North America Research Group

NARG NEWSLETTER

Official Publication of the North America Research Group Spring 2017

Volume 6 Number 1

Newport Fossil Fest

This year's Newport Fossil Fest could not have gone any smoother. NARG members came in droves, so set up was fast and take down done in minutes. Bill Hanshumaker, with the Hatfield Marine Science Center, predicted attendance was up from last year. NARG's displays made up the bulk of the show. We featured ammonites this time, so both current and extinct nautiluses and ammonites were displayed. In addition, displays of ammolite and dinosaur bone were there to intrigue the crowd, while MacKenzie Smith helped kids choose free fossil shark teeth. As usual, Dr. Bill Orr and Arron identified many fossils/special rocks. In fact there was often a line up for this feature throughout the day. (Dr Orr gave a talk on Condon Collection at the MNCH at UO. Outside of NARG, there was Kent Gibson. He brought a large shark tooth he had found Friday before the show. It appears to belong to the genus *Carcharocles chubutensis*. His many skulls were a hit. To top off the event, the weather was beautiful throughout the weekend. Thanks for those NARG members that helped to make this event a success.

We had Greg Carr and his wonderful thalattosaur models printed from 3-D printer.

There was a hands on table staffed by Debbie Shannon, Dave Ellingson, and Linda Frennette.

Tim and Tonya Fisher managed the T-shirt sales.

Dr. Bill Orr and Arron identified many fossils/special rocks.

MacKenzie Smith helping kids sift for fossil shark teeth.

Kent Gibson showing his beach finds.

Tim F. helping at Identification table

MacKenzie, Debbie, Cindy, and Tonya at our display table.

NARG's displays made up the bulk of the show. We featured ammonites this time, so both current and extinct nautiluses and ammonites were displayed.

Greg Carr's thalattosaur pieces from 3-D printer.

Extracting Fossils

By Dan O'Loughlin

While at the Newport Fossil Fest this year, I thought about all the little tips people have given me about extracting fossils from the ground. Here are many of those tips and why they are so important to follow. It is sad to think that fossils have survived millions of years in the ground only to be destroyed by an impatient collector.

1. When extracting the fossil from the matrix, make sure you give the fossil plenty of room. You should be willing to carry home a large protective piece of matrix with fossil rather than a thin fragile piece.
2. When striking the matrix, make sure your blows are directed away from the fossil. Many fossils, especially the wet ones, will crumble due to the vibrations you create with the hammer.
3. Use a chisel. You have more control of your blows while using a hammer and chisel than when using a hammer alone.
4. Wet matrix must always be allowed to dry before prepping. A slow dry is achieved by wrapping a wet fossil in wet newspaper then placing this into a plastic bag with minimal air holes. It may take 3-6 months to dry completely. Most of the standard stabilizers/consolidants will not bond well to wet matrix.
5. Get used to viewing a fossil in reverse. Many fossils are left because they are sheared off and some of it is missing. Visualize the fossil from the deeper layers towards you. If the matrix and fossil can be extracted intact, you can then stabilize the entire piece and prep from the opposite direction. A nice display piece can be obtained from this approach.
6. Protect your piece with crumpled foil, newspaper, or bubble wrap. The fossil is not part of your collection until it gets home intact.
7. Label fossils or their box with location, date, and collectors present. Don't wait until you get home. Much scientific data can be lost when we rely on our memory.
8. NEVER! NEVER! Field prep a fossil. It is better to take home more matrix than it is to watch a fossil crumble because you were cleaning it.

Remember, you cannot dig fossils out of the beach floor or walls, these example pictures were done out of convenience while at the beach.

This *Patinopectin* has 2 halves. The upper shell is destroyed but the lower half may be intact.

This shell is missing too much to salvage from the opposite side.

This whale vertebra is in a wet environment. Allow a generous amount of matrix around it, and then allow it to dry before evaluating it. There is a good chance that any buried processes will be punky.

The *Musashia* on the left may be prepped from the opposite side as showing. The one on the right needs plenty of room while extracting. It should dry before you prep it.

Hagg Lake Fossil Beds

By William Larrimore

In between Gaston and Dilley is a small valley that used to be a rural farming town called Scoggins Valley. Today, it is known as Henry Hagg Lake. It is a unique area where things seem to come together. Four main creeks and numerous feeder creeks come off the surrounding hills and come together. There are also three formations that come together As you drive around the lake from the east side to the west side you will go through a section of the Pittsburg Bluff Formation right before you get to the lake. Then on the east side of the lake you will pass through the upper member of the Spencer Formation. On the north side of the lake wrapping around to the west side is the Yamhill Formation. There are also, two small sections of the Spencer Formation (lower member) on the east side and one on the southwest as mapped out in "*Oregon Geology*" (published by the Oregon Department of Geology and Mineral Industries in July 1993, vol. 55:4 pages 75-86). http://www.oregongeology.org/pubs/og/OGv55all.pdf

In my findings from taking trips looking for fossiliferous rocks, I have noted a sandstone wall with clam beds that seem to be a mortality layer from an event that was repeated at least three times. This rock face is 0.8 miles past the Lake Stop store heading toward Hagg Lake. The wall is about 15 to 20 feet tall and made of a fine grained sandstone. The clam beds in the rock are at a slight angle and some have been weathered through, however some still hold lots of shells. All of the shells I observed are closed and whole. Most of the shells are horizontal but there are some that are vertical. From what I know living clams are upright and whole therefore I believe that a slide happened that smashed them down and buried them. The longest visible line of clams is the one on the top. It runs a distance of about 37 yards. The starting point of that line is about 4 feet road level and ends at the top of the rock face (from east to west). It holds the most shells and is the thickest bed from top to bottom. The next bed down starts 10 yards past the top bed and about 4 feet under it. This bed rises at less of an angle so 8 yards past the start there is about 6 feet in between them. About 8 yards past the start of that bed is another bed underneath that one. There is only about 2-2 1/2 feet between those two beds. This lowest bed runs up at a sharper angle and joins the bed above it. Once they join together

they shoot up at a much steeper angle. This closes the gap between the top line and bottom back down to about 3 1/2 feet. There was one more bed up above the top bed but that one seems to have no shells left and is too high to take a closer look. If you look through the rocks that have fallen to the ground you can find gastropods and various clam shells. I am sure there are more things to find there however I have not found them yet. Lastly, because it is so easy to find cool fossils on the ground I ask that no one dig into the wall. *del* The longer it is left undisturbed, the longer it will be there for others to enjoy.

