North America Research Group

NARG NEWSLETTER

Official Publication of the North America Research Group Fall 2016

Volume 5 Number 3

In Memory of James Scheirbeck

6/4/1929 - 9/4-/2016

Jim and Bill at Bill's house.

Robert R and Jim at Buffalo Canyon, NV.

On Ferry going to Hornby Island, BC, Canada.

Bill , Mike, Jim, Peg, Michael, Rick at Ishi Wlilderness in California

Birth of a Fossil Park

by Curt Burbach

On Dec. 19th, 2014, the president signed into law the designation of Tule Springs Fossil Beds National Monument, the 405th unit within the National Park Service at that time. It stretches out for 25-miles from tip to tip, consists of 22,650 acres, and comprises much of the Upper Las Wash on the northern margin of the city of Las Vegas, NV. Unlike most public land fossil parks which are usually located far from highly populated areas, Tule Springs has the potential of becoming a world-class urban fossil park, complementing the other popular public land sites that surround Las Vegas Valley and contributing to the overall "Vegas experience."

Geology

Tule Springs provides an outstanding sampling of the Las Vegas Formation – a compilation of soft-soil sediment deposits from the repeated occurrences of fresh water springs. Latest USGS soil samples indicate that some of the oldest deposits date back to 300,000 bp, whereas the youngest ones are a mere 10,000 years old. Continuous changes in climate and environments have put the springs into a recurrent cycle of discharge (depositing sediments) and dry conditions (erosion). We are currently in a dry erosion state. During a time of discharge the spring water soaked the area with wetlands, pools, marshes, and shallow meandering streams. Naturally, this type of habitat sported a wide range of biota as depicted in the fossil record, such snails, insects, amphibians, reptiles, aves, rodents, and of course, the widely popular mega-fauna that went extinct at the end of the last Ice Age. Due to this repeated cycle and the relatively random erosion patterns, the remaining deposits provide researchers with a complex variety of stratigraphic arrangements rich with unconformities. Needless to say, it's a challenge for them.

Figure 1 Spring deposits at Tule Springs (photo by C. Burbach)

(Cont. on pg. 3)

Cont. from pg. 2)

Research History Highlights

Scientists and researchers have been making significant discoveries in Tule Springs for over 100 years, dating back to 1903 when Josiah Spurr and his team mapped out the geology of southern Nevada for the first time. They discovered numerous Pleistocene-age fossils, including elements of a “mastodon” which was likely from a misidentified Columbian mammoth (*Mammuthus columbi*).

Figure 2 Josiah Spurr (middle), San Francisco CA, 1896 (USGS Portrait Photo 3321)

Later, an archaeologist on expedition in Tule Springs in 1933 with Hunter Fenley, recovered an obsidian flake embedded in charcoal near a few mega-fauna fossils, leading him (and many others) to believe that an animal was possibly butchered at a fire pit thousands of years ago. This was very significant at that time, because an igneous rock such as obsidian is not indigenous to the area, and researchers were very curious about the possible interaction between the newly arrived humans (~13,000 bp) and the now-extinct mega-fauna. This fueled an increased interest amongst archaeologists as to the scientific potential of Tule Springs and spurred decades worth of investigative research. During the following years various expeditions took place mostly focusing on archaeology, which always concluded with poor results, except for the paleontologists.

Figure 3 *Bison latifrons* skull (AMNH 30052) collected by Hunter Fenley's team; currently on loan to Canada Museum of Nature at Ottawa, Ontario, Canada; SBCM image figured in Springer, et al (2011).

(Cont. on pg. 4)

Eventually, a major project for Tule Springs was organized by the Nevada State Museum at Carson City. It lasted for four months ('62-'63) and included a wide variety of researchers representing the science disciplines of geology, paleontology, archeology, sedimentology, and palynology. Nearly a dozen deep, parallel trenches were carved through the landscape with bulldozers allowing for close examination of the various sediment units. Today, this project is referred to as the "Big Dig". Interestingly, the newly developed dating technique called "radio-carbon dating" was employed to assist with age-dating of samples and unit correlation. This was the first time that radio-carbon dating was used in a major research project, and it served to launch this new technique as a viable research tool and place it at the forefront of scientific studies. Amongst other things, the project revealed that Tule Springs is rich with Pleistocene fossils, but sparse with archaeological resources. The archaeological community gave up on Tule Springs at this point, especially since new discoveries were to be made in New Mexico.

Figure 4 One of the trenches dug out during the 1962-63 Big Dig (photo by C. Burbach)

While managed by the BLM, scant research had been performed at Tule Springs over the next 30 years. Eventually, a team from San Bernardino County Museum would be contracted on a few occasions to mitigate during transmission power line, and conservation projects. Tens of thousands of fossils were recovered and curated. At the same time, the USGS began analyzing and mapping Tule Springs. In fact, at the time of this writing, the USGS is on the verge of publishing two field guides and a major Las Vegas Formation document.

Park Challenges

With the Las Vegas metropolitan area so close, the Tule Springs landscape has been used quite a bit by the local populace, and not in a healthy way. There is a long-standing cultural belief here that it is acceptable to dump unwanted trash out into the desert. In fact several decades ago, the city encouraged its citizens to bury their large unwanted items out in the desert. In recent generations, this practice has become abbreviated to merely dumping it. Ergo, Tule Springs is riddled with thousands of tons of trash in certain areas. Additionally, the northern most section of the park was a designated shooting area while these lands were managed by BLM. People are still shooting there while the area looks like a designated dumping ground. A hazmat study may have to be performed before clean-up operations ensue.

.

(Cont. from pg. 4)

Local residents also like to use this former BLM land for off-road recreation by riding their motorcycles, ATV's, and four-wheel vehicles across the desert. Sometimes they will tear down fencing just to gain access to the land. All of these behaviors (the dumping, shooting, trespassing) still need to be corrected and eliminated, as they still continue today. Along with public education, the NPS needs to employ signs, law enforcement, and fencing in order to stop the "bleeding" and halt the desecration of this newly established fossil-park

Aside from these unhealthy uses of the land, Tule Springs also faces a significant threat of vandalism, theft and destruction of paleontological resources. Adolescence mischief, amateur collecting, and thievery to support a drug addicts' habit, all pose real threats to *in situ* fossils within the park. In fact, the best example of a partial skeleton (mammoth) here within the park has recently been destroyed.

Another major challenge that Tule Springs is faced with is its lack of infrastructure. We have no buildings of our own; no official park entrance; no established trails, no visitor center, and no real programs of any kind for the public to enjoy. Congressional legislation has started us out on a shoe-string budget, and so when we inform people that we are starting out on the ground-floor, we really mean it.

Paleontological Resources

Tule Springs is rich with Pleistocene fossils embedded within the ancient spring deposits. Most specimens are disarticulated and fragmented. Partial skeletons are rare. There have been a few occurrences of bones, teeth and tusks of various animals "jumbled" together resulting from animals falling into a pool, dying, and spring water bubbling up and churning the mixture of bones – sometimes even polishing them. But in most cases, a single, often times fragmented fossil is what's found and recovered here in Tule Springs. This is not the site of a catastrophe as at Waco Mammoth National Monument, or a predator trap like at La Brea Tar Pits. But rather, this was an ongoing tranquil habitat that supported a typical ratio of animals. Hence, the most common specimens discovered are from herbivories such as the mammoth, bison, horse, and camel. However, ground sloth, dire wolf, sabre-tooth cat, American lion, and the teratorn have also been identified, along with many others.

The many scientific expeditions over the last 100 years have generated numerous fossil collections – all of which were taken to repositories far from Las Vegas. The Hunter Henry collection of 1933 (obsidian flake) is curated at the American Museum of Natural History in New York. The Big Dig collection is located at Berkley, while other collections reside at LA County, San Bernardino County, Santa Barbara County, the Autry Science Center (formerly the Southwest Museum), and the Nevada State Museum at Carson City, NV. Just this last year, one collection was relocated back to Las Vegas, with another hopefully soon to follow. We look forward to having our own repository here at Tule Springs with the hopes of bringing more of these collections together.

On the following pages are some photographs of typical fossil discoveries at the surface, here at Tule Springs. Larger specimens are normally discovered once excavating begins.

(Cont. on pg 5.

(Cont. from pg. 5)

Figure 5 Vertebrate bone *in situ* (photo by C. Burbach)

Figure 6 Horse tooth *in situ* (photo by C. Burbach)

Figure 7 Possible mammoth foot bones *in situ* (photo by C. Burbach)

(Cont. on pg. 7)

(Cont. from pg.6)

Figure 8 Unidentified leg bone (photo by C. Burbach)

Figure 9 Unidentified bone material (photo by C. Burbach)

Figure 10 Horse tooth on surface (photo by K. Springer)

(Cont. on pg.8)

(Cont. from pg. 7)

Figure 11 Unidentified assorted bone material (photo by C. Burbach)

Figure 12 Mammoth tusk erupting out from side of slope (photo by C. Burbach)

(Cont. on pg. 9)

(Cont. from pg.8)

Figure 13 Two mammoth tusks (in red circles) exposed *(in situ*) on side of slope. They are 50-inches apart, both at same height, both pointing out at same oblique angle. Possible site of a mammoth skull within the soils (photo by C. Burbach)

Figure 14 Horse tooth on surface (photo by C. Burbach)

(Cont. on pg.10)

(Cont. from pg.9)

Figure 15 Rib bone *in situ* (photo by C. Burbach

Figure 16 Possible Metapodial or phalanx bone *in situ* (photo by C. Burbach)

Each location within the National Park Service is assigned a four-digit code that is used throughout the Department of Interior, to streamline communication. For instance, Death Valley National Park is DEVA. Here at Tule Springs Fossil Beds National Monument we are called TUSK.

Figure 17 Park Ranger Curt Burbach with an American Lion skull

Curt Burbach
Park Ranger / TUSK
Curt_Burbach@nps.gov
burbacasaur@gmail.com
(NARG Member since 2004)

"Get Your Jurassic Dinosaur Here" A Brief on the Morrison Formation

Jerold Dodson, Nov. 2016

Most of us are familiar with many of the animals of the Jurassic world. Chief among them are the great sauropods – Brachiosaurus, Brontosaurus, Apatosaurus, Camarasaurus, Diplodocus – the predaceous Allosaurus, and the most easily recognized Stegosaurids. Yet there are many more variations of these great dinosaurs that most of us haven't heard of: Suuwassee, Haplocanthosaurus, Kaatedocus, Amphocoelias, Supersaurus, Dyslocosaurus to name a few more long necks. But there are other lesser known (again to some of us): Dryosaurus – an iquanodont, Coelurus, Ceratosaurus, Othnieliasaurus, Nanosaurus (probable Othnielia), Laosaurus – a hypsolophodontid, Camptosaurus, Palaeopterix (dubious with only a few bones), and an Ankylosaurid – Mymoorapelta. And there are other early and mid-Jurassic species/variants.

Yet my goal in this article is to provide information regarding the Morrison Formation, its evolution as such from the mid to late Jurassic. NARG members that have participated in digs at Como Bluff, WY and in the Nail Quarry since 2011 know that the Nail is late Jurassic Morrison at about 153 MYA. Perhaps this article will promote and encourage other NARGies to participate in our work at Como Bluff.

Terms that I have used interchangeably and synonymously have different origins: When we talk about "Time" in relation to geology we go from the Late to Mid to Early (going back in time from some present). Correspondingly (and synonymously to me) going from Upper or top "Rock" layers (Later timewise) to Middle (Mid timewise) to Lower (Early timewise) refers to stratigraphy. I'm not confused. Really! Note that the radiometric dating of the Morrison is from Early (Morrison) at 156.3 +or- 2 MYA to Late (Morrison) at 146.8 +or- 1 MYA (I capitalize mya, million years ago, to emphasize age).

So what and where is this Morrison Formation?

This was an important lesson to me: The Morrison Formation is huge. It is underlain by the Sundance Formation (plus some unconformity and bits of the Unkpapa Formation) and of course is overlain where the layer exists – not eroded - by the early Cretaceous. The area of the currently known Morrison is approximately 600,000 square miles. *Refer to the 1st exhibit – photo of the contiguous US overlain with a diagram of the extent of the Morrison Formation.*

To better understand the Morrison, I examined what was happening to the North American (N Am) continent before and after. Of course, the N Am continent is not independent of the rest of our dear sweet Mother Earth, thus I had to know more about what was happening worldwide geologically. What was happening that resulted in the Morrison and ultimately what brings us to existing exposures of the Morrison? Let's start with the breakup of Pangea. Mind you I won't bother with my rudimentary knowledge of plate tectonics but will mention what was/is happening.

Exhibit 1

(Cont. on pg.12)

(cont. from pg 11)

Give or take a few million years, Pangea began breaking up near the Permian/Triassic boundary 250 MYA. By 190 MYA (+-) Eurasia had begun moving away from the rest of the Pangeac landmass. This opened-up a small but growing Tethys Ocean which might have appeared as a huge gaping mouth of the still connected supercontinent. The rest of our watery planet was/is known as the Panthalassa Ocean (7-8 times the area of the Tethys). What would become N Am straddled the equator. S Am and Africa were still joined along with Antarctica, India and Australia and were located fully in the Southern Hemisphere. Climate-wise (and without going into the C02 and temperature gradients and their measurement/comparisons), Earth had gone from a low point of C02/temperature in the late Carboniferous/early Permian (with attendant glaciations) spiking to a high at the PT boundary which was also a high for the Mesozoic Era. *Note: Paleozoic highs exceeded the PT high with highest spikes in the Cambrian and Devonian Periods.*

By 180 MYA (mid Jurassic), N Am and S Am were attached via a thinning isthmus, Africa was separating from S Am as well as Antarctica/Australia/India. Eurasia had separated from N Am. The Tethys Ocean was growing into the spaces opening as the continents we are familiar with were forming.

Relative motions of the continents: N Am and S Am were moving slightly clockwise, westerly and northward. Africa continued to shed Antarctica, Australia and India. Africa was moving easterly and northward, Antarctica, Australia and India become separate land masses with Antarctica moving slightly southward, India moving North and East and toward a direct collision with Eurasia, and Australia moving slightly north and easterly toward the Western edge of the tip of South America. By mid-Cretaceous (100 MYA) the Atlantic and Pacific Oceans had formed, the Tethys was at its peak area wise with all of the land masses we now recognize separated by water. Also climate (CO2 and temperature) had fluctuated in a downward trend during the mid-Jurassic but was on an upward trend in the late Jurassic (the Kimmeridgian and Tithonian stages which encompass the Morrison Formation) with another Mesozoic high point at 100 MYA.

Note: At 100 MYA (mid Cretaceous), an apparent high water mark for all continents, N Am was separated by the Western Interior Seaway into 2 landmasses - Laramidia in the West and Appalachia in the East. The Seaway extended from the Arctic Ocean thru N Am to the Gulf of Mexico. It was shallow at approximately 2500' depth but was 600 miles wide and 2000 miles long. The Hudson Seaway formed another shallow separation along the northern edge of Appalachia and southern Canada – but this is provided to give visualization reference to the high water marks over all the continents. In the Jurassic, such a seaway never occurred albeit the Sundance Sea transgressed(advanced) from the North to the South and regressed(receded) from the South to the North at least 5 times.

The Sundance Sea resulted from changes in climate as well as "usual" and unusual plate tectonics. The significance of the Sundance Sea is its trail of transgressions/regressions. The "usual" Westward motion of the N Am plate with continual collision and subduction of the Eastward motion of the Farallon plate which was slowly "consumed – subducted" until approximately 30 MYA. The Pacific plate pushed against the Farallon and continues to grind against the N Am plate as it too is subducted as it slowly dives below N Am. The result of this motion and collision is mountains, that is, mountain ranges. Periods of mountain building – orogenies. Unusual would include a "theory" of "flat slab" subduction. The "flat slab" theory suggests that the slab, although subducted by the N Am plate, doesn't subduct in a wedge like fashion – the flat slab may extend a 1000 miles before it stickily sinks pulling a large section of the N Am plate downward thus creating a large depression on the surface of the upper plate. The surface depression along with higher climate temperatures/ rising sea levels result in a period of transgression. Regression resulted from lower sea levels probably due to cooling and the rebound/rising of the depression as the subducted layer moved Eastward and stopped. This is considered a likely explanation for the advance/recession of the Sundance Sea. The Sundance Formation is the sedimentation (both from marine deposits and erosion from the mountains that had formed from the Nevada Orogeny (roughly 190-140 MYA). We are familiar with the Sierra Nevada and Klamath Mountains of the Nevada Orogeny. There were other mountains and uplifts that occurred as the "Sundance" sank. The Sevier orogeny (roughly 145 – 90 MYA) formed Utah and Idaho mountain ranges – I include this info for those who might consider erosion from the mountains formed during the Sevier as some part of the Sundance and of course is not so.

The Sundance Formation is important to understanding the Morrison. It underlies the Morrison and although not considered part of the Morrison, if a paleontologist/geologist finds the Morrison, it is highly likely that some part of the Sundance Formation is below (unconformities or Unkpapa notwithstanding). The stratigraphy can differ depending on where the Morrison and Sundance are encountered. The Sundance is around 10.6 million years old from upper (157.0 MYA) to lower (167.6 MYA) layers. The 5 stratigraphic layers (upper to lower): Windy Hill Sandstone (3.5 million years of transgression/regression), Redwater Shale (4.5 million years of transgression/regression), Hulett Sandstone (possibly Lak and Pine Butte depending on the State - .8 million years), Stockade Beaver Shale (.7 million years) and the basement layer Canyon Springs sandstone of tidal inlet (1 million years). It can be confusing to read about the Sundance Formation as it may be called something different depending on the State (WY – Sundance, MT – Swift, ND & SD – Williston Basin, ID – Stump Formation and UT – Curtis Formation.)

(Cont. on pg. 12)

(cont. from pg 12)

Although I didn't research each of these in depth, my guess is that the general stratigraphy of the Sundance in the different States shows unconformities due to erosion. The stratigraphic layers as described are fairly definitive for the Sundance at Como Bluff and the area of the Nail Quarry.

Consider this (I write it separately to emphasize the relative motions of the colliding/subducting tectonic plates): In the 10.6 million years of the Sundance Sea/Extent of the Morrison Basin, the N Am plate moved westward approximately 473 miles (if at an average rate of 3" per year). Thus the N Am coastline/continent could have grown Westward by 473 miles (excluding orogenies). The point is that the N Am plate pushed over 473 miles of the subducting Farallon then the Pacific plates. As I'm writing this, I'm thinking about how far a "flat slab" would extend under the N Am plate!?! Also, the depression would have shortened the East/West boundaries under transgression and stretched back out as it decompressed in the regression. Food for thought.

The overlying layer of the Cretaceous (if it hasn't completely eroded) has different names depending on the State: WY - Cloverly Formation, MT – Kootenai Formation, SD – Lakota, UT – Cedar Mountain, and CO – Burro Canyon. No additional research has been done to further identify and discuss. Perhaps another short article for NARG newsletter?

The extent of the 600,000 square miles of the Morrison Formation is typical of the range of the Morrison Basin. The Morrison Basin is the geographical extent of the Sundance Sea which is defined by what we know as the Sundance Formation. **See exhibit 2** – close up overlay of the Morrison Basin on the contiguous US map. The green circles are areas where Morrison dinosaur fossils were found and excavated. These areas are some of the first finds. Wikipedia search for Morrison Formation dinosaurs produced some quarry sites. Included are sites in CO, UT and WY. Note that this list is not all inclusive and is included here to arouse your interest – these are places you can find on the map and may be able to get to. Just REMEMBER this: You MUST have PERMISSIONS from owners of private property (even just crossing to get to public lands) to both search for and collect fossils. Respect private and public properties and the rights of ownership thus to avoid trespass and charges of theft. WY – Bone Cabin Quarry (off limits) near Medicine Bow, Como Bluff and the Bone Wars plus Nail Quarry, Wyoming Dinosaur Center in Thermopolis, Shell WY where Big Al the allosaurus was found in 1991. UT – Cleveland Lloyd Dinosaur Quarry South of Price, Dinosaur National Monument, the Carnegie Quarry near Vernal. CO – Garden Park BLM Paleo resources where Stegosaurus Stenops was found in 1992, Dry Mesa Quarry near Delta an ancient mudhole where Supersaurus, Ultrasaurus, Torvosaurus have been dug by BYU since 1972 (over 4000 bones have been removed), Fruita Badlands Paleo Resource Area an active but small quarry between Fruita and Grand Junction, and Purgatoire River trackways site in SE CO where over 1500 tracks have been identified. A final note on Exhibit 1 and 2, the lower Lance formation of the Cretaceous is outlined in blue hashing.

