated backbone of one specimen, and then Gloria and Greg Carr (NARG members) re-found it in 2011. The backbones were recovered in 2011, and the heads in 2014.

Using previously discovered salmon fossils as well as ones found by Greg, Gloria, and Tim, the authors propose renaming the sabertoothed salmon to spike-tooth salmon. They hypothesize multifunctionality of the spikes. Additionally, they show that the species has sexual dimorphism where males and females have different characteristics.

## From sabers to spikes: A newfangled reconstruction of the ancient, giant, sexually dimorphic Pacific salmon, *Oncorhynchus rastrosus* (SALMONINAE: SALMONINI).

Claeson KM, Sidlauskas BL, Troll R, Prescott ZM, Davis EB (2024) From sabers to spikes: A newfangled reconstruction of the ancient, giant, sexually dimorphic Pacific salmon, †*Oncorhynchus rastrosus* (SALMONINAE: SALMONINI). PLoS ONE 19(4): e0300252. <https://doi.org/10.1371/journal.pone.0300252>

### Abstract

The impressive †*Oncorhynchus rastrosus* of the Pacific Northwest's Miocene and Pliocene eras was the largest salmonid ever to live. It sported a hypertrophied premaxilla with a pair of enlarged teeth which the original describers reconstructed as projecting ventrally into the mouth, leading them to assign the species to “*Smilodonichthys*,” a genus now in synonymy. Through CT reconstruction of the holotype and newly collected specimens, we demonstrate that the famed teeth projected laterally like tusks, not ventrally like sabers or fangs. We also expand the original description to characterize sexual dimorphism in mature, breeding individuals. Male and female †*Oncorhynchus rastrosus* differ in the form of the vomer, rostrum, dermethmoid-supraethmoid, and dentary, much as do other extant species of *Oncorhynchus*. Male specimens possess a more elongate vomer than do females, and female vomers have concave ventral surfaces and prominent median dorsal keels. The dentary of females has no evidence of a kype, though some specimens of †*O. rastrosus* have a non-uniform density mesial to the tooth bed, which we interpret as a male kype. Unlike extant *Oncorhynchus*, male and female †*O. rastrosus* do not differ in premaxilla shape. Because male and females possess hypertrophied premaxillae and lateral premaxillary spikes, the former common name “Sabertoothed Salmon” no longer reflects our understanding of the species' morphology. Accordingly, we redub †*O. rastrosus* the Spike-Toothed Salmon and postulate that its spikes were multifunctional, serving as defense against predators, in agonism against conspecifics, and as a practical aid to nest construction.

### Acknowledgments

We thank Gateway Quarry Landowners for access to the land and donation of specimens. G. Carr and North American Research Group for donating specimens; P. Konstantinidis and G. R. Smith provided helpful discussion and insight about premaxillary tooth morphology among fishes. The Academy of Natural Sciences Philadelphia of Drexel University provided access to VGStudio Max.

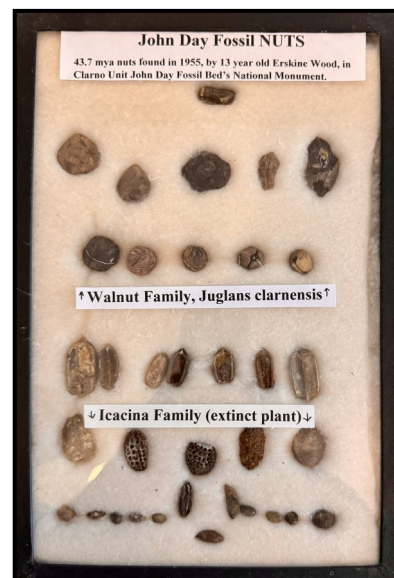
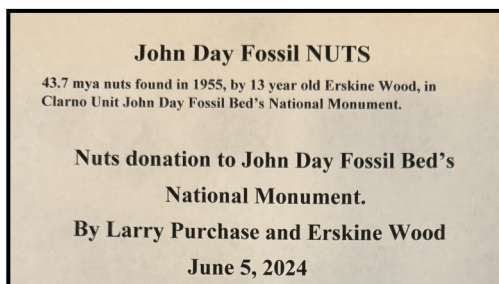


## Donation to John Day Fossil Beds National Monument

At NARG's June meeting, Larry Purchase shared a display of fossil nuts his long-time friend, Erskine Wood, had collected in 1955 from the Clarno Unit of John Day Fossil Beds National Monument. Our speaker for the night was Nick Famoso, the Paleontologist for the JDFB. Larry recalled collecting in the area back in 1955 when teenagers were blowing the hillsides with TNT to collect. "Things are a bit different now." Larry let us know that he was donating these fossilized Juglans and Icacina nuts to the John Day. They were mailed in care of Nick and will remain in the John Day collections.