I have found this area to be very interesting and it tells a good story. Everything I have observed is just that, an observation and is subject to change. I hope you can check it out some time and enjoy the beauty and the stories it tells.

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Interactive Geologic map of Oregon http://www.oregongeology.org/geologicmap/

Cherry Seeds: A Small Piece of the Puzzle

By Dave Ellingson

For the last few years fossil enthusiasts have been coming to Woodburn, Oregon to participate in paleontology digs. What makes these digs unique, is the large numbers of fossils that are available to be found. No one leaves without finding plants or animals that lived when the last ice age was ending. These specimens have been instrumental in reconstructing the ecosystem that existed in Woodburn and the Willamette Valley 13,000 years ago.

I have been teaching at Woodburn High School since 1997 and have been tutored by Dr. Alison Stenger on how to use these digs to promote scientific inquiry in my classroom. She has helped me to understand the importance of collecting accurate scientific data. With that training, each September, I lead 100 High School Freshman to participate in the digs on our campus. For those of you who don't remember what it was like to be 14 years old, I invite you to come to the school some fall and watch the dynamics of such an undertaking. Like all who participate, these students have the hope of finding bones of large mammals like bison, mammoths, and sloths. While some do uncover the bones of these megafauna, many more students find bones of smaller animals, like rodents, turtles, frogs, and ducks. For those that don't find bones, seeds, cones, and wood are in plenty.

When students are at the site for the first time, I teach them how determine if what they are holding is wood or bone. I tell them that if they squeeze what they are holding between their fingers and water comes out it is wood. If no water comes out, it could be a bone. Students quickly realize there is a lot of wood that looks like bone. We call these Woodbones from Woodburn.

While not as plentiful as the wood, there are many different kinds seeds to find. One of the larger seeds is light brown, and woody, which makes it easy to see. For the first few years we collected them, but stored them away without any identification. As interest in the digs increased, plant people got involved and helped identify some of these unknown seeds and wood. One of these was Chris Rombough. Chris graduated from a high school a few miles north of Woodburn, and today is a Wildlife Biologist with a passion for plants. He was blown away by the preservation of the plant material and identified a number of things that I hadn't even noticed. Chris easily identified these large, woody seeds as a cherry seed. Exactly what type of cherry seed was still unknown.

When the seeds are found some are only a single seed. Occasionally clusters can be found with 20 or more in a small area. However, all the seeds are found in what Dr. Stenger has identified as Strata 4 and 5. Below is a quick guide to the soil stratification of the digs with depths and dates of the different strata.

There are two native cherry trees in the Pacific Northwest, *Prunus emarginata* (Bitter Cherry) and *Prunus virginiana* (Chokecherry). To help identify the species of cherry I took some seeds to the OSU Seed Laboratory where Dr. David Stimpson and his crew compared the seeds with their collection. He identified the seeds as *Prunus emarginata*.

Soil Stratification			
DEPTH (Meters) & AGE (Before Present and Calibrated)	**HORIZON**	**STRATUM**	**DESCRIPTION**
0-0.5 0-6,850 BP, 0-7,720 Cal	Fill or Topsoil	1	Topsoil is brown silty clay loam
0.5-1.5 6,850 BP, 7720 Cal	Clay	2	Dense clay, gray brown to dark gray
1.2-2.8 10,480-10,330 BP, 12,350-12,150 Cal	Late bog stage, Woodland developing	3A	Lose, woody, dark brown. Contains wood, peat, seeds, cones, and insects
10,920-10,480 BP, 12,890-12,350 Cal	Classic bog stage	3B	Peat, sphagnum moss with leaves and seeds, red brown to dark brown
11,840-11,300BP, 13,770-13,200 Cal	Early bog stage	3C	Dessicated bog and loam with slight clay and silt. Micro and avifauna present
2.8-3.4 12,200-12,050 BP, 14,300-14,000 Cal	Post flood horizon	4	Firm, micaceous silt with slight clay medium, dark brown with sparse organics. Avifauna, mega and microfauna.
3.4-5.5+ 12,760-12,310 BP, 15,180-14,490 Cal	Willamette silts	5	Firm, micaceous clay silt, medium olive gray. Sparse organics.

As I've already mentioned, the soils we look through are filled with a lot of wood. Some of the wood comes with bark still attached that can peel horizontally. The bark also has large pores and is dark in color. At first, it was assumed that this wood belonged to a species of birch tree, but these characteristics also belong to *P. emarginata.* Once I had the species identified, I started lookimg through my collection of plant field guides to learn more about the tree. In the Plants of the Pacific Northwest Coast it says that "tree-sized bitter cherry can be confused with dark-barked paper birch. The tough, stringy bark of bitter cherry peels off in horizontal or spiral strips or sheets." For those who have found pieces of wood, this is a pretty acurate description of what is found.

Today, Bitter Cherry is found from Baja California to British Columbia and in all Western states to Wyoming. It is a small tree or shrub that usually has multiple stems, a large number of spreading branches, and can reach a height of 40-50 feet if there is enough moisture. They are commonly found on rocky slopes, in open woodlands, and along riparian zones. Much of the literature I searched has Bitter Cherry found at mid to high elevations between 2,800-9,000 feet where the temperature is colder, however, some references state the tree can also grow in lower elevations but their appearance is limited.

Woodburn has an elevation of 130 feet, and the ecosystem 13,000 years ago was a slow moving, shallow body of water with a muddy substrate. One question I try to have my students think about when they are looking through the soils, is what was the environment like when these animals and plants were alive. To emphasize the point that ecosystems and climates change, I show students the remains of two other plants we find in the digs, Mountain Hemlock cones and Bog Bean seeds. Both of these plants grow at higher elevations in Oregon. I also mention that these two plants are found in coastal wetlands of Southeast Alaska. I suggest that the Woodburn of 13,000 years ago and modern Southeast Alaska were very similar to each other.

However, while Bitter Cherry still grows in Oregon, it is not found in Alaska today. This is new information for me. While 13,000 years ago the area of Woodburn may have had a climate similar to Southeast Alaska, it may not have looked exactly the same. I'm going to have to tweek my lesson plans.

