



NARG NEWSLETTER

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Northwest FossilFest 2022

After a two-year hiatus due to COVID, NARG sponsored a successful Northwest FossilFest on August 6, 2022. The theme of the event was "A Look to the Past: Fifteen Years of Paleo Search and Rescue in the Pacific Northwest." It was a chance to show-off some of NARG's successful projects including a fossilized whale skeleton retrieval, recovery of several partial thalattosaur skeletons, and, most recently, the discovery and collection of more than six spike-tooth salmon specimens. This was the first year the Fest was held at our new location at the Tualatin Heritage Center. Previously, the event took place at the Rice Museum in Hillsboro.

Between one to two hundred people attended, including many children with their families. The kids' spinning wheel with fossil and dinosaur prizes was a big success, with Robert Rosé hosting that area. Another popular activity, supervised by Gordon Hale, was sifting for shark teeth fossils. Kids were thrilled to be able to leave with real fossils!



Robert Rosé in the Kid's Corner

Aaron Currier provided identification assistance to folks who brought in fossils. One woman had found a *Desmostylus* bone at the Oregon Coast! Joe Cantrell demonstrated his fossil photography technique, again showing how art and science can be interwoven. Greg Carr gave two talks: one describing the recent discoveries of extinct salmon skeletons near Madras (see article later in this newsletter) and a second on the discovery of thalattosaurs in Central Oregon.



Aaron Currier in the fossil ID corner



Joe Cantrell demonstrating photo techniques

Continued from previous page, FossilFest

Attendees were able to view displays that covered a wide range of topics and expertise of members, including trilobites, Oregon beach bone, prepared crab fossils, petrified wood rounds, Menagerie Wilderness plant fossils, cut and polished dinosaur bone, and more. After learning about the club's diverse paleontology interests, folks were able to purchase their own living fossils (*Ginkgo* and *Metasequoia* tree starts grown by Dan O'Loughlin), as well as FossilFest t-shirts. This year's illustration of a thalattosaur was designed by NARG's talented artist Lisa Schenk.

Special thanks for Linda Harvey for planning and organizing the FossilFest to fit our new space. Also, special thanks to Dan O-Loughlin for his storage and transportation of all the display cabinets, tents, and many other supplies needed for the event. And finally, thank you to the many NARG members who volunteered during the event, and who set-up and tore-down the large number of display boxes, tents, and tables for this year's FossilFest. It really is a spectacular event that showcases our club's many successes, and it takes many people to make it a success!



Greg Carr in front of his display about Bernie, the Thalattosaur



Lisa Schenk's illustration for this year's theme



Isaac Gagner talks with a friend while volunteering at a FossilFest table



Larry Purchase and Robert Rosé at set-up

Continued from previous page, FossilFest

A few of the display cabinets from Northwest FossilFest 2022.



A display showing a survey of Menagerie Wilderness plant fossils by Robert Rosé



A display of cut and polished agatized dinosaur bone by Dan O'Loughlin



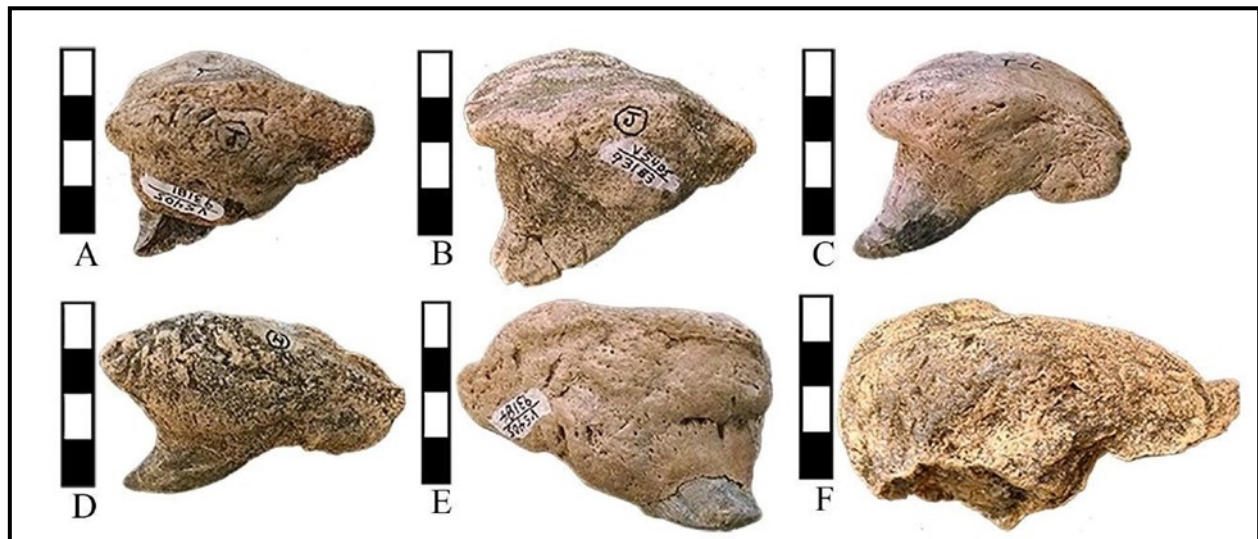
A display of Oregon Coast mammalian and fish fossils by Debbie Shannon, Tara Baker, and Greg Carr

Trip Report: Salmon Recovery Dig at Vibbert's Gateway Quarry

A group of NARG members, joined by staff of Columbia Springs Nature Center and Samantha Hopkins of the University of Oregon, had a fossil dig on June 18 & 19, 2022. The dig was at a gravel quarry owned by the Vibbert family near Gateway, Oregon, about 12 miles north of Madras, in central Oregon. This quarry has a long history of supplying excellent specimens of *Onchorhynchus rastrosus*, known by the nickname of "Saber Tooth Salmon" or more recently "Spike Tooth Salmon." To read a brief history into the understanding and naming of this animal, please click [here](#). Between 1960 through 2014, the quarry yielded four skulls of these animals. This year, however, another six to seven specimens were identified by Greg Carr, who periodically visits the quarry to look for new specimens. He removed one specimen in May 2022 and identified many more potential specimens. Due to the large number of specimens and the large amount of work to remove them, the NARG group Summer field trip in June was used to do a formal field excavation and fossil recovery.

History of *Onchorhynchus rastrosus* discoveries

Though currently inactive, the quarry was once used to provide road fill when the Gateway Grade road was constructed in the 1950s. After the quarry was opened, members of the Vibbert family began to collect fish bones from it, including large teeth of unusual size and shape. Similar teeth had been found in California and were determined to belong to the extinct large salmon species, *Onchorhynchus rastrosus*. Here is a picture of the teeth from the article by [Sankey, et. al.](#) that describes these unique teeth.