One of our own "fossil nuts," Larry Purchase



## Upcoming Field Trip

Our June 2024 field trip will focus on fossil areas around Post, Oregon. These include:

- 1) the BLM sections just to the East of Post itself (new parts we haven't explored before),
- 2) the Pink Limb cast area off of Camp Creek road.

The dates are Friday 6/28 to Sunday 6/30. I will be camping at Elkhorn campground, which is a few miles East of Post, south of highway 380, on NF road 16 (Drake Creek Road) Friday and Saturday night. A link to Google map location of the campground is

[https://www.google.com/maps/place/Elkhorn+Campground/@44.1240559,-120.3372797,443m/data=!3m1!1e3!4m6!3m5!1s0x54b96cddb62c92b1:0x8c6f7bf4165a56a4!8m2!3d44.079009!4d-120.32029!16s%2Fq%2F11q8lgw2x\\_?entry=ttu](https://www.google.com/maps/place/Elkhorn+Campground/@44.1240559,-120.3372797,443m/data=!3m1!1e3!4m6!3m5!1s0x54b96cddb62c92b1:0x8c6f7bf4165a56a4!8m2!3d44.079009!4d-120.32029!16s%2Fq%2F11q8lgw2x_?entry=ttu)

If you don't want to dry camp at the campground (no running water) you can stay in Prineville and come out during the days. Post is about 27 miles from Prineville and will take you about 40 minutes to drive there. The campground is an additional 12 miles from Post.

We have been to both these locations before. However, I intend to do more walking than usual, in particular to explore more of the area around the Post BLM. However, the big basin at Post is hard to beat with its unusual crystals and petrified wood, so you can hunt there if you want. Temperatures will be hot - bring lots of water, be prepared for sun, and we'll have to watch out for heat stroke!

Plan on doing surface collecting - bring a backpack, rock hammer or trowel, wrapping materials. I will have my pickup and can take people to the more rugged areas at the Pink limb cast area if you have a normal car.

As usual, if you have questions, please contact me. Greg Carr - 503 367 4085

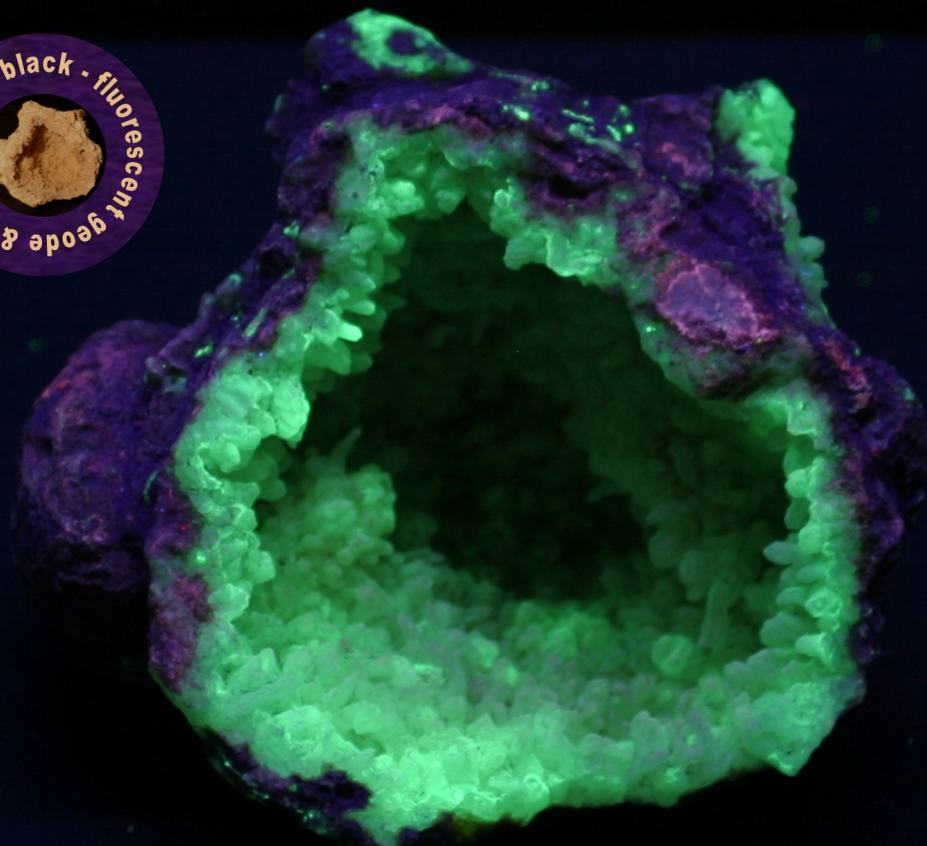
Portland Regional Gem & Mineral Show Assoc. (a non-profit 501(c)(3) org.)