Knowing the species of the seed adds a small piece to the puzzle of recreating an ancient ecosystem. Because Bitter Cherry is occasionally found at lower elevations, the idea of a colder climate is less solid. However, there is a unique feature found on many of these seeds that may help to solidify the idea of a colder climate.

One day, before the seeds were identified, I was looking at some of them with a fellow biology teacher Greg de Nevers. He pointed to one seed that had a hole in it. He asked me if I knew what caused that hole. I had never thought about it. Greg took the seed and looked under a microscope. He told me he could see tooth marks on the seed. I looked through the scope and he was right. I'm no tooth marking expert, but this was unmistakable.

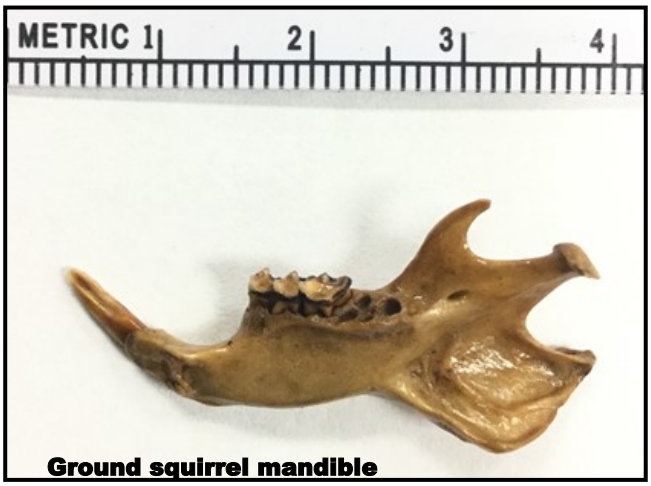
I had one of my student assistants take all the cherry seeds we had found and count those that were complete and those that had a hole. Of the seeds collected up to 2016, there are 126 seeds with holes and 145 complete seeds. What animal was making these holes? It had to be some small herbivore with teeth, probably a rodent. Joe Cantrell, an amazing micro photographer, volunteered his expertise and took some images of the seeds, making it easy to see the gnawing marks.

Cherry seed with predation hole

I did some internet research and found some clues. Seed sampling done at the OSU Andrews Research Forest located East of Eugene reported that some of the Bitter Cherry seeds they had found had a single hole indicative of seed predation. Also, the US Forest Service reports on their website that the fruits of Bitter Cherry are eaten by birds, rodents. These animals also help in the dispersal of the seeds. So, the next question is: have we found any bones of an animal that could possible eat Bitter Cherry seeds? All of the herbivorous birds identified so far are waterfowl such as mallards, teal, Canada goose, sandhill crane, and turkey. None of these are able to puncture small holes into seeds as they have no teeth and swallow seeds while. We have found a variety of bones of rodents and small mammals. These include, voles, pocket gophers, muskrats, and ground squirrels. Voles and pocket gophers usually eat only leaves and roots. Muskrats eat small invertebrates as well as vegetation, but no seeds. Ground squirrels eat leaves and seeds. Could this be the critter we are looking for?

In his book *Mammals of the Pacific Northwest*, Chris Maser identifies three species of *Spermophilus* that are still present in Oregon. This is the same genus we find in the digs. All three of these species are reported as eating seeds, nuts, fruits, and the leaft parts of plants. Two of these, *S. beldingi,* and *S. lateralis,* occur at higher elevations, while *S. beecheyi* is found at lower elevations, including the Willamette Valley. As of 2016, there have only

been three mandibles of ground squirrels found in the digs. Not that many compared to other critters. Only one of the mandibles was able to be measured and when compared with modern data it fell into the range for *S. beldingi,* the smallest of the three. At the Andrews Research Forest, where they have Bitter Cherry and have identified seeds with holes in them. Both *S. beecheyi,* and *S. lateralis* are found.



Ground squirrel mandible

It is very probable that more than one species of ground squirrel is represented in the digs at Woodburn. However, this means we are going to have to do more digs and get more people involved so we can find more bones. I'm okay with that.

So, we have evidence of Bitter Cherry growing in the Willamette Valley 13,000 years ago when the climate was colder than it is today. We also have evidence that may show the seeds of Bitter Cherry being eaten by ground squirrels that live at higher elevations. This is another small piece of the puzzle. It is this kind of research that keeps people coming back each year, and I hope some of you will be able to join us this summer to find more treasures and hopefully answers to more question.

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Plants of the Pacific Northwest Coast, Jim Pojar and Andy MacKinnon
Animal Skulls: A Guide to North American Species, Mark Elbroch

Dan O'Loughlin's pictures of a Fungus gnat in Dominican amber. Picture stacking by Joe Cantrell.

Occupied by Ostracods

MacKenzie Smith

If you have ever accidentally swallowed water while swimming in open water you probably swallowed many crustaceans. In addition to crabs, lobster, shrimp and barnacles smaller, planktonic crustaceans exist such as branchiopods[1], copepods[2] and ostracods. The last class will be the focus of this article honing in on their relationship to other arthropods, what they are, why we care and a great find by one of our own NARG members.

As outlined earlier, ostracods are crustaceans which fall in the phylum Arthropoda, a group of animals united by having jointed appendages, an exoskeleton and a segmented body. Crustaceans all go through a nauplius larval form and have bifurcating (biramous) legs. In my opinion, crustacean is a useful word because it refers to all animals with these characters and there is little ambiguity to what is or is not a crustacean. However, it is not a "true" (monophyletic) group. In other words it is a paraphyletic group meaning that you cannot isolate all crustaceans from the arthropod tree without making an additional separation based on recent studies on nuclear genetics within the arthropods (Regier et al. 2010, Figure 1). And in this case it is from the hexapods which includes insects. The group that contains traditional crustaceans and hexapods is called Pancrustacea. Most scholars (including Regier et al. 2010, von Reumont et al. 2012 and Oakley et al. 2013) place Ostracods sister to or in a group sister to the rest of Pancrustacea (Figure 1). So while crabs and ostracods are both crustaceans, a dragonfly is more closely related to a crab than an ostracod (Figure 1). However, other authors have proposed ostracods to be nested somewhere else within Pancrustacea (Jondeung et al. 2012 and Rota-Stabelli et al. 2013). Though it appears their exact relationship is unknown, all of these authors do agree that ostracods fall within Pancrustacea and that they are distantly related to Hexapoda. Additionally, work done by Oakley et al. (2013) finds that ostracods are indeed a true monophyletic group which makes it easier for paleontologists not having to worry about convertent morphological traits.

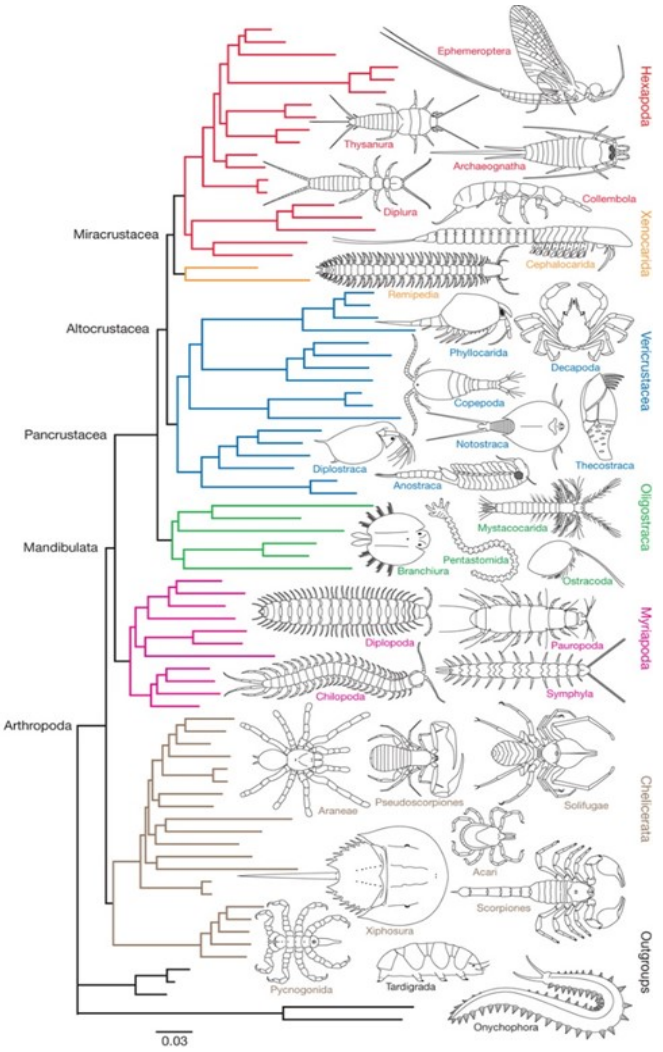

Figure 1: A hypothesis for the phylum Arthropoda relations presented in Regier et al. 2010. Ostracods are placed in Oligostraca which is colored green. Phyla Tardigrada and Onychophora are used as outgroups. At the

So what exactly is an ostracod? They are small crustaceans, generally no larger than a millimeter in length. Their key diagnostic morphological feature though is a bivalve carapace that covers their body which can be composed of pseudochitin and calcium (with low magnesium) carbonate. Note the term "carapace" is used just like other crustaceans. This carapace lacks concentric growth rings. If growth rings are present the animal is probably in Conchostraca, the clam shrimp order.

[1] *Triops spp.* and *Daphnia pluex* are both examples. The former resembles a horseshoe crab whereas the latter is often used in high school and college biology classes for experiments.

[2] Think of the character Plankton from *Spongebob*

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Figure 2 shows an image of an extant ostracod with labeled anatomy. The segmentation in ostracod bodies is ill-defined though not on their appendages. The segmentation on their second pair of antennae actually is a diagnostic feature between the two subclasses of ostracods.

Ostracods will use their antennae to swim. Most marine species are benthic meaning they live at the bottom of the ocean though some are pelagic (open water swimmers). Ostracods also live in freshwater, soils and under ephemeral conditions (places where there water is only temporary). Like with habitats, ostracods exhibit a diversity of diets. Some are herbivorous while others are scavengers or predators. Additionally, they may be active or filter feeders. Males and females will have differently shaped and sized carapace (and sometimes even diets). Many species though, especially non-marine species are parthenogenetic and only females exist.

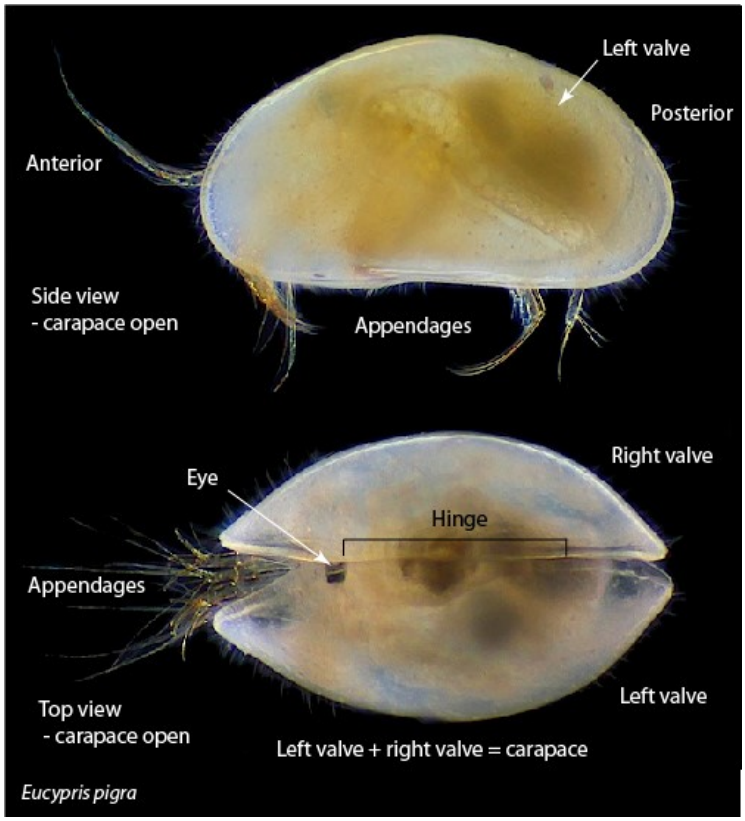

Figure 2: Basic anatomy of the living ostracod *Eucypris pigra* (Smith n.d. http://www.lbm.go.jp/smith/about.html).

Due to their abundance, ostracods are an important component of zooplankton, an important food source for higher trophic level organisms. They also have a direct human application. Some species of ostracods bioluminesce producing a blue light that can be read by but hard to detect (Smith n.d.). Thus, during WWII Japanese soldiers would keep small containers of ostracods as flashlights. However, ostracods are more notable for their paleontological significance. Since they molt, have hard parts and have a fossil record back to about 485 million years ago they are the most abundant arthropod paleontology (Smith n.d.). Due to this artifact they can be used as index fossils to date strata in certain areas. They can also be used to reconstruct climate via their shell chemistry. A few specimens have the whole animal preserved as opposed the carapaces that are typically found.

Our very own Joe Cantrell has found some ostracods preserved in a very unusual way: inside the chambers of the freshwater snail *Elimia tenera*[3]. The vast majority of *E. tenera* fossils are found in the Laney Member of the Green River Formation. The rock was formed when high quantities of silica entered ancient Lakes Gosiute and Uinta about 45 million years ago (Allmon 2005; USGS n.d.). Due to the high amounts of silica in the rock (since it is chalcedonized) I believe we are looking at a volcanic eruption that put high silica ash in the lake then which turned to agate. Alternatively, there could just be high amounts of silica in the lake(s) at this moment in their history due to erosion of surrounding rocks. After all, they are not preserved in a tuff though the water may dissociate the ash. However several things do not add up for this assemblage regardless of the cause. For instance, we mainly see snails and no vertebrates. I do not know the material well enough to say for sure, but I have never seen any *Turretella* agate being sold with something other than molluscs. A possible explanation for this may be that hot ash heated the water on entry (or the water was

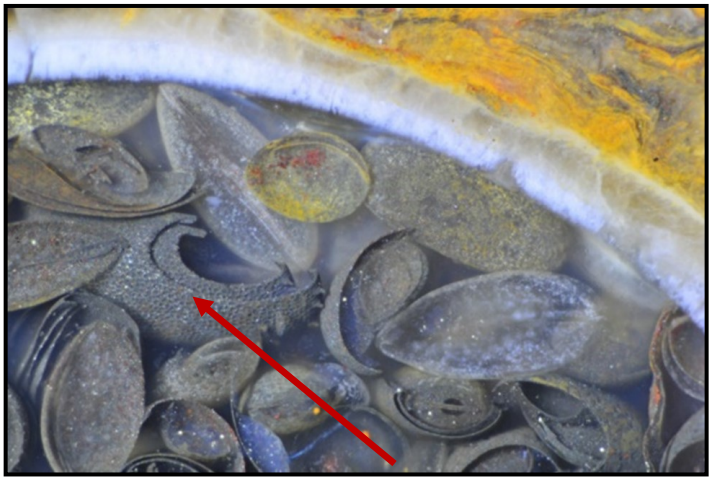

Figure 3: Various ostracods inside an *Elimia tenera* shell from the Green River Formation. Arrow pointing to an ostracod with deep pitting in its carapace. Photo by Joe Cantrell.

[3]Because of the snail's long spire it is often confused with the marine snail *Turritella spp*. and is called *Turritella* agate by dealers. While the two are in the same superfamily (Cerithioidea) they occupy different habitats and have different features. The *Elimia* from the Green River Formation has also been referred to as *Goniobasis* and *Pleurocera* in older publications.

warmer at this time) thereby changing the taphonomic conditions of the lake. When fish die they float to the surface due to the gasses in there swim bladder expanding (UCMP n.d.). However, if the water is cold enough they may sink to be buried (UCMP n.d.).

Figure 4: Ostracods in the Elimia tenera from the Green River Formation. Note that (a.) is short and round whereas Potamocypris williamsi (?) (b.) is long and flat. Both noted ostracods are in a non-lateral orientation.

The biggest problem is, why are there so many ostracods *inside* the snails? A snail, of course, has soft parts inside its shell thus in order for the ostracods to get inside (in the numbers that we see in the specimen), there can't be any soft tissue. Thus the snails had to die and the soft tissue had to be removed before the ostracods entered them. If it were a volcanic eruption ash would also clog snail and fish gills and have a lesser effect on the ostracods since they respire through their cuticle. This would allow the ostracods to eat the snails. However, it could also just be a time of high silica content in the water. Furthermore it is possible that the carapaces could have washed in the shells after decomposition but that seems unlikely. Some species of ostracods are scavengers while others can take on larger prey in groups (Smith n.d.). Furthermore, there are a few parasitic species (Smith n.d.). At this time, we must also ask are we looking at molts, animals or both? To determine the animals' behavior we have to identify them first. A quick Google search on "ostracods in *Elimia*" yields similar specimens on eBay and images using Joe's stacked image technique. In 2012, 16th place for Nikon's Small World photography contest (a contest that acknowledges photomicrography) actually went to a photo of ostracods in *Elimia* (CBS 2017). However, there are no academic results.

Swain (1949; 1964) has identified many of the ostracods from the Green River Formation. Neither of the aforementioned publications mention the ostracod containing *Elimias* though. In his 1964 paper Swain recognizes the families Cypridae, Candonidae and

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Figure 5: Ostracods in one whorl of an *Elimia tenera* from the Green River Formation. Arrow pointing to adont hinge. Photo by Joe Cantrell.

Limnocytheridae. 75% of the extant freshwater ostracods belong to the first two families (Martens et al. 2008). At this point in time, I do not trust my ability to identify all of the ostracods in these images, even to the genus level since they can vary in shape and size throughout geologic time and exhibit sexual dimorphism (males and females look different). Additionally, many of them look the same to the untrained eye (me). With regards to the specimen identification, I would like to point out a couple of observations. The first being is that I think we have at least 3 species. In Figure 3 you will notice that one carapace has well defined pitting (at arrow) whereas the rest do not. Figure 4 shows non-lateral views of some ostracods, neither of which show the prominent pitting as in Figure 3. Note that yellow one (at a.) is shorter and fatter that the grey one, possibly *Potamocypris williamsi* (at b.) which is tall and skinny (again, from either a dorsal of ventral perspective). One potentially diagnostic feature for some ostracods is their hinge. Figure 5 at arrow shows an ostracod with an adont hinge (no teeth). With more time spent looking at images and additional material it would be possible to assign names to these animals which may give insight to their peculiar fossilization.

In short, ostracods are a diverse group of crustaceans (in terms of life style) with a rich fossil history that can give us insight to a particular paleoenvironment and/or help date a stratum. They have been observed inside the snail *E. tenera* though no academic work has been done on why we find them there. By identifying the species we see (and perhaps doing a few taphonomic experiments) we will gain insight on the biological and physical processes that make this phenomena possible.

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Elimia tenera from the Green River Formation, with Ostracods inside the whorles.

Dime on right in picture can be used to show size of the ostracods..

The ostracod shells are all well under 1-mm in length, and those are the big ones. Pictures by Joe Cantrell

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Petrified Forest National Park

By Robert Rosé

In the northeast quarter of Arizona lies a wide swath of colorful rock called the Painted Desert. In the southeast corner of this desert is Petrified Forest National Park. Not only is this park known for its petrified logs but other plant fossils and a wide variety of fossil vertebrates. These fossils are in rocks of the Late Triassic Chinle Formation.

In February, 2017 I revisited Petrified Forest after many decades. The Park is elongated north to south with entrances at both ends. Entering through the south entrance you come first to the museum which is a must see. Here the visitor is shown up-to-date interpretations of the geology, paleontology and paleogeography of the Late Triassic.

Outside on the hills around the museum is a loop trail which takes the visitor close to numerous petrified logs of varying lengths and diameters. It is quite a thrill to walk along and see all these logs some of which are more than twenty feet long. The long logs trail takes you past a jumble of logs some more than 180 feet long.

Back in the museum you learn that the forests that created all these logs grew in a large flood plain that drained northwest across what would become New Mexico, Arizona, Utah and the southwest corner of Colorado. It is believed that the abundance of the logs was due to log jams in the rivers. The Chinle Formation spans a time from 225 to 205 million years when plants and animals were very different than we see today

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Driving north from the museum you can stop at any of several overlooks/driving loops which allow exploration of the geology and paleontology. At the Crystal Forest more logs lie on numerous hills and if the sun is just right light will reflect off quartz crystal druze on the logs. A 0.75 mile long paved trail makes this an easy stop. The Jasper Forest stop has a much longer trail but has great panoramas and lots of logs. The Agate Bridge stop is the classic view of a 110 feet long log spanning a wash and historically shows tourists standing on top of it.

The Blue Mesa driving loop gives you views of logs on top of pinnacles and grey and blue colored rocks creating a badlands topography. At the top of the Mesa is a pebbly sandstone and conglomerate with in situ logs.

At Newspaper Rock there is a viewing platform from which you can see over 650 petroglyphs. Nearby at Puerco Pueblo more evidence of Indian activity highlights foundations of homes occupied 1250-1380BCE.

At the north end of the park you see where the old Highway 66 crossed. Only a line of telephone poles remains of the route. Rocks exposed at the north end are slightly younger Chinle Formation and dominantly pink to pinkish red in color.

Dinosaur Hunting at Nail Quarry

By Jerold Dodson

There is a lot to plan for this year. I hope that more NARGies will find time to participate. The big drawback is that we don't get to keep the bones - except for unknown scraps though many of these may be identified to a particular bone but not the animal.

I've assumed a larger leadership role this year and going forward. That doesn't mean that the ranch (land owners), the Tate Museum (repository), and Jim Seigwarth (the relationship master) won't change their minds. Note: Greg Carr will be participating as he can and his knowledge and shared leadership will be appreciated. Other quarry leaders: Jim Seigwarth, Anita Colin, Glenn Doyle - all Coloradans and we work as a team.

Plans for Summer 2017: Dates - July 16 thru August 23 - the July date is established so as to get more NARGies involved. I'm pushing for NARGies in the July period.

Housing: Camping at the site - this is roughing it, not much room or attitude for large RVs but possibly atop the ridge (flat and windy as hell); camping hookups at Medicine Bow and Rock River - Expect nightly rates of approx. $25 with weekly and longer periods discounted - I have contact phone #s but Rock River has no bath facilities (but we can rent a room at the Longhorn for baths; Motels/Hotels - The Virginian in Medicine Bow, the Longhorn in Rock River - there are NO luxury accommodations - expect nightly rates, yes rooms can be shared, of $60 but with weekly rates and longer. Other possibilities are AirBnB for Laramie - I shared a house in Laramie for a week last summer - not too bad a way to go except for the daily commute.

Food: Cafes in Medicine Bow and now in Rock River (brand spanking new) - this is rural country with low income thus pricing accommodates what the locals can support $8 breakfast, $12 dinners, lunches (sack and groupies at the quarry).

Groceries: About 50 minutes to Rawlins or 50 minutes to Laramie - for fresh foods, meats etc. Local gas station with limited and mostly convenience items (bread, milk, candy bars, hot dogs, beer, soft drinks, water, ICE)in both Medicine Bow and Rock River. Our goal is to support the locals - they will like us better and get to know us.

Travel: There are decent accommodations between Portland and Laramie. You can expect to pay, depending on your desires, from $60 to $140 per night. I dont know about campsites but KOA and others are along the route. Its approx 1100 mile to Medicine Bow or Rock River. Lots to see of course, places to visit along the way (Hagerman, Kimmerer, Green River, Vernal, Yellowstone). I get there in a day and a half but really put in a long 1st day with effort to reach Burley, ID for overnight.

Expenditures:
Share costs of water, ice, casting materials, shared food/lunches. Except for plaster of paris and burlap, there is not much need for stocking up in Portland and carrying too many ice chests. I carry two good size ones. We keep record of costs and collect when folks depart. I spent approx $3k last summer but that included several trips to the Denver airport and to Ft Collins - but that was a month from home and I was paying for my granddaughter's trip out. I expect to not spend as much this year - I will be taking the Lil Guy (think upgraded Robert Rose) but will still budget in the neighborhood of $2,500 for 6 weeks.

Lots of To-do's at the quarry (with more study and scholarship afterwards on the data gathered):
Mucking out - the erosion during the Winter and Spring has generally filled the dig pit. We have a local man who will be back in Medicine Bow for the summer and the dig - he will be checking out the site when he returns in May. We must prepare the site before we start looking for bones. Shelters (from the sun and wind and showers) - got to get them up and stable for our daily lunch and relaxation as well as shade over the work area. Clean up before departure.

Urgent to respond and plan - I learned that there is high probability of construction of wind farm near Rock River - this will impact housing (above). Get in gear, we need to lock in Housing within the next month. That's all for now. Come to the May NARG meeting, its Dinosaur time.

Jerry Dodson (Cell: 360-721-9492; email jdodson01@msn.com)

Tips and Tricks Using a Paleotools (r) #1 air scribe

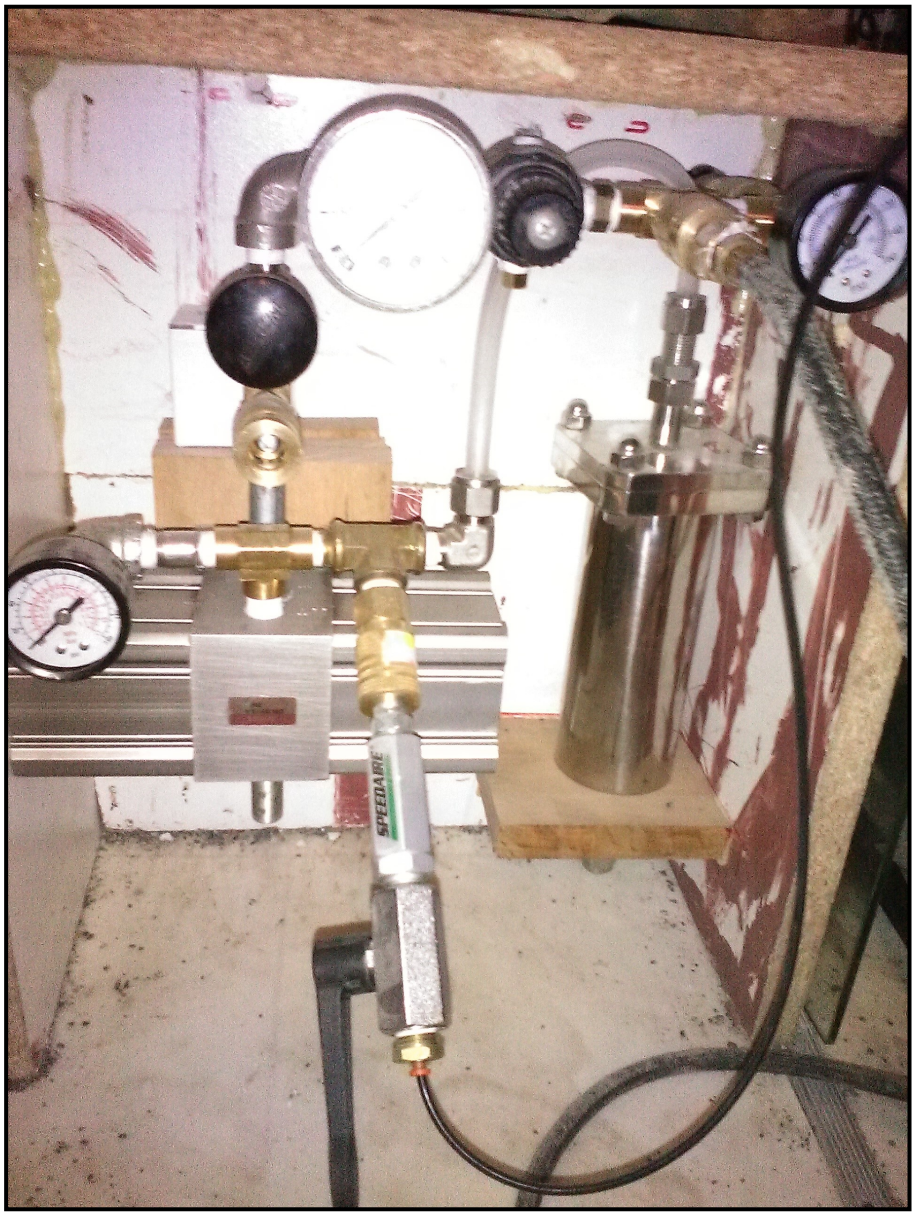
By Greg Carr

Paleotools makes a fine set of air scribes for fossil preparation. But... they are expensive. I was lucky enough to acquire one (lightly used) from an Ebay auction. They don't come up very often - we all like them. Anyway, it was a Paleotools #1, the smallest they make. I needed something smaller than the modified Chicago Pneumatic that I generally use at home. Here are the tools #1 to #6:

You may notice that the #1 does not have a valve on the tool - instead, it is on the supply connection. That can be a problem if the supply connection is not handy. The tip of the tool is so thin (1.1mm tungsten carbide) that it is very easy to break.

So here is my first trick - an accessible tool holder with a built-in air vale in the form of an air switch. It is made from some stuff I had laying around and a 3D printed 'pen holder' scaled to fit the tool. Now all I need to do to turn it on and off is flick the air valve mounted on the holder - no awkward reaching and potentially dropping it
and breaking the tip.

Paleotools
(www.paleotools.com)
1006 West Hwy 13, #4
Brigham UT 84302
ph (435) 734 0148
fx (435) 734 0151
800 493 8130)



The second issue is the air supply. Paleotools recommends 100 - 125 PSIG air for this tool. On a good day my compressor can supply 80 PSIG up at the tool. So I found a pneumatic 'air amplifier' - basically an air pump that will double the air pressure in a supply line by doubling the air consumption. Since this tool uses very little air, it's a good tradeoff. It is a small object with an air inlet, an air outlet and an exhaust. It is recommended that the air outlet have a small reservoir to even out the air pressure. I had some small stainless cylinders that used to house exotic air filters, so I used one of them. Throwing in an air pressure regulator, some additional air quick-couplings and some gauges I ended up with a slick little unit. I run the #1 at about 140 PSIG, while my Chicago pneumatic runs at 80 PSIG.

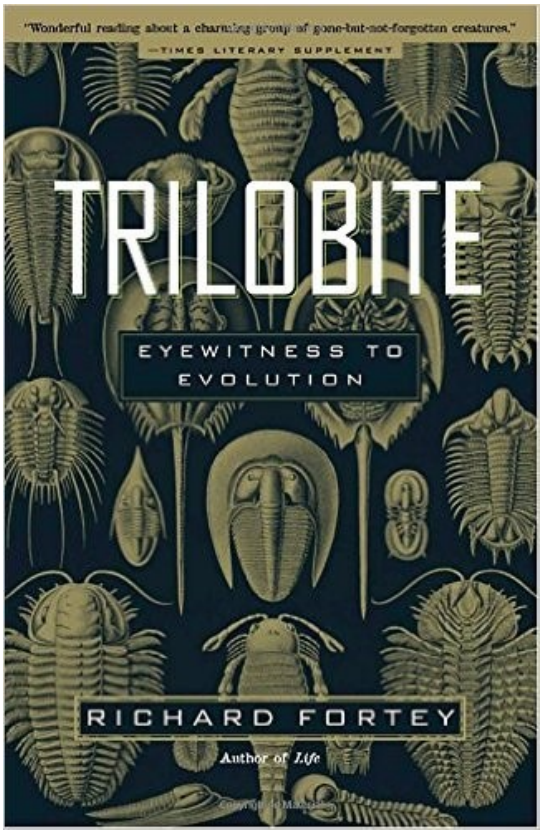
Third, I need an air dryer. Quite a while ago I detailed out a home-made air dryer made from two water filter housings. One is merely a drop-out pot that traps water droplets coming up my air hose, while the other contains a filter and calcium chloride (drizeaire) to reduce humidity. I mounted it on the other side of the box that holds the air amplifier, giving a nice little all-complete roll-around air cart.

Air dryer set up is in the box under the concretions.

Last of all, I've had one problem with the #1 as well. Internally, the tool tip is a collar silver-soldered to the tungsten carbide rod that makes up the tip. This unit is held back against a flat plate where the air comes in. The spring is designed to prevent the tip from rotating since it is essentially impossible to keep it ground centered. Well, the tiny bent end of the spring was slipping off the side of the collar and jamming against the wall of the housing, causing the tip to lose power and bind. I ended up tightening the coil of the spring so that it grips the collar tighter. This prevents it from coming loose, and really makes it more reliable and more powerful.

Reading about Fossils – Trilobite!

By G F Lukos



Trilobite: Eyewitness to Evolution (2000), by Richard Fortey, is an engaging read about the popular fossil that has lured so many people into an interest in paleontology. The author, a senior paleontologist at the Natural History Museum in London, covers a lot of facts about the long-extinct creatures. In a wide-ranging narrative he also illustrates how curiosity about something as arcane as ancient arthropods can contribute to a greater understanding of concepts such as evolution and the movement of continents.

The first chapter starts with a visit to England's Cornwall coast to find the very spot where a (fictional) trilobite made an appearance in a Thomas Hardy novel a century earlier. The chapter ends by introducing a theme that is carried on throughout the book: the role of unsung scientists – including citizen scientists – working cooperatively to advance knowledge of the planet we live on.

Presentation of information about trilobites is interwoven with stories about the author's personal path into the lost world of trilobites at sites around the globe and with profiles of many trilobite explorers who preceded him. This is very much a narrative, not a reference book, but there is plenty of detail for the trilobite enthusiast looking for answers.

An early chapter that looks at the modern history of trilobite fossils from the late 17th century, when a specimen was first referenced as a "flatfish" introduces trilobite anatomy. The next chapter continues the history with accounts of how long-missing trilobite legs were finally revealed. Another chapter is devoted to eyes and considers how the world might have looked to trilobites equipped with various arrangements of calcite crystal lenses. I especially appreciated the chapter that discusses how the study of trilobite fossils has contributed to scientists' understanding of ancient geology by setting reliable markers for where continents merged and split.

The discussions about how these discoveries were made, in tiny increments, building upon (and sometimes correcting) earlier insights is the story of how science works – with the humble trilobite in the leading role. I chose this book because I knew absolutely nothing about trilobites and wanted to learn about these ubiquitous fossils, but I believe Fortey's chronicle would be of interest also to people who are already very knowledgeable about the little critters.

Side note:
Trilobite: Eyewitness to Evolution is not in the NARG library, but it is available through the Washington County library system in hard copy and through the Multnomah County library system in both hard copy and as an e-book. The book includes photos of many different types of trilobite fossils and diagrams interspersed through the text and sections of photos at intervals (or, in the case of the e-book, at the end). While the e-book is great for the ability to quickly look up the meaning of some Britishisms and other terminology that may not be in your vocabulary, it does not facilitate moving back to the text after checking a referenced figure in the back of the book.

Stonerose Plant Fossil Quarry Membership Dig

Stonerose is thrilled to revive our popular local Auction on April 29! Membership Weekend is April 28-30, 2017, and we hope you'll join other members for fun and fossils during this exclusive weekend. Not a member? Join now and you can dig with other members. You don't have to be a member to join us for the Party in the Park!

The popular "Guided Dig with 3G" will be offered on Sunday, April 30 from 10am-1pm. The cost to learn to properly quarry a site at the restricted "Corner Lot" site is $40 per person and includes a hearty, healthy snack. Email us stonerose@frontier to reserve your spot with the fabulous Gregg Wilson!

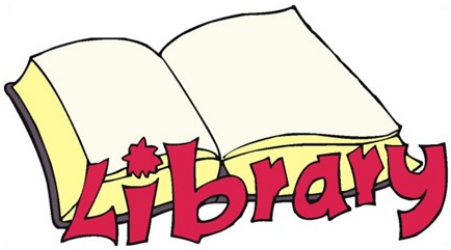
Dan is taking a friend up to Stonerose for the member's dig. If any NARG members want to come contact him.

Fossil Preparation and Collection Symposium

The Association for Material and methods in Paleontology (AMMP)is proud to be planning for the 10th Annual Meeting, to be held in Austin, Texas in April 19 -22 , 2017. While this is the tenth 'Fossil Preparation and Collection Symposium' to be held, AMMP has a shorter history. The concept and formalization came about with the input and hard work of the community engaged in the hands-on care and stabilization of paleontological materials. We are made up of experienced innovators and eager novices who are working toward a common goal. Please visit the AMMP website for complete details.

http://www.paleomethods.org/2017-Annual-Meeting/Annual-Meeting.html

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

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NARG Membership

NARG's membership dues for 2017 are due January 1, 2017

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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.

NARG Up Coming Activities

2017

*	FossilFest -	Hillsboro, OR	August 12
*	Portland Regional	Hillsboro, OR	

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Secretary:	Tami Smith	(503) 620-5317
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	Aaron Currier
	Dan O"Loughlin
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	Dan O'Loughlin