The first specimen found at this quarry became a 'type specimen' of a supposed new species, "*Smilodonichthys rastrosus*." ([Cavender, T., & Miller, R. R., 1972](#)). However, scientists recognized that this species had been previously described, and the specimen is now known as *Onchorhynchus rastrosus*. Link to the UO museum reference: <http://natural-history.uoregon.edu/collections/web-galleries/saber-toothed-salmon> The original specimen was found in 1964. Another very complete skull was recovered in 1980 by Reuben Holeman. This specimen remained in his collection until it was acquired for the University of Oregon (UO) by the NARG group from an Ebay auction in 2018.

Two more specimens were found in 2011, originally by Tim Fisher, and later re-discovered by Gloria Carr, both NARG members. These specimens included two articulated backbones, lying side-by-side, recovered in a dig in 2011. The skulls of these two animals were recovered in 2014 in a separate dig once the cliff above the skulls had eroded enough that they were safe to excavate. These were the first specimens at UO with the big teeth in-situ.

Continued from previous page, Salmon Field Trip

The two big teeth of this salmon are only lightly fastened to the rest of the skull bones and frequently fall off and are found separately. The original skull's teeth were separate, and the drawing reconstruction had the teeth pointing down like they were used for feeding.

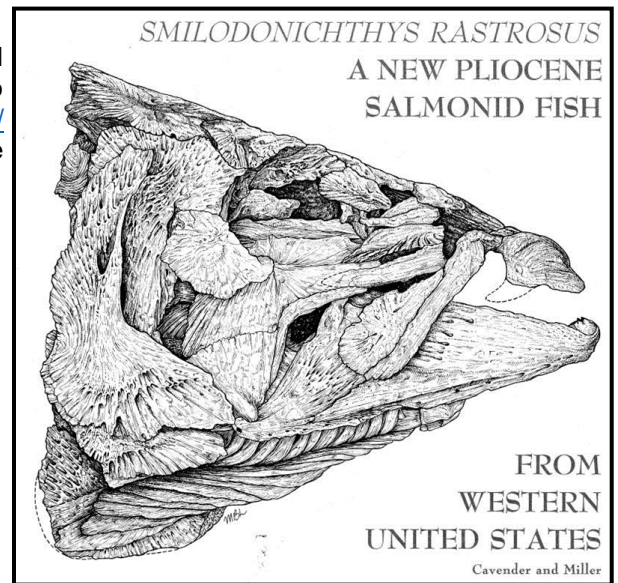
However, two skulls recovered from the Vibbert quarry in 2014 had the teeth in situ, showing that the teeth pointed sideways. This led to a very different understanding of the animal. <https://deepblue.lib.umich.edu/handle/2027.42/134040>. Other links can be found to this radical change:

<https://www.ccfeg.org/about-spiketooth>,

<https://around.uoregon.edu/content/fish-storymuseums-sabertooth-salmon-gets-its-teeth-fixed>,

<https://around.uoregon.edu/content/fossil-findsyield-surprise-about-oregons-sabertooth-salmon>.

Enough history – what happened at the dig?



Field Trip Report

The inactive Vibbert quarry is basically a large cliff of lightly cemented gravel with a flat floor to drive on. Attendees arrived by 10 AM on Saturday June 18, 2022. We had 11 people according to the insurance slip – Anthony and Tara Baker, Steve and Debbie Shannon, Katherine and Michael Cory, Brian Rauh, Aubrey Cloud, and Greg, Gloria, and Eric Carr. On the second day we had some of these folks as well as Doug Olson, Shelly Scofield, Alberto Gonzalez, and Samantha Hopkins. Katherine, Aubrey, Shelly, and Alberto are from the [Columbia Springs Nature Center](#).

Initially, the attendees were tasked with merely finding the fossils embedded in the cliff face. After the first one was found, Greg Carr showed us where the other ones were. Most people were amazed at how difficult the fossils were to identify even if they knew where the fossils were. Here is a group picture of people digging at the cliff face:



Continued from previous page, Salmon Field Trip

Here's what some of the fossils looked like in-situ:



Specimen 1: Skull Fragment



Specimen 2: Backbone

More digging at the cliff face, Day 2. Note the larger holes where some of the fossils have been removed.



Part of the NARG dig-site crew (Photo by Doug Olson)

Continued from previous page, Salmon Field Trip



We recovered 3 large blocks (torso size), 4 medium blocks (head size) and 31 small blocks (hand size) weighing hundreds of pounds in total. We believe there were about 7 specimens in whole or part: one entire skull, two partial skulls, some fins and lots of articulated backbones. We left two skulls behind as there wasn't enough time to do the large excavation to collect them. They are safe buried deep in the cliff face. Maybe next year!

Here's a picture of the specimens loaded in the back of a pickup truck! Hundreds of pounds of rocks!

No one got hurt, and thanks to the wonderful support from the Vibberts: they even provided a Porta-Potty® for our use while we were there!!! It was much appreciated by all the participants. We cleaned up after ourselves and removed some plastic debris that was at the back end of the quarry.

The NARG group would like to thank the Vibbert family for letting us excavate these fossils, and even providing a Porta-Potty® for our use while we were there!!!

Sincerely, Greg Carr



Continued from previous page, Salmon Field Trip

Up-date on recovered salmon fossils:

Tuesday June 21 at OMSI, Greg did a little work on specimen #6, a very small part of a skull. The skull piece is nothing much, about the size of a hockey puck. However, in the rest of the block he found the first known tail of one of these salmon! It is still being prepared but attached is a preview.

The connection to the backbone is up, with one vertebra still attached. There should be many treasures to be found in these rocks!



Science Literature Research Hints

Jim Goedert, NARG advisor, was looking for specimens of tube worms for a researcher in the Czech Republic. Bob Manley, Greg Gentry and I gathered what examples we had (mostly attached to crabs) and sent them to Jim. The Czech researcher, whose English is limited, wrote back thanking us and asking if we could help him find an obscure California paper from 1916 on Eocene ocean fauna. I offered to help, but Jim had already answered with this helpful hint:

"When you need papers like this, the best place I have found is the [Biodiversity Heritage Library](#). It is amazing how much has been scanned now and is available to download, for free! It takes a little practice to do the searching and then select what you want – either a whole paper or just a couple of pages – and then it builds a PDF. They send you a link in an email, and you download the paper. Might be good to put in the newsletter. It really is amazing how much information these days is available 'at our fingertips' "

Shared By Bruce Thiel

Arbuckle Mountain Field Trip Report

On July 23-24, 2022, a group of NARG members visited the fossil plant site at Arbuckle Mountain located near Hepner in Central Oregon. Several people actually showed up on Friday the 22nd and dug at the main dig site before the nominal leader even got there!