## 43rd Show of Gems, Minerals & Fossils

**Wingspan Event and Conference Center**

At Westside Commons, 801 NE 34th Ave., Hillsboro, OR 97124

**October 4-6, 2024 Fri & Sat 10-6, Sun 10-5**



**40+ Dealers / Presentations / Fossil Discovery Area / Kids Activities**



**Door Prizes / Silent Auction / Demonstrations / Exhibits**

**Admission \$7 weekend pass, kids 12 & under free**

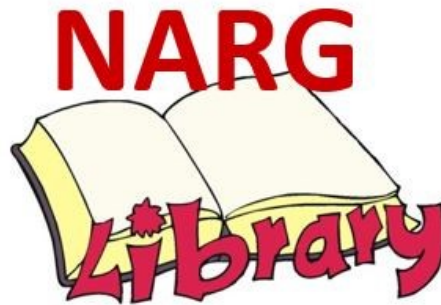
Venue charges separately for parking.

[www.portlandregionalgemandmineral.com](http://www.portlandregionalgemandmineral.com)

PRGMSA is a 501(c)(3) nonprofit and not affiliated with any school program or district







The NARG library has just become easier for members to use. The 430 books can be viewed by using the link below. Once you find a book you want, click on it and find its 'index' number. Requests for books using the index number are made to danolough@aol.com. He will notify you if the book is already checked out. If it is not, he will bring it to the next NARG meeting. Members can check out 2 books at a time and should return them at one of the following 2 meetings.

<http://cloud.collectorz.com/danolough/books>

## NARG Membership

NARG's annual membership dues are due January 1, 2024.

|                       |      |
|-----------------------|------|
| Individual Membership | \$25 |
| Family Membership     | \$40 |
| Student Membership    | \$10 |

**Pay your membership by:**

**\*Mail a check and [application](#) to:**

NARG (North America Research Group)  
Membership  
PO Box 233  
Tualatin, OR 97062

**\*Renew membership and pay via credit card with PayPal (No account necessary):**

Use the following links:

**Family membership: \$40, click [here](#).**

**Individual membership, \$25, click [here](#).**

**Student membership, \$10, click [here](#).**

# Fossil Calendar

|            |                                                                                                                 |
|------------|-----------------------------------------------------------------------------------------------------------------|
| June 28-31 | Post, OR Field Trip (See page 11 for details)                                                                   |
| July 3     | NARG Monthly Meeting, <a href="#">Kathleen Pigg</a> speaker (Zoom), Tualatin Heritage Center, Tualatin @ 7PM    |
| July 8-13  | Woodburn Fossil Dig, Woodburn High School, 9AM-1PM                                                              |
| July TBD   | Second Summer Field Trip                                                                                        |
| Aug 3      | FossilFest at the Tualatin Heritage Center 8AM-4PM                                                              |
| Aug 7      | NARG Monthly Meeting, Picnic and Future of NARG, Tualatin Heritage Center, Tualatin @ 7PM                       |
| Sept 4     | NARG Monthly Meeting, <a href="#">Liz Nesbitt</a> speaker (in-person), Tualatin Heritage Center, Tualatin @ 7PM |
| Oct 2      | NARG Monthly Meeting, <a href="#">Brandon Peacock</a> speaker (Zoom), Tualatin Heritage Center, Tualatin @ 7PM  |
| Oct 4-6    | Portland Regional Gem and Mineral Show                                                                          |

Check the [website](#), emails, and [Facebook](#) for any updates.

For a listing of local gem and mineral shows, check out:

<http://www.mineralcouncil.org/shows.pdf>

<http://orerocon.com/> Click on Portland Area Rock Clubs (includes PNW Clubs)

## NARG Officers:

|                 |               |                              |
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|                    |                                                                                                    |
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| FossilFest:        | Tara Baker<br>Debbie Shannon                                                                       |
| NARG Fossil Swap:  | Debbie Shannon<br>Gerry Lukos                                                                      |
| Portland Regional: | Debbie Shannon<br>Tara Baker                                                                       |



## NARG's Mission Statement

To encourage responsible stewardship of earth's paleontological resources; to promote scientific research, communication, and public education.