North America Research Group

NARG NEWSLETTER

Official Publication of the North America Research Group Winter 2020

Volume 8 Number 4

NARG Members Oregon Council Display Case in the Capital Building

By Philip Knutson

This past November the Oregon Council was informed that one of their member clubs was unable to fill the Oregon Council display case in the Oregon State capital building. The Oregon Council requested that NARG put in a display of Oregon fossils. NARG is currently a member of the Oregon Council, but was given guest status in order to participate.

Four Salem area NARG members contributed fossils from their collections for the case. Robert Rose put in Miocene leaf fossils from Moose Mountain (Menagerie Wilderness), Bob Manley displayed fossil crabs from the Eocene Yamhill formation and marine fossils from the Oligocene Scotts Mill formation. Joe Start contributed fossil wood rounds from the Sweet Home, Oregon and Philip Knutson added a display of the Oligocene Lyons Flora.

The display has been well received by visitors to the capital building. If you are in the Salem area the fossils will be on display until mid-June. For more information or to see close-ups of all the fossils on display, go to https://www.ocrmc.org/showcase_trophy/2020_north_america/index.html .

Pictured from L to R: Bob Manley, Phil Knutson, Robert Rosé, and Joe Start.


Fossil crabs
Yamhill formation, 45MYA
Polk County


Betula vera leaf
Birch
Miocene - 15 million years
Linn Co. Oregon


Clam and Snail fossils
Scotts Mills formation, 25 MYA
Clackamas County


Unidentified fern
Oligocene
Little Butte Volcanics
First ever found in
Clackamas County, Oregon


DISPLAY FURNISHED BY
NORTH AMERICA RESEARCH GROUP
HILLSBORO, OREGON


DAWN REDWOOD
Metasequoia occidentalis
Foliage
Lyons Flora
Oligocene (31-33 M BP)
L1152

Newport Fossil Fest 2020

By Tara Baker

It was another successful Fossil Fest at the Hatfield Marine Science Center in Newport. Many visitors came to the Fossil Fest as it stormed outside and king tides crashed at the beach. On February 8, ten NARG members participated in the activities during the festival. We had several tables set-up where we answered questions, showed marine fossils from the Oregon coast, and sold NARG Fossil Fest t-shirts. Dan O'Laughlin and his family were there early to set-up tables and carry in display cases. Tim and Tonya Fisher were in-charge of sales of shirts, while Jordan Morris and Debbie Shannon educated a steady stream of visitors about fossils found at the coast. Linda and William Harvey were busy filling-in and assisting wherever needed. Bill Orr shared his passion and knowledge of Oregon fossils as guest speaker. Microscopes were set-up on a table where Tara Baker showed attendees what fossilized bone looked like magnified 50X and Greg Carr identified fossils. Two elementary-age boys and their father brought in two wonderful nautilus fossils they had found near Newport. Other exhibitors at the festival were fellow fossil-enthusiasts Mike Full, who brought many of the Pleistocene fossils he has found from the Yamhill River, and Kent Gibson, who showed many of the whale and pinniped skulls found at Newport beaches.

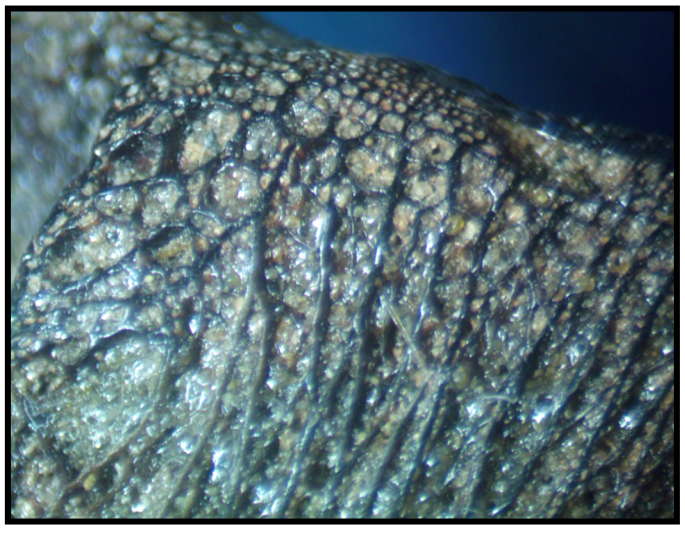
Several NARG members were able to go to the beach at low tide to look for fossils. The big winter storms had exposed rock on one area of Beverly Beach for the first time in ten or more years. Greg discovered a whale brain case and excavated it from the exposed rock bed, while others found bone fragments lying on the sand.

Bill Orr chatting with a Fossil Fest visitor

Jordan enjoying the anemone exhibits

Greg excavating exposed whale brain case on Beverly Beach

Partial whale brain case from Beverly Beach



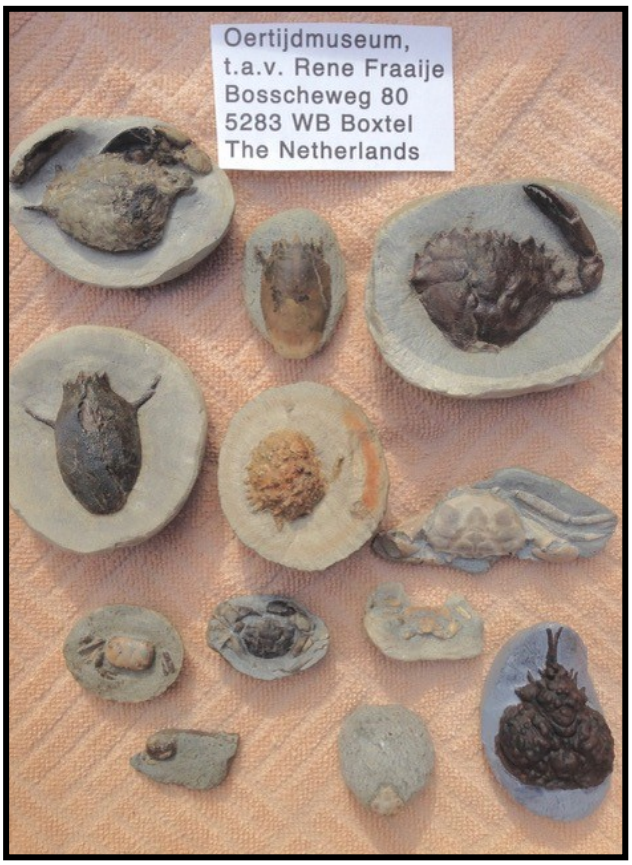
Fossilized fish bony vertebra under the microscope

Compact and spongy bone from dolphin vertebra

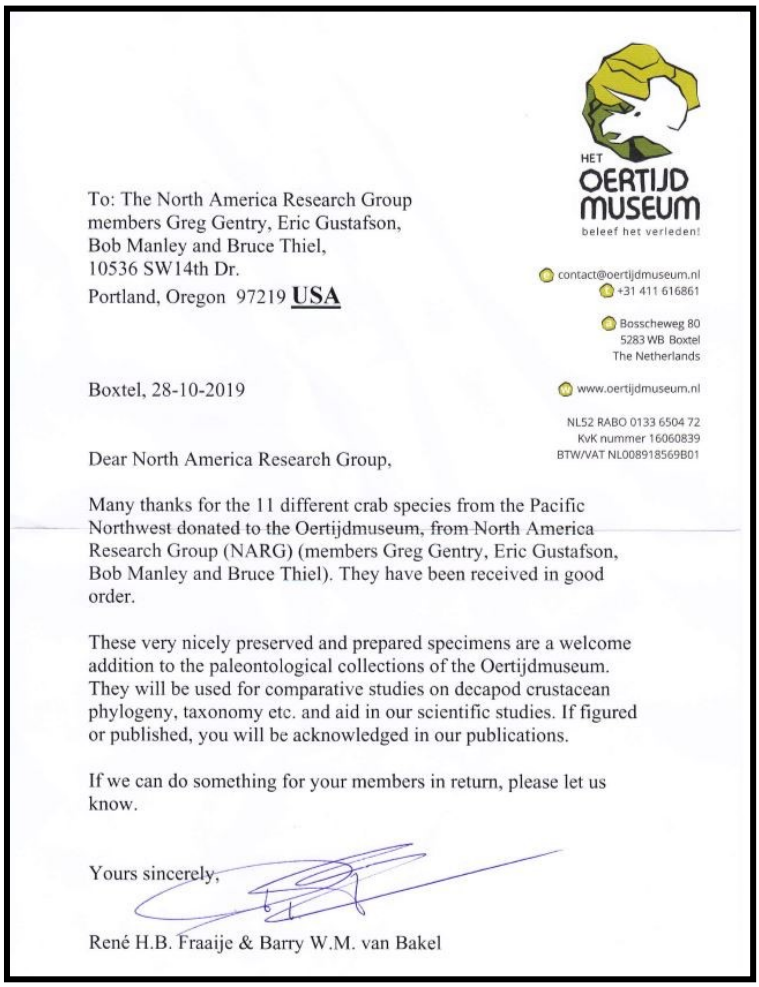
NARG sends 11 species of crabs to the Netherlands Oertijd Museum

By Bruce Thiel

Barry van Bakel, a raninid crab expert in the Netherlands co-authored a paper describing the new raninid crab discovered by and named after Bob Manley (Summer 2018 newsletter). Barry later mentioned that the museum he's affiliated with has no other Eocene/Oligocene North American crabs except Pulalius. He asked that if any of us had extras or casts of NW crabs we would be willing to part with, the museum would like to expand their reference collection. NARG members who collect and prepare fossil crabs got together and each contributed to send a collection of 11 different species of NW fossil crabs. The crabs are from four different geologic formations, spanning ages from the 18 MYO Astoria Fm. to the 50 MYO Lookingglass Fm.



The crabs pictured from top L. to R. are
Megokkos macrospinus – Keasey Fm.
Raninoides willapensis – Coaledo Fm.
Maeandricampus triangulum - Keasey Fm.
Macroacaena schencki – Keasey Fm. U
Trichopeltarion granulosa – Astoria Fm.
Orbitoplax weaveri - Lookingglass Fm.
Paleopinnixia rotundus - Coaledo Fm.
2 - *Orbitoplax weaveri* - Lookingglass Fm.
Paleopinnixa rathbunae - Lookingglass Fm.
Globihexapus paxillus – Astoria Fm.
Eriosachila orri - Lookingglass Fm.
Macrocheira sullivani – Keasey Fm. (cast)



HET OERTIJD MUSEUM
beleef het verleden!

To: The North America Research Group
members Greg Gentry, Eric Gustafson,
Bob Manley and Bruce Thiel,
10536 SW14th Dr.
Portland, Oregon 97219 **USA**

contact@oertijdmuseum.nl
+31 411 616861

Bosscheweg 80
5283 WB Boxtel
The Netherlands

www.oertijdmuseum.nl

NL52 RABO 0133 6504 72
KvK nummer 16060839
BTW/VAT NL008918569B01

Boxtel, 28-10-2019

Dear North America Research Group,

Many thanks for the 11 different crab species from the Pacific Northwest donated to the Oertijdmuseum, from North America Research Group (NARG) (members Greg Gentry, Eric Gustafson, Bob Manley and Bruce Thiel). They have been received in good order.

These very nicely preserved and prepared specimens are a welcome addition to the paleontological collections of the Oertijdmuseum. They will be used for comparative studies on decapod crustacean phylogeny, taxonomy etc. and aid in our scientific studies. If figured or published, you will be acknowledged in our publications.

If we can do something for your members in return, please let us know.

Yours sincerely,

René H.B. Fraaije & Barry W.M. van Bakel

Reparation of a Titanothere (or Brontothere) Skull

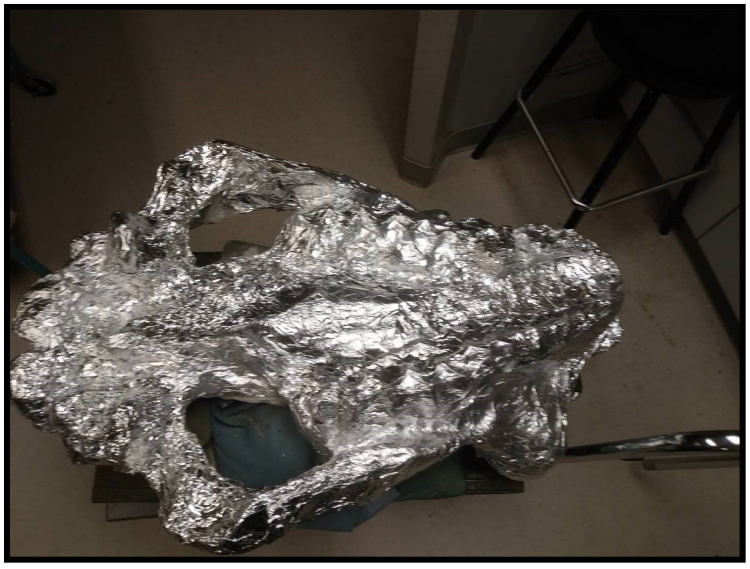
Early in 2019 I was asked to repair/prepare, by the Rice Rock and Mineral museum, a titanothere skull that had been donated to the museum a few years earlier. It had previously belonged to a dentist and was exhibited in their office for a number of years. During it's time it had been moved, been broken, been restored and had been painted numerous times. It was great to be asked to do something so grand – how often do you get to work on a real, whole titanothere skull almost 3 feet long? I agreed to take on the challenge, with the caveat that I would do it at the paleontology lab at OMSI where many people could watch the process.

The first step was to transport the skull to OMSI. Four folks, a piece of stout plywood, a pickup and it's a done deal. The skull weighs about 200 pounds so it was not too difficult. It was moved to the lab and the work then began.

The first task was to clean off the surface of the skull. It was completely covered with a white paint except where the wonderful teeth were exposed. We didn't even know how much bone there was in the skull! It was common 40 or more years ago to 'restore' a skull with plaster and paint to recreate what it looked like in "life" (actually soon after death). OMSI has a good example of this – they have a skull of a Miomastodon, that actually is mostly painted plaster with an actual upper and lower jaw. I scrubbed off the paint and a thin coating of drywall 'mud' with abrasive pads and lots of water for about 8 hours to reveal what was underneath. What was underneath was actual bone pieces, broken into palm-sized pieces, held together with a patchwork of plaster, cement mortar and Bondo ® . There was a large steel bar imbedded in plaster along the upper palate. It was clear that the skull had broken during a move and had been successfully repaired. Some of the original matrix (a degraded volcanic ash) was still present in cracks, but on the whole, it was nicely prepared. And the teeth are beautiful!

The next step was to prepare a permanent conformal cradle to hold the skull, supporting it in such a manner as to prevent it from breaking again. Such cradles are generally made from a thick layer of plywood, covered with plaster that conform to the bottom of the fossil and hold it up all across the bottom surface. This prevents it from bending and breaking. For this skull, we needed to support as much of the skull as we could, but still show off the wonderful teeth. We ended up making a ¾ inch plywood base that extended out along the hard palate, then spreading out to hold up the cheekbones and all the rest of the skull. It ended vaguely looking like a guitar. A hole had to be cut to allow part of the skull to project down through the plywood – otherwise the conformal plaster layer would be much too thick

The cushion was ¼ inch polyester felt purchased at a local fabric store. This was cut to roughly conform to the bottom of the skull. The skull itself was covered with aluminum foil to prevent any inadvertent contamination with plaster - it is really difficult to get plaster off fossils!

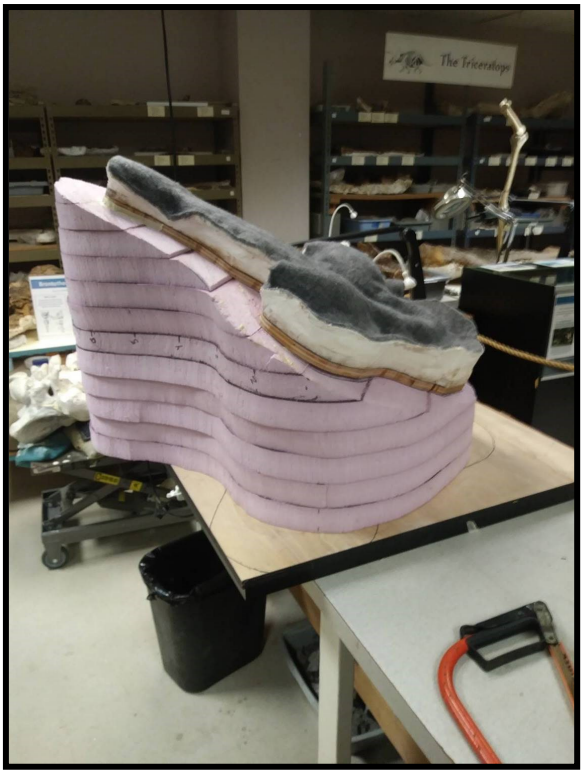


The placement of the plaster layer is a frantic but rewarding process. The skull was placed bottom-side up after covering with plaster. The cushion of felt was molded into place. Then a mix of plaster and chopped fiberglass was dumped and molded onto the felt, worked into the felt surface to assure a good bond. More plaster was added, and the plywood was placed onto the plaster to bond with it. The plywood has some drywall screws put into it so the plaster is 'keyed' and will not come loose. Each layer of plaster only takes about 5 minutes to harden, so you have to work fast!!! Jack (another volunteer) and I certainly got plastered this day!

After the plaster hardens, the cradle is removed, the aluminum foil removed, and the whole thing flipped over with the skull in the proper upright position.

Now what would be a good way to display this fossil. The teeth are magnificant, easily the best part of the specimen. There are stories that in the early exploration of the Dakota badlands that sometimes fossils, including skulls, would be found as the caprocks on the top of hoodoos. Here is a natural hoodoo from New Mexico:

So we decided to make a mount that would elevate and tilt the skull so that the teeth would be easily visible. The mount was made of a core of pink insulating foam glued together with Gorilla Glue® . It was sculpted so that the top of the mount was a plywood sheet that would interlock with the bottom plywood sheet of the cradle. This way the skull+cradle could be transported separately from mount.



After the mount was tapered and finished, it was covered with several layers of a flexible mortar to give a hard surface that roughly resembled rock. Note the sophisticated shaping tooling used! The patterning was vertical striations resembling water-worn soft rock. It was painted with a mixture of sand and brown paint to look more realistic

The skull was placed on the stand and the finish work was begun. There were many holes in the skull between the bone pieces and the remaining plaster. Depending on the size of the holes and cracks, they were filled with superglue®, epoxy, and for very large holes, Gorilla glue® in a cavity wetted with water before filling. As much as possible, the surface of the bones were all cleaned of plaster and Bondo®, exposing the original fossil.

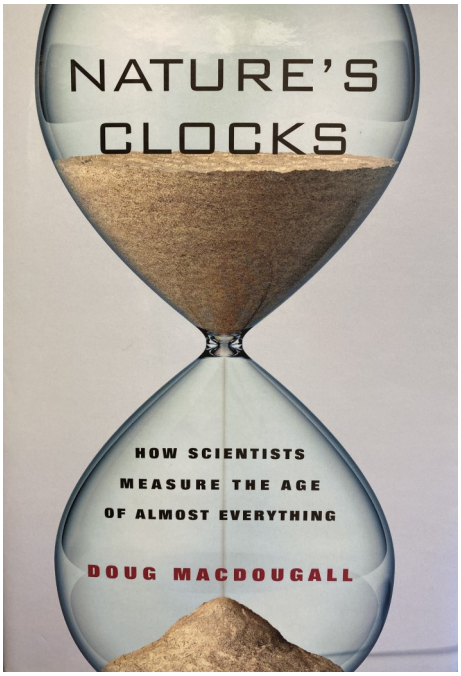
Finally, the fossil+cradle and the stand were transported back to the Rice museum. It was placed in a display case in the Northwest Gallery just before Thanksgiving 2019!

Sincerely, Greg Car

(Editor's note: When the Titanothere skull was originally donated to the Rice Museum, it was in poor condition. A previous curator at Rice asked Bob Manley, a NARG member, to perform basic repairs so that some of the skull could be displayed. Bob was given a rapid dead-line as the curator wanted a display before she retired from the museum. Because the Titanothere rostrum was in pieces, Bob was able to prepare some of teeth and jaw. However, these never were displayed. It is a fantastic achievement by NARG that the entire Titanothere skull has been rescued and now displayed for the many Rice Museum visitors.)

Book Review of: NATURE'S CLOCKS By Doug MacDougall

Review by E. Anne Sivers



Although paleontologists have long used relative techniques such as tree-ring counting, stratigraphy, and biological clocks to date fossils, absolute dating was not possible before the discovery of radioactivity. Doug MacDougall explains radiometric dating and traces the history of its development and use. The basic theory is fairly simple, but accurate dating has required the development of very ingenious measurement techniques that are still being refined today. The four most useful types of radiometric dating are radio-Carbon, Uranium-Lead, Potassium-Argon, and Rubidium-Strontium dating.

It is necessary to know a bit of physical chemistry to understand radio-Carbon dating. Life on Earth is based upon Carbon. The common, stable atom of Carbon C^{12} has a nucleus with 6 protons and 6 neutrons. (*The "12" is the sum of the number of neutrons and protons in a Carbon nucleus. The name "Carbon" is identified with 6 protons.)* The common, stable form of atmospheric Nitrogen gas N^{14} has a nucleus with 7 protons and 7 neutrons. Earth is constantly bombarded by cosmic rays, some of which are energetic neutrons. When an energetic neutron enters the nucleus of a N^{14} atom, it can knock out a proton and change N^{14} into C^{14}, a radioactive isotope of Carbon with a nucleus containing 6 protons and 8 neutrons. C^{14} decays back into N^{14} gas, but not immediately. After about 5,730 years, half of a given sample of C^{14} will have decayed into N^{14} gas. Thus, 5,730 years is called the half-life of C^{14}, denoted by $\tau_{C^{14}_{1/2}}$.

It is extremely difficult to measure the amount of N^{14} gas attributable to C^{14} decay in an atmosphere that contains 78.09% N^{14}. However, to a first approximation, the rate at which C^{14} is created in the atmosphere is constant. Thus, while alive, earthly lifeforms absorb both C^{14} and C^{12} in a fairly constant ratio $R^{14/12}$. However, after death, lifeforms no longer absorb carbon. The amount of stable C^{12} in a carbon-bearing sample remains constant, but radioactive C^{14} decays.

Readers familiar with calculus may want to read the author's derivation of the radioactive decay equation in Appendix C. However, you need only a scientific calculator capable of computing the natural logarithm ln[ ] (*turn your iPhone calculator sideways*) to use the equation. Instead of the half-life $\tau_{C^{14}_{1/2}}$, it is more convenient to use the decay constant λ^{C}_{14} defined as:

$$\lambda^{C}_{14} = -\ln[0.5]/\tau_{C^{14}_{1/2}} = 0.693/\tau_{C^{14}_{1/2}}$$

Then, if you measure n^{12}, the unchanging number of C^{12} atoms in a carboniferous sample, and you know the initial ratio $R^{14/12}$, you can calculate n_o^{14}, the number of C^{14} atoms initially present in the live sample.

$$n_o^{14} = R^{14/12} \times n^{12}$$

You also need to measure n^{14}, the number C^{14} atoms remaining in the sample. Finally, you can determine the age t of the sample from the radioactive decay equation as follows:

$$t = (\ln[n_o^{14}] - \ln[n^{14}])/\lambda^{C}_{14}$$

(Continued review of "Nature's Clocks" review…)

Of course, knowing the equation did not immediately yield accurate determinations of t. Determining the precise half-life of C^{14} and learning to separate and measure the numbers of C^{14} and C^{12} atoms in a sample required decades of research. Additionally, the rate of production of C^{14} in the atmosphere isn't quite constant. It has been necessary to compile calibration tables (*using tree-ring counts and cave deposits*) covering thousands of years to correct for variations in $R^{14/12}$ as a function of time. Because of the relatively short half-life of C^{14}, initially radio-carbon dating was useful only for carboniferous samples younger than 10,000 years. Development of the ingenious measurement techniques mentioned earlier has extended this range to 60,000 years in some applications.

Dating samples older than 60,000 years requires the presence of radio-isotopes with longer half-lives. The following table lists four of the most commonly used radioactive decays used to date the distant past. The process chosen depends upon the expected time range and the availability of the isotope.

Radioactive Parent (P) Isotope	Stable Daughter (D) Isotope	Parent Half-life ($\tau^P_{1/2}$)
Uranium – 235	Lead - 207	704 million years
Potassium – 40	Argon – 40	1.25 billion years
Uranium – 238	Lead – 206	4.47 billion years
Rubidium – 87	Strontium – 87	48.8 billion years

Unlike radio-Carbon dating, these methods use a slightly different form of the radioactive decay equation. In these measurements, a radioactive parent isotope initially present in the sample decays into a stable daughter isotope, both of which can be measured. Assuming that only the parent isotope was present when the sample was formed, the sum of the current number of parent atoms n^P and daughter atoms n^D will be equal to the original number of parent atoms n_o^P.

$$n_o^P = n^P + n^D$$

In this case, the age of the sample t can be obtained from the radioactive decay equation as follows

$$t = (\ln[n^D + n^P] - \ln[n^P])/ \lambda^P$$

where $\lambda^P = 0.693/\tau^P_{1/2}$.

Again, while the radioactive decay equation is straightforward, the execution of the measurements is not. In fact, we have geochemist Clair Patterson to thank for our heightened awareness of environmental lead contamination and the removal of tetraethyl lead from gasoline. (*He lost his oil industry funding as a result*). Patterson was using Uranium-Lead decay to date zircon crystals when he discovered that the lead concentration in his laboratory was orders of magnitude higher than the amounts in the sample that he was attempting to measure. Even today, eliminating contamination is a primary obstacle to accurate radioisotope dating.

It would be difficult to overestimate the contribution that radioisotope dating has made to our understanding of Paleontology and Archaeology. I hope that you will enjoy this exploration into its origins.

NARG Member Trivia by Bruce Thiel

Which NARG member climbed all 16 mountain peaks in the Pacific NW and received plaque #33 from the Mazamas recognizing him for his accomplishments? Approximately 500 Mazamas have received this award. **HINT** - Honorary & former board member, lives in Washington

Follow-up question: Can you name the 16 Pacific NW mountain peaks?

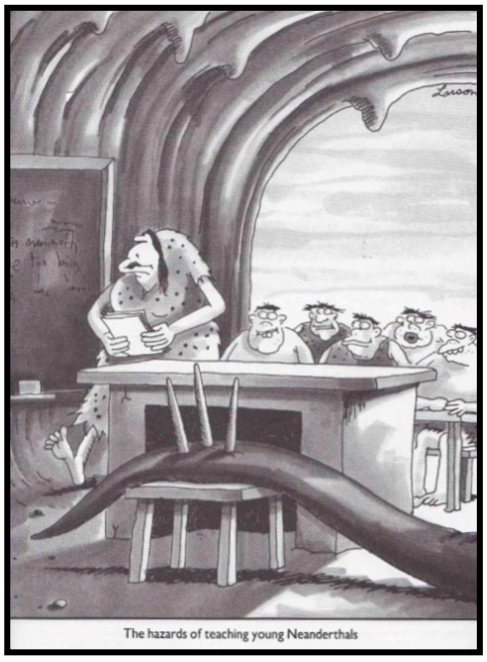
Answer: Larry Purchase. Only about 500 Mazamas have received this award.
Follow-up Answer: Mount Rainier, Mount Shasta, Mount Adams, Mount Hood, Mount Baker, Glacier Peak, Mount Jefferson, South Sister, Middle Sister, North Sister, Mount Stuart, Mount Shuksan, Mount St. Helens, Mount Olympus, Three-Fingered Jack, Mount Washington

NARG Brick at the Mammoth Site in Hot Springs, South Dakota

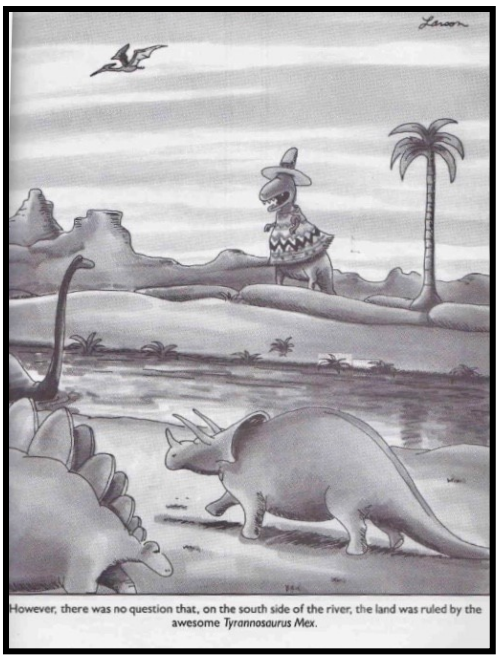
By G F Lukos

Next time you are travelling through South Dakota, make sure you take time to visit the The Mammoth Site in Hot Springs. (https://www.mammothsite.org/) This outstanding museum and active dig in the southwest corner of the state is well worth a half-day (or more) visit on your way to or from the Badlands.

And while you're there, look for the NARG brick somewhere on the new entry plaza. Take a photo of yourself with it and send the photo back to NARG. No idea where on the plaza it is, so finding it might be like searching for fossils on the beach!



Some paleo-humor by cartoonist Greg Larson (The Farside) via Greg Carr



Member Spotlight: Dan O'Loughlin

In February, long-time NARG member, Dan O'Laughlin, stepped down from his position as Vice President of NARG. After 5-6 years serving as V.P., Dan will continue to act as a Board Member-At-Large and will be involved in organizing Fossil Fest and other activities. Greg Carr was elected as the new NARG Vice President.

Dan has been a NARG member since almost the beginning of the club. He says he joined the club to find outdoors activities he could share with his kids, one son and one daughter. He couldn't get his kids to camp or hike, but they all liked rocks. Dan's favorite NARG field trip was one he did with his daughter years ago. They joined other NARG members on a trip along the Oregon coast. He says what he was most impressed by was how friendly and generous the NARG members were to his family. Dan and his daughter did not have a lot of fossil knowledge, and the NARG field trip participants were patient and took the time to help them both learn about the fossils available at the coast. In fact, one of Dan's favorite fossils is one he collected on that trip, a fossilized white shark tooth. This is a really rare find, and he picked it up as a novice. Instead of trying to take his find or belittle it, Dan says the NARG members were excited for him and let him know how special the tooth was. Several times during this interview, Dan repeated his appreciation for club members who are really fossil experts who help each other out.

At first, Dan attended few NARG meetings even after paying yearly dues. He and the kids enjoyed the field trips, but he could not follow the complex presentations. However, as he began to sit through and learn from the meetings, he gained some of the knowledge necessary to follow the presentations and now is rarely absent.

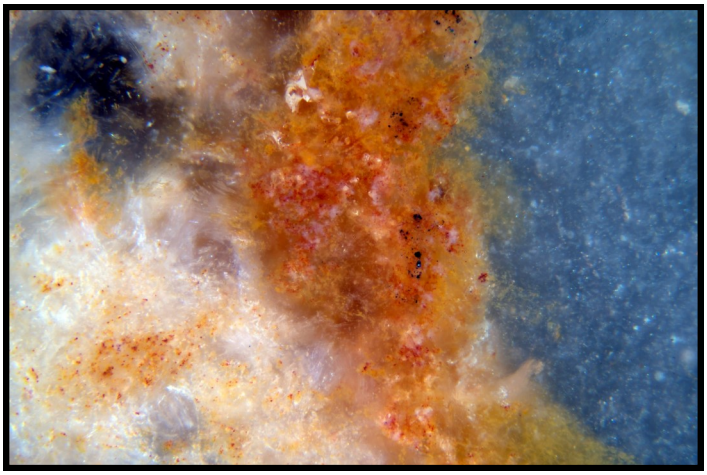
Dan will no longer be serving as Vice President and that frees up some time for him. He will use it to be more fully involved in some of his other clubs. He is looking forward to spending time with the Oregon Bee Atlas, specifically. He will still be very involved with NARG and sees some future projects here too. Dan appreciates those in the group who expose and present Pacific Northwest crabs. He says he doesn't have the patience to do that work. However, he would love to have a fossilized crab collection with one example of every Oregon species. Along those lines, he can also see NARG working to publish a guidebook containing all the Pacific Northwest crabs.

Dan has been with the club a long while and has seen it grow to include more people. But one thing he says has not changed, and that is how friendly and helpful members are to each other and new members who are just beginning to learn about paleontology.

Oldest Life, 3.4 Billion Years of Age

Deep thanks to the Rice Museum of Rocks and Minerals for yesterday's access to their Proterozoan stromatolite from Strelley Pool, Pilbara, Western Australia. The dark corners are because of a mismatched camera adapter, but that was what I had on hand. These images were shot at varying magnifications, in several of them you may notice the effect of zooming in. But new to me, an Artificial Intelligence program has enhanced the visibility of the detail in most of these, and as far as I know, this is the first time anywhere that some of this stuff is visible. These were microbial matts. There is so very much to be gleaned from them, but I am no scientist, just a very privileged photographer.

Enjoy! Joe Cantrell

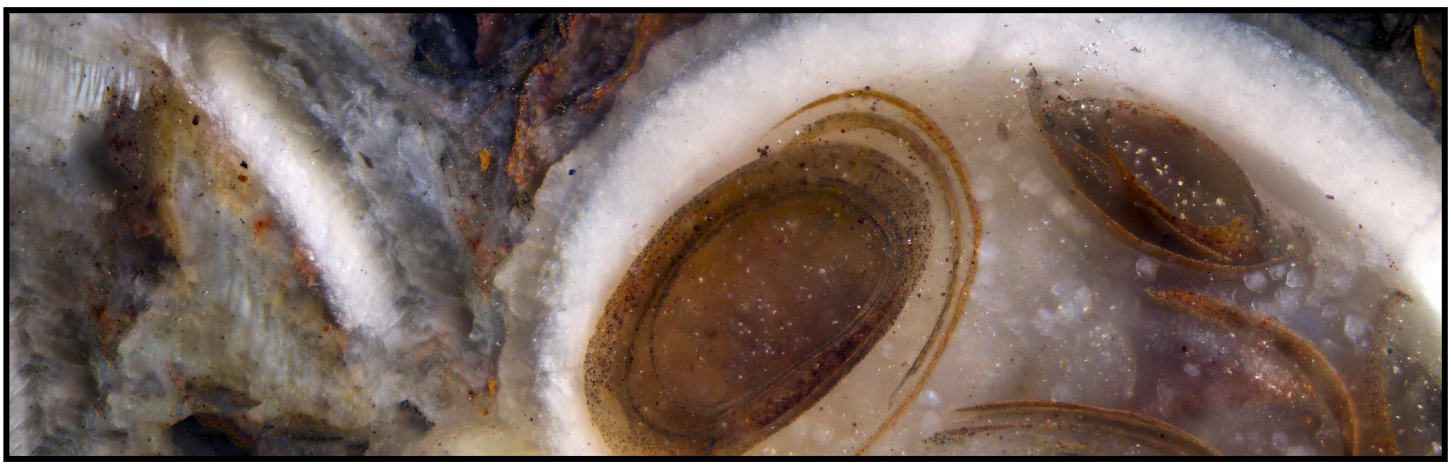


Shrimp in Snails: Captured in Stone and Film

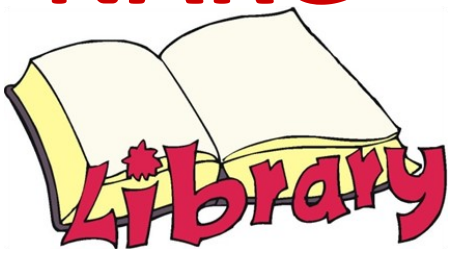
Here's *Elimia tenera* containing ostracods, "seed shrimp." This was a series of images created by pixel-shifted images from a Sony A7R III that have been focus-stacked. After each focus stacked image, I moved the microscope stage horizontally to shoot another image with slight overlap.

I processed the separate images, then put them in Photoshop and joined them together as a "panoramic" image so the pristine ostracods inside the shells contrast with the ones outside the shells which are compressed and broken.

Joe Cantrell



NARG



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 for 2018 are due January 1, 2020

.

Individual Membership = $25

Family Membership = $40

Student Membership = $10

You may pay for your membership by:

* Bring your money to our next NARG meeting..

* You can mail your payment to:

NARG
Margaret Johnson
2220 179th Ave E
Lake Tapps, WA 98391

* You can pay your dues thru Pay Pal. You don't need a Pay Pal account to pay this way. You can pay using a credit Card.

Fossil Calendar

Because of COVID-19, in-person meetings and events are cancelled.
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://orerockon.com/ Click on Portland Area Rock Clubs, includes PNW Clubs)

NARG Officers:

President:	**Aaron Currier**	**(503) 364-2979**
Vice President:	**Greg Carr**	**(503 754-6392**
Secretary:	**Tami Smith**	**(503) 620-5317**
Treasurer:	**Peg Johnson**	**(253) 370-8892**
Directors:		
Garret Romaine		**(503) 591-8622**
MacKenzie Smith		**(503) 403-8941**
Robert Rosé		**(541) 367-2052**
Linda Harvey		**(503) 310-3036**
Debbie Shannon		**(503) 887-7423**
Dan O'Loughlin	**(503) 866-5997**	
Honorary Directors:		
Michael Santino		**(503) 981-8902**
Larry Purchase		**(360) 254-5635**
Committees:		
Newsletter:	**Tara Baker**	
	Aaron Currier	
	Dan O"Loughlin	
FossilFest:	**Linda Harvey**	
	Dan O'Loughlin	
NARG Auction	**Linda Harvey**