Attendees were: Isaac Gagner, Gloria Carr, Greg Carr, Tara Baker, Bruce Watson, Kent Gibson, Arnold Williams, Scott and Andree Kraker. Isaac had just joined the NARG group a few weeks before so this was his first NARG trip – but not his first fossil hunting trip!

Arnold had camped alongside the main access road (FS5370) a mile or so past the usual dig site. Saturday morning he went further along the road until he met a locked gate just before the road accesses a stream. He turned around to head back and felt an urge to pull over to examine an un-dug road cut. Within ½ hour he filled the back seat of his sedan with wonderful fossilized palm leaves. [See Arnold's story in the next article.] He was nice enough to share this new dig site with the rest of the group and we dug there the rest of the morning with great success. We all got great palm leaves as well as excellent deciduous leaves with little trouble. The site, to be called "Sir Arnolds Dig Site", is 3.5 miles from Arbuckle Corral along FS5730.

Several of the folks went home Saturday afternoon since they all got what they wanted. Kent Gibson took home the largest palm specimen, almost 3 foot long (one piece!). (Picture below.)



It is definitely worth going to Sir Arnold's site – the digging is much easier than the usual 2 roadcuts, and the fossils are spectacular!

Sincerely, Greg Carr



Arnold Williams with a large palm leaf and petiole



Bruce Watson showing his palm leaf find from the site.

Continued, Arbuckle Mountain Field Trip

One special fossil found may be remains of some seed pods.



Greg Carr examining leaf imprints at Sir Arnold Hill site.

Field trip Preparation to Arbuckle Mountain

Arbuckle Mountain has deposits of plant material, probably dating from the Eocene. At one time there were some unprofitable coal mines there with mining from poor-quality coal layers. This is good news for fossil hunters since these types of mixed organic/inorganic layers are the best for fossils. The locality is most famous for large palm leaf fossils. Robert Rosé has a great but unwieldy specimen. One of the digging spots has a definite layer of palm leaves in it. I think the NARG group last visited it in 2013.

There are many locations where plant fossils occur. The best location, which has the palm layer, is found on a sharp bend on USFR 5730.

The dig site is located close to 'Arbuckle Corral' (GPS 45.22295, -119.26341), which is a nice place to dry camp. For those wanting more amenities, there is a county park, Cutsforth Campground, a few miles from the dig area. Link for information and reservations: <https://cutsforth.morrowcountyparks.org/>. And there are motels in Heppner, the town closest to the dig site. I have scheduled the dig for July 23rd and 24th, 2 ½ weeks from now. There are still some camping sites at the park available.

The digging here in the usual roadcut is hard rock – you will need hammer and chisel at a minimum, bars, sledgehammers and splitting wedges can be used on larger blocks. I will be bringing some of these. Be prepared to dig out and split rocks. There are many leaves, you won't need to hunt around to find them. Getting the palm leaves can be a lot of work since they are large fossils.

Getting there: Heppner is in North Central Oregon. Follow directions from normal map companies. Groceries and services are located in Heppner. Read up about their flood in 1903 – 238 people died! Follow Highway I-84 east to state highway 74, just past Arlington, Oregon. There are other ways to get there as well, take time to enjoy the trip.

From Heppner, go south out of town on highway 206/207, the Heppner – Spray road. Turn left (East) on Willow creek road. Follow along Willow creek road approximately 21 miles to Cutsforth park.

From Cutsforth park, to the dig-site, backtrack about 1 mile along Willow creek road. Go East on NF5326 – Shaw Grade Road. Follow this road for 3.7 miles to an intersection with USFS 50. Then turn left. Follow USNF 50 for 1.7 miles to arrive at Arbuckle Corral. From the Corral go to USFS 5730 approximately 1 mile to the main dig site, or 3.5 miles to "Sir Arnolds Dig Site".

Sincerely, Greg Carr

The Discovery of Sir Arnold Hill Fossil Site on Arbuckle Mountain

I went on my first field trip with NARG to Arbuckle Mountain this July. I arrived on Friday afternoon, July 22, and did a little digging with Kent Gibson at the main site. I recovered a few small plant fossils. As evening rolled around, I drove up the road to find a nice spot to spend the night.

Saturday morning, I woke up at 5:00 AM. I ate two Ding Dongs, drank a Pepsi, and was ready for the day. Since it was early I decided to do a little exploring, so I headed down the road hoping to get to the creek area. I had read that there might be fossils at this location. After driving a couple miles, I came to a gate blocking the road. I turned around and headed back planning to go meet up with the group. As I drove, I was looking at road cuts to see if there was anything interesting. As I came to one roadcut, I saw some promising rock formations. I grabbed my hammer and chisel and made my way up the steep slope. As I checked out the area, I noticed a fossilized palm frond sticking out of a large boulder. Then I noticed a few leaf fossils sticking out of the same large rock. I started chiseling it off in layers. Each layer was full of leaves and palm fronds. The last piece had a nice palm frond with stem. I was pretty excited about my discovery.

I slid everything down the slope to the road's edge, drove my car up to the specimens, and started to load everything in bubble wrap. I headed back to the main dig site where I found Kent reading a sasquatch book. I told him I was done collecting and showed him what I had found. Shortly after that, the rest of the group started to arrive. After joking around about what it would cost everyone for me to reveal the location of my site, we decided to go see what could be found. I led the group back to the road cut and everyone attacked the hill like a herd of giant gophers.

Kent went to the spot where I had worked, and after clearing out a bigger area, he started pulling out large palm fronds. One after another, large specimens slid down the hill. Other members of the group were working on other rock outcroppings and recovering some nice leaf plates. I sat in my chair, drank a Pepsi and enjoyed watching everyone work.



Kent Gibson excavating for palm fossils with crowbar



NARG members working sites on Sir Arnold's Hill roadcut

Continued from previous page, Discovery of Sir Arnold Hill

It was decided the site would be named Sir Arnold Hill. By 11:30AM everyone had recovered some nice specimens and we sat back and had lunch. I'm sure the site will produce more specimens another day. It was a great field trip and will go down in Rock history! It was also very enjoyable getting to know the members of the group. A truly great bunch of people. As I drove away to head home, I wished everyone peace and love and the smiles on their faces warmed my heart.

By Arnold Williams



Collecting and Preparing: A Look Into the Rich Cambrian of Utah

Collecting:

Utah is famous for its trilobite fossils, particularly the hundreds if not thousands of *Elrathia kingii* and *Asaphiscus wheeleri* produced from the U-Dig trilobite quarry every year. However, the Cambrian of Utah has much more to offer. This summer thanks to some generous help from local collector and professional preparator, Jonathan Ginouves, I was able to get a taste of the finer offerings of the area.



Jonathan provided us with 4 different localities to hunt: three of the famous Wheeler Shale, and one of the lesser known Weeks Formation. In Utah, my mother and I met up with the other half of our collecting crew, Evan Sizemore, volunteer preparation technician at the Chicago Field Museum, and amateur paleo-artist RJ Villareal. We set up camp at the main site, and within minutes of poking around at the exposed shale, I found the first fossil of the trip, and my first ever trilobite, this *Asaphiscus*. While less productive than the U-Dig quarry, these outcroppings of the Wheeler Shale are known to produce excellent colors.



Just a few hours into the first day of hunting I came across this bright red shape peeking out of the tailings (left in image). I immediately snatched it up, as this kind of coloration is common among the rarer finds of the formation, including phyllocarids, radiodonts, and worms. Initially, I was at a loss as to the identity of this critter. Later as the sun set and I sifted through the surface with a headlamp I found the negative side of the same creature (right in image), and immediately recognized it: *Pseudoarctolepis sharpi*! This Utah exclusive was something I've only dreamed of finding until now. Originally described as a phyllocarid, this bi-valved arthropod remains enigmatic to this day. It is only known from the Wheeler Shale and is among the rarest arthropods known from the formation.

Over the next few days, this site produced numerous *Asaphiscus*, *Elrathia*, and *Itagnostus*.

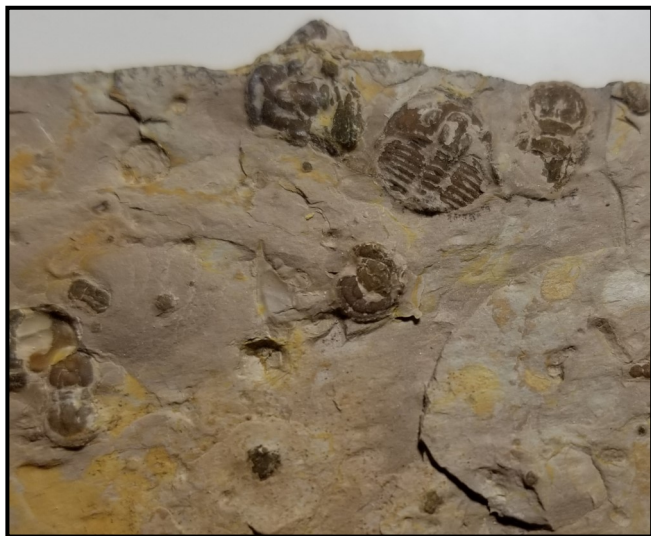


Elrathia kingii adult (left) and juvenile (right) found by myself and RJ, prepared by me.



Itagnostus interstrictus cluster

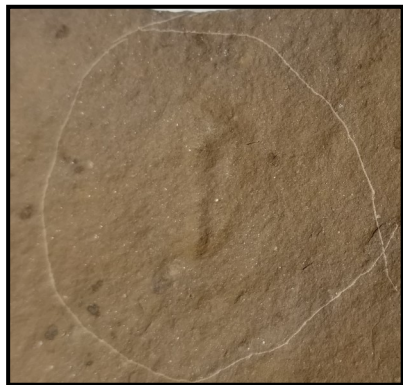
Continued from previous page, Utah Cambrian



At another of our Wheeler locations we ran into Gene Boardman, a U-Dig Operator, out in search of *Bolaspidella* and *Gogia* in the Marjum Formation. He took us to a highly productive nearby exposure of the Wheeler Shale where we spent some time digging with him and found numerous more trilobites.

Elrathia kingii and *Itagnostus interstrictus* from Gene's Wheeler site, unprepared.

Lastly, we spent an afternoon at the Weeks Formation site. This formation is notoriously difficult to collect: the shale is difficult to split and, unlike the Wheeler Shale, the trilobites do not split close to the surface. The trilobites from Weeks are typically found as "ghosts". When found, the trilobite is still buried in the stone and only a faint impression of the fossil's general shape can be seen. Many of these "ghosts" can only be seen when the light hits them at the correct angle. In fact, some collectors visit this formation in the dark with flashlights for improved visibility. Here you can see a couple of such "ghosts".



Despite the difficulty, one's time is well spent in the Weeks Formation, the trilobites are breathtaking. In the prep lab, these 'ghosts' transform into trilobites like this ventral *Cedaria minor* I found and prepared.



After initial diagnostic abrasion



Completed specimen

Continued from previous page, Utah Cambrian

Preparing:

I have begun prepping the finds from this trip, but still have dozens of complete trilobites I've yet to begin working on. My preparation is done with a Paasche AECR abrasive unit using sodium bicarbonate and dolomite as mediums. To prevent incidental damage to the fossil during preparation, all abrasion is done under 10X magnification using a stereo-microscope.

The U-Dig specimens are the easiest to work with, while the matrix from Wheeler Shale locales that produce brighter colors are slightly more difficult to work with, and finally, the Weeks Formation specimens are much more time-consuming. An average sized *Elrathia kingii* from our main site seems to take me between 1 and 2.5 hours to prepare. The Weeks Formation Cedaria pictured above took about 4.5 hours to prepare from start to finish. The Marjum formation features a relatively soft matrix, but to preserve fine detail, it's crucial to abrade slowly. This 4.5 mm *Bolaspidea sp* took me about an hour of careful work. Found by Gene Boardman and given to me to prepare.



By Isaac Gagner

Fossil Tidbit- Convergent & Divergent Evolution

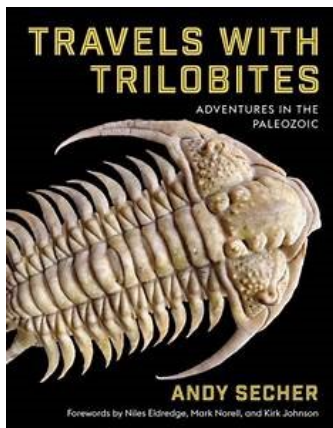
Divergent evolution is a process where species with a common ancestry slowly evolve. For example, mammoths and elephants evolved gradually from the same ancestor. This is opposed to convergent evolution where the independent evolution of similar features in different species occurs separately in different periods or epochs in time.

Perhaps one of the most astonishing cases of convergent evolution is the origin of flight. Flight appears to have evolved separately **four times** in history: in insects, bats, birds and pterosaurs. These four groups of flying animals didn't evolve from a single, flying ancestor.

The convergent evolution of eyesight is also an interesting feature to study. Scientists estimate that eyes may have evolved independently **as many as hundreds of times**, starting as early as 550 million years ago. According to one scientist's calculations, **if an eye improved just 0.005 percent each generation, it would take 364,000 years for eyes to evolve from a patch of light sensitive cells to the complex eyes we have today.**

Sources: Wikipedia, Scienceworld.ca, Richard Dawkins, "Flights of Fancy: Defying Gravity by Design and Evolution"

By Bruce Thiel



Book Review: Adventures in the Paleozoic

Early in the summer of 1956, when I was 15, my family camped at Beverly Beach on the Oregon coast. One day as I was searching for fossils in the beach-side cliffs (yes, it was legal then), my parents struck up a conversation with a couple from Alberta, Canada. The visitors wondered what that boy was doing up on the cliff? "Hunting for fossils," my parents responded. The couple suggested that we visit them in Drumheller, Canada, where I could prospect for bigger game: dinosaurs. My parents had always wanted to visit the Canadian Rockies, so in August 1956 we visited Alberta, and I collected bits and pieces of dinosaurs, with the permission of scientists from the Royal Ontario Museum.

On this trip, I suggested that we also visit the Burgess Shale in British Columbia — my Uncle Harold had given me his college geology textbook, which mentioned this Middle Cambrian site. Upon arrival, my mother gave me two hours to visit the site, some couple of miles up the mountain from Field, a Mounties station. I literally ran up that mountain! A couple of fellows working at the site befriended me and made sure that I left with some prized specimens: soft-bodied worms, and of course, trilobites. For example, I came away with a beautiful example of *Ogygopsis klotzi* (Rominger, 1887); and also a partial specimen, which clearly preserved its appendages on the underside.

So, when Andy Secher's book was announced, I knew it would be of considerable personal interest. It has not disappointed! Secher, a very gifted amateur trilobite collector and scholar, and Martin Shugar, a field associate at the American Museum of Natural History (AMNH), together edit the AMNH's impressive [trilobite website](#). Secher is par excellence as an example of a passionate private collector who has worked closely with a major museum — he has given the AMNH "important and scientific species" (p. xx).

Secher's personal "collection encompasses most of the known [trilobite] species" (p. xix), and many of these are reproduced in beautiful color photographs throughout the volume. Each specimen is identified by scientific name, geological period, and site where collected, typical size in centimeters, and comments: for example, "*Platylchas sp.*, Lowest Upper Ordovician, Caradocian; Kukruse Regional Stage; St. Petersburg, Russia; 2.5 cm." This genus was known strictly from scattered parts for more than a century. Recent discoveries, however, have provided both science and collectors with occasional complete specimens" (p. 95). The numerous illustrations are stunning, of generally complete examples, and beautifully prepared.

The book is organized chronologically, by Paleozoic subdivision. For each period, in addition to the photos, Secher describes sites noted for their abundant and/or rare species, but can't resist inserting photos of as many specimens as, I suspect, the publisher would allow!

Inserted into the text, here and there, are brief introductions and commentaries on numerous topics of interest, for example, molting, eyes, pathology, predation, enrollment, exoskeletons, preparation techniques, and the cost of acquiring specimens commercially.

A final section, "Trilobite Thoughts and Observations," covers a miscellany of topics, for example, fossil shows, the commercial market for specimens, museums, fake trilobites, strange species, preparators, trilobite color patterns, and much more.

As impressive as this volume is, I'd like to have seen more attention to trilobite marine habitats, the different ecological niches of particular species, and also some attention to type specimens, rather than just the best, most complete, excellently prepared, eye-popping examples. Despite these caveats, Secher's superbly illustrated volume is highly recommended for anyone fascinated with these amazing, prolific, and long-lived Paleozoic marine bugs. And you can check it out of our library.

[A. Secher. *Travels with Trilobites: Adventures in the Paleozoic* \(New York: Columbia University Press, 2022\).](#)

By Harold E. Hinds, Jr.

Fossil and Mineral Collecting in the San Rafael Swell, Utah

In July I had the opportunity to return to my hometown of Price, Utah for a visit with my father and to get in some long-overdue rockhounding. This excursion was spent exploring new areas outside of my traditional hunting grounds, zig-zagging across the entire north section of the San Rafael Swell from Cleveland to Green River. My father and I spent many days walking the old Spanish trail as it hugged the jagged cliff faces of the book cliffs, opened into deep and ancient ravines, and laid bare hundreds of millions of years of history. Aside from the incredible variety of fossils we stumbled on, this outing proved particularly fruitful for a wide variety of beautiful minerals and crystals including stunning quartz stones, chalcedony, uranium, and muscovite to name only a few. Our collecting was done in a variety of locations which included BLM land and private property while following all federal, state, and local collecting regulations.

From locations nearer to Highway 6 at the far-northern end of the Swell we located several concretions/septarian nodules that proved to be denser than that of other specimens from nearby locations. While these concretions were more difficult to break open than what I have traditionally found, their contents did not disappoint. Within the first handful of stones, we had broken open a 3/5 complete specimen of a beautiful *Placenticerias ammonite*, by far the largest I had ever collected.

From there we travelled south towards Cedar Mountain, through desert plains densely packed with pear cacti as far as the eye can see and over the shockingly deep canyons carved by the Price River. Just south of the Cleveland-Lloyd Dinosaur Quarry and Jurassic National Monument we found a great series of dry washes leading in and out of long plateaus that were absolutely chock-full of an incredible variety of quartz and other minerals. Some of the quartz stones were nicknamed "Jupiter Stones" by my daughter Bridgette as many had similar banding as the gas giant.



Placenticerias ammonite



Quartz and other rocks, including "Jupiter stones" collected in dry washes

Continued from previous page, San Rafael Swell

From there we ventured north again towards the community of Miller Creek, driving along dirt roads maintained by the many gas companies operating in the area. We passed through remnants of ghost towns marked only by the derelict cemeteries of pioneers long dead but whose stories and experiences can still be felt through the stunning vistas in all directions. Between two of these ghost towns, in an area where we could collect, we resumed our search from the previous year for cretaceous fish teeth which proved to be far more prolific than we had anticipated. As we had done the previous year, once we located an anthill that we confirmed was uninhabited, it was relocated into a five-gallon bucket and brought back to my workshop for sifting and sorting.

The prior year, the anthill we had examined produced approximately 100-150 specimens of chondrichthyan (cartilaginous fish: ie. sharks, skates, rays) teeth as well as a meteorite, and a limb small (~1cm) bone. This current anthill is approximately 90% sorted and, so far, I have collected approximately 1,500-2,000 teeth, five meteorites, and another small limb bone. It may go without saying that my vision and back have both suffered greatly as a result of this cretaceous bounty, but I'm certainly not complaining. The teeth represent a remarkable variety of life with canine, incisor, and drum teeth of incredible quality representing species from carp to sharks and so many fascinating varieties in-between. Once the sifting and sorting is complete my plan is to create high-quality displays by placing the teeth in anatomically correct orientations matching the species jaws within nice frames that can then be mounted. As there are so many teeth to work with, I hope to be able to create a sequenced display beginning with the smallest sets teeth on the left with new and slightly larger ones in sequence from left to right showing anatomically accurate layouts of these ancient jaws.

By Nathaniel Woodward



Specimens collected from sifted ant-hills include chondrichthyan teeth, meteorites, and a small limb bone. (Limb bone in petri dish shown next to garnet for comparison.)



Chasing the Wallowa Mountain Ichthyosaur

The vicissitudes of COVID-19, high gas prices, and now the summer heat and inevitable fires, make it somewhat problematic for NARG members to plan field work. With careful consideration to these variables, here is a suggestion for a Fall trip based on our early Summer exploration. Jerry Dodson and I went in search of the famed Ichthyosaur of the Wallowa Mountains in Eastern Oregon.

The ichthyosaurus story begins in 1981 as recounted in the Baker City Herald. Dr. William Orr, a paleontology professor at the University of Oregon (U of O), led a group of geology students along Eagle Creek, about 30 miles from Baker City. Those students found several fossil vertebrae and ribs while exploring a road cut in the Martin Bridge Formation. Dr. Orr deduced that these specimens were from a Triassic Ichthyosaur (*Shastasaurus*) that had likely died in the Pacific Ocean off the coast of mainland China over 200 MYA. Plate tectonics then transferred the fossils, the volcanic islands, and tropical reef-like structures eastward embedding them in Eastern Oregon over the next 100 million years.

Of course, more bones were needed to confirm the identification. By an incredible stroke of luck in 1990, a student at an OMSI summer course found a limestone rock at the same road cut containing what proved to be the remains of an ichthyosaur skull.

Our trip used Baker City as a base camp and began with a visit to the [Baker City Heritage Museum](#) ichthyosaur exhibit. The Museum is worth a visit by itself. It has exhibits on the regional history and features a very large mineral and gem exhibit. Museum staff and volunteers are friendly and knowledgeable. Photos from the Museum's ichthyosaur exhibit are shown in Figures 1-3.



Figures 1-3. Photos of the Shastasour Exhibit, Baker City Heritage Museum (Photo credits: Lynn Weems Museum Director lweems@bakercounty.org)

Jerry Dodson had previously explored the Martin Bridge Formation with fellow NARG member Greg Carr in 2014. We were able to return to that original Eagle Creek site (see Figure 4 on following page) about 30 miles NE of Baker City using maps prepared by Larry Purchase (fellow NARG member) for a 2014 NARG outing to Eagle Creek and to Black Marble Canyon near Joseph. Access is via forest service roads that are dusty and graveled this time of year with washboard effects on inclines and declines.

Continued from previous page, Wallowa Mtn. Ichthyosaur

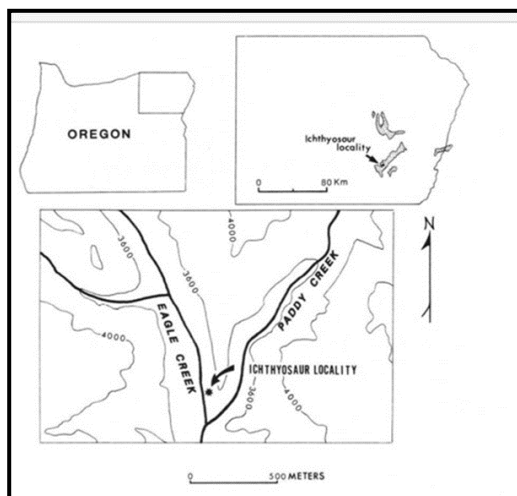


Figure 4. Area of Interest.

A NORIAN (LATE TRIASSIC) ICHTHYOSAUR FROM THE MARTIN BRIDGE LIMESTONE, WALLOWA MOUNTAINS, OREGON By WILLIAM N. ORR pp 41-47. Geology of the Blue Mountains Region of Oregon, Idaho, and Washington Geologic publications of Paleozoic and Mesozoic Paleontology and Biostratigraphy, Blue Mountains Province, Oregon and Idaho U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 1435 UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON : 1986

This site was nicely stratified but the cliff side of the road cut is unstable. Fortunately, there was plenty of material alongside the roadbed to explore.



Figures 5-6. Photos of the road cut and debris at Eagle Creek

After several hours of field work at Eagle Creek we followed the forest service roads to the summit to further explore the reef deposits. The photographs below show that the fossil reef deposits are exposed nearly up to the summit. The lateness of the day prevented systematic exploration of these deposits but marked a target for a future visit.



Figure 7. The pinnacle of the reef-like deposit below the summit



Figure 8. Wallowa Whitman Lookout station at Summit Point at 7006 foot elevation

Continued from previous page, Wallowa Mtn. Ichthyosaur

We discovered that both the limestone and the dark shale material contained evidence of a large variety of invertebrate life and some small quartz-filled wood slabs. These fossils are very small. Search as we might, no bone was found. These formations feature many bivalves and brachiopods. Figures 9-11 are examples of what we found.

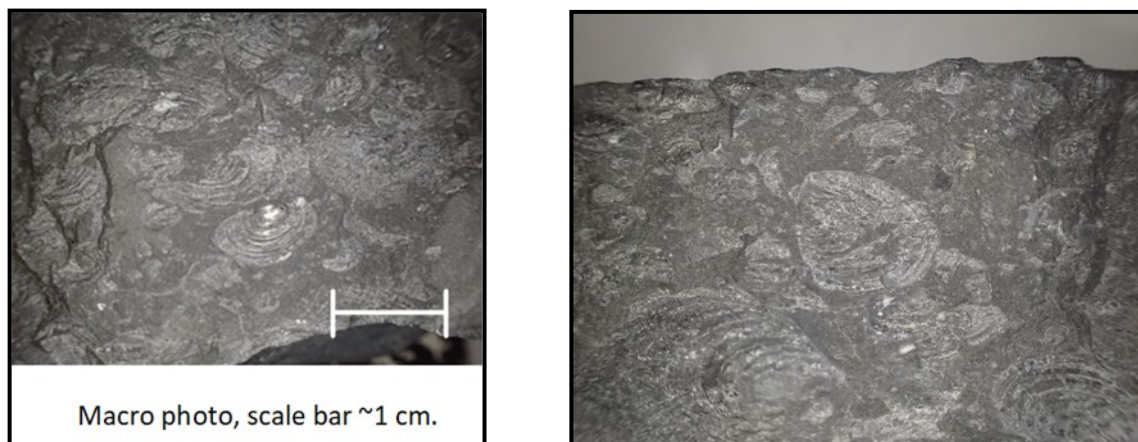


Figure 9. Photos left and right are macro views of specimen rocks. The scale bar applies to both. These are after acid prep.

Below are images from several specimens from the site.



Figure 10. Small quartz wood slabs.



Figure 11. Worm traces

Trip Report and Recommendation by Doug Olson

Woodburn, The Home of Really Small Pleistocene Animals

Another year excavating for Ice Age fossils beside Woodburn High School. Results showed once again that Woodburn was a great place for frogs, sticklebacks, muskrats, voles, and turtles to hangout about 13,000 years ago. Over 250 bones of these critters were found between August 15-20. What was special about this year was the number of school kids who showed up with their parents. Most were from homeschool groups, and ages ranged from pre-school to high school. It was fun to see the excitement that comes to kids when they find their first bone.

Many of the regular NARG crew were there as well. Debbie Shannon found quite a few small fish bones. We were able to catch a living stickleback in the nearby creek so she could compare the bones to verify that there were sticklebacks here 13,000 years ago.



A young family with their discovered Ice Age fossils from the site



Sifters set-up on site

In the middle of September, we will open another site for the high school students in Woodburn. The pit will be dug closer to the creek than in previous years in hope of finding more large bones. Back in 1986 during sewage line upgrades, many large bones of sloth, horse, and bison were found. This site is about 15 feet from the creek and is on the side of the creek that is owned by the City of Woodburn. The large bison skeleton that was found in 2008 was also about 15 feet from the high school-owned side of the creek, so logic would suggest we dig close to the creek to find more big bones. I will let you know what we find.

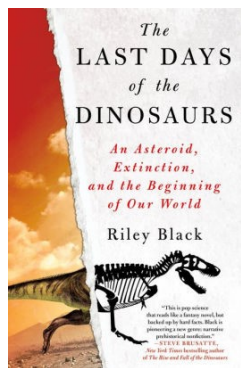
By Dave Ellingson

Ice Age Floods National Geological Trail

Dave Ellingson (second from left) attended the ribbon cutting for the temporary visitor's center for the Ice Age Floods National Geological Trail. It will be housed at the Tualatin Library where a ancient bison skull from Woodburn, a partial mastodon skeleton found in Tualatin, as well as other mammoth and Pleistocene bones, are on display.

Photo credit: Ray Pitz from Pamplin Media





Book Report: The Last Days of the Dinosaurs: An Asteroid, Extinction, and the Beginning of Our World

Not always does praise on a book jacket succinctly capture the essence of a book. Steve Brusatte and Michael J. Benton, two eminent paleontologists, nail it: “Black is pioneering a new genre: narrative prehistoric nonfiction” (Brusatte), and “the writing is founded on thorough and careful analysis of the rich scientific evidence that lies behind the story” (Benton). I would add that this book is literary paleo-art. For example, “every chapter ... [has] a living protagonist, some sort of species that might help tell the story of the Cretaceous and Paleocene worlds” (p. 244).

Do not skip the Notes, which cite her evidence; and be sure to read the Appendix, which “explains what’s fact and what’s hypothesis or invention” (p. 15). In fact, the book might best be read by starting with the Appendix, before the main text. The book is primarily based on the discoveries at Montana’s Hell Creek Formation. Black also adds, at the conclusion of each chapter, codas about other places and ecosystems, including Antarctica, North Atlantic, Asia, New Jersey, Utah, and New Zealand. The book is arranged chronologically, with chapters devoted to “Before Impact” [of the asteroid], 1 hour after impact, the first day after impact, the initial month after impact, then 100 years, 1,000 years, 100,000 years, and a million years after impact. So the book’s title is somewhat misleading, since at least half the contents are devoted, not to the dinosaur’s last days, but to “the story of how life bounced back from the worst day in history” (p. xii). And this is significant. Scientists have written extensively about the K-Pg mass extinction of dinosaurs, “but little has been said about life’s recovery during the Paleocene” (p. 215).

Unless you have kept up with the technical paleontological scientific literature on the period 66.043 — ca. 65 million years ago, and also on the next million years, you’ll certainly profit from Black’s vivid description and analysis.

Highly recommended, and it’s available in our library.

R. Black. *The Last Days of the Dinosaurs: An Asteroid, Extinction, and the Beginning of Our World*. (St. Martin’s Press, 2022.)

By Harold E. Hinds, Jr.

In the News: Joe Dabelko

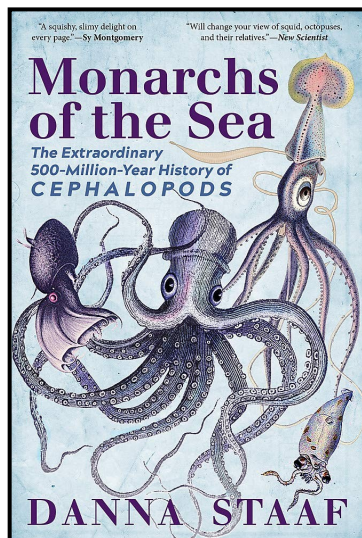
NARG member and Utah resident, Joe Dabelko, was recently featured in an article from the Salt Lake Tribune. Joe, who is a paleontologist, donated more than 200 of his collected fossils to a new interactive exhibit, “I Dig Dinos,” at the Discovery Gateway Children’s Museum in downtown Salt Lake City. The article describes Joe’s real interest in inspiring young people to learn about fossils and paleontology.

“When one little girl asks him when a “90 billion-year-old dinosaur egg will hatch,” he laughs, bends down to her level and tells her they’ll have to wait and see, since it hasn’t hatched yet.”

To read the entire article, please click [here](#).



Joe and museum executive director, Kathleen Bodelos
Photo credit: Chris Samuels, The Salt Lake Tribune



Book Review: Monarchs of the Sea: The Extraordinary 500-Million-Year History of Cephalopods

I am fascinated by octopus behavior and love seeing videos of how they solve problems, like opening a jar to extract a crab, or hide in plain sight with their amazing camouflage abilities. I was eager to read *Monarchs of the Sea* to learn more about octopus and their cousins. I soon realized, however, that, like taking a mouthful of ika sashimi (Japanese raw squid), I perhaps had bitten off more than I could chew.

The author discovered a love of cephalopods when she was about 10 years old and soon became known as “the girl with the pet octopus.” She eventually learned to scuba dive, went on to become a marine biologist, and earned a doctorate. This book is her effort to give cephalopods the “dinosaur treatment,” so more people can understand how these intriguing creatures once ruled the oceans.

The author writes in a breezy, fun style (e.g., she refers to squid as “swimming protein bars”), but the information she presents is dense, as it would have to be to cover almost half a billion years of cephalopod existence and decades of scientific literature. While this book probably won’t captivate kids – well, young kids, anyway -- it has plenty of content to appeal to adults who want to understand how modern octopus, squid, cuttlefish and nautilus came to be and how scientists interpret the fossils to speculate about how they moved, where they lived, what they ate – and what ate them.

There is so much new-to-me information in this book that I could retain only a small portion, but anyone who is interested in cephalopod paleontology would probably find a lot to like.

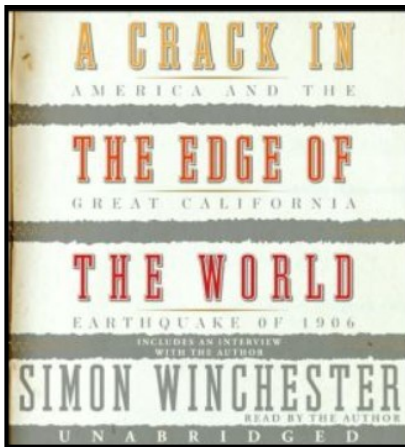
Available as an [ebook](#) through Multnomah County Library system.

D Staaf. *Monarchs of the Sea: The Extraordinary 500-Million-Year History of Cephalopods*. (The Experiment, 2020) (Originally published under title *Squid Empire: The Rise and Fall of the Cephalopods*)

By Gerry Lukos



Meme sent in by Bruce Thiel, shared from his Facebook feed



Book Report: A Crack in the Edge of the World-America and the Great California Earthquake of 1906

I recently finished reading my third book by Simon Winchester. This one is about the California earthquake of 1906. The other 2 books by this author that I have are: "The Day the World Exploded, Krakatoa" (2003) and "The Map that Changed the World-William Smith and the Birth of Modern Geology" (2002). These are both good reads as well.

In this book, the author talks about the history of San Francisco, a basic history of the western USA including geology, and a pretty detailed account of the 1906 big California quake and fire. The book has a big appendix with an explanation of the measuring scales for earthquakes, a glossary of terms used in the book and an extensive suggested reading list if you want to learn more about this quake.

Winchester begins by introducing a couple geologically turbulent years in the Earth's history. In addition to the big California quake in 1906, six other big earthquake/volcanic events happened around the world between 1905-1906. On January 31, 1905, an 8.8 (Richter scale) quake in Ecuador occurred. On February 16, 1906, another quake, between VII and VIII (Medvedev-Sponheuer-Karnik scale), shook Saint Lucia in the Caribbean. On February 21, 1906 there was a medium sized quake (not sure of the magnitude-he did not say) centered at Shemakha in the Caucasus Mountains. On March 17, 1906, there was a big quake (again not sure of the magnitude, he didn't say) in Taiwan called the Chiayi or Meishan quake. On April 6, 1906, Vesuvius erupted for 10 days and several villages were buried. In mid-August 1906, there was an 8.3 (Richter scale) quake in Valparaíso, Chile. (Note that the author explains the different earthquake scales in the appendix of this book.) This kind of makes you wonder if all of the activity was related somehow: I'm guessing, yes.

The author describes the 1906 earthquake effects centered at Mount Diablo State Park in the Bay Area of California. It sounds like an interesting place to visit. The park has views of the city of San Francisco, north to Mount Shasta and east to the Sierra Nevada. At the park, a beacon atop a building is lit once-a-year to memorialize the Pearl Harbor attack in 1941. The building is made from a local fossiliferous limestone. It might be worth a visit sometime to see the views and the fossils in the limestone used on the building.

The San Andreas Fault includes three different faults. From Cape Mendocino to the town of San Juan Bautista about 27 miles. The longer southern section runs from the beginning of the Sierra Madres southwest of Bakersfield, 350 miles to the fault's southern terminus at the Salton Sea. In between is a 125-mile-long section centered on the town of Parkfield. The entire fault is a right-lateral slip with the Pacific plate side on the west-side of the fault moving northward about an inch-and-a-half per year. The interesting difference in the three parts is that the middle section is always moving, but the other two parts do not move much at all: they are pretty much "stuck". This is what can cause big earthquakes. Lots of stress build up then a quick release.

I can recommend this book for those interested in reading about the geology of the California area and specifically about the 1906 earthquake and fire that resulted in more than 3000 deaths and destruction of the majority of San Francisco.

S. Winchester. *A Crack in the Edge of the World-America and the Great California Earthquake of 1906*. (Harpers Perennial, 2006).

By Debbie Shannon

Portland Regional Gem & Mineral Show Association (a non-profit organization)

41st Show of Gems, Minerals & Fossils

hosting the Northwest Federation of Mineralogical Societies

Wingspan Event Center

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

Sept. 30, Oct. 1-2, 2022 Fri & Sat 10-6, Sun 10-5

Photo - Bruce Kelley, All rights reserved, Copyright 2016. Magnetite, Enstatite, from Summit Rock, Klamath Co., OR.



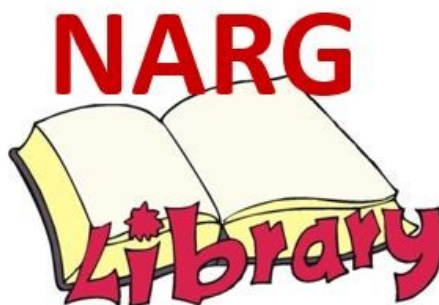
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The NARG library has just become easier for members to use. The 430 books can be viewed by using the link below. Once you find a book you want, click on it and find its "index" number. Requests for books using the index number are made to danolough@aol.com. 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 membership dues are due January 1, 2022.

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

Pay your membership by:

***Mail a check to:**

NARG
Membership
PO Box 726
North Plains, OR 97133

***Pay via credit card with PayPal (No account necessary.):**

Use the following links:

Family membership \$40 https://paypal.com/cgi-bin/webscr?cmd=s-xclick&hosted_button_id=AXASMFKa8MZU4
Single Membership \$25 https://paypal.com/cgi-bin/webscr?cmd=s-xclick&hosted_button_id=438FVX4E6CTQY
Student Membership \$10 https://paypal.com/cgi-bin/webscr?cmd=s-xclick&hosted_button_id=9QCCT4D7FTFRU

Fossil Calendar

September 7	NARG Monthly Meeting, Tualatin Heritage Center, Tualatin
September 15	Deadline for Portland Regional Applications to Exhibit
September 30-October 2	Portland Regional Gem and Mineral Show, Wingspan Event Center, Hillsboro
October 5	NARG Monthly Meeting, Tualatin Heritage Center, Tualatin
October 8-9	Field Trip to Post (stay tuned)
November 2	NARG Monthly Meeting, Tualatin Heritage Center, Tualatin
November 12	NARG Annual Thanksgiving Potluck and Auction, Tualatin Heritage Center, Tualatin
December 7	NARG Monthly Meeting, Tualatin Heritage Center, Tualatin

Please check the web-site and emails for any changes or alternatives.

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)

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Portland Regional	Tara Baker
	Dan O'Loughlin



NARG's Mission Statement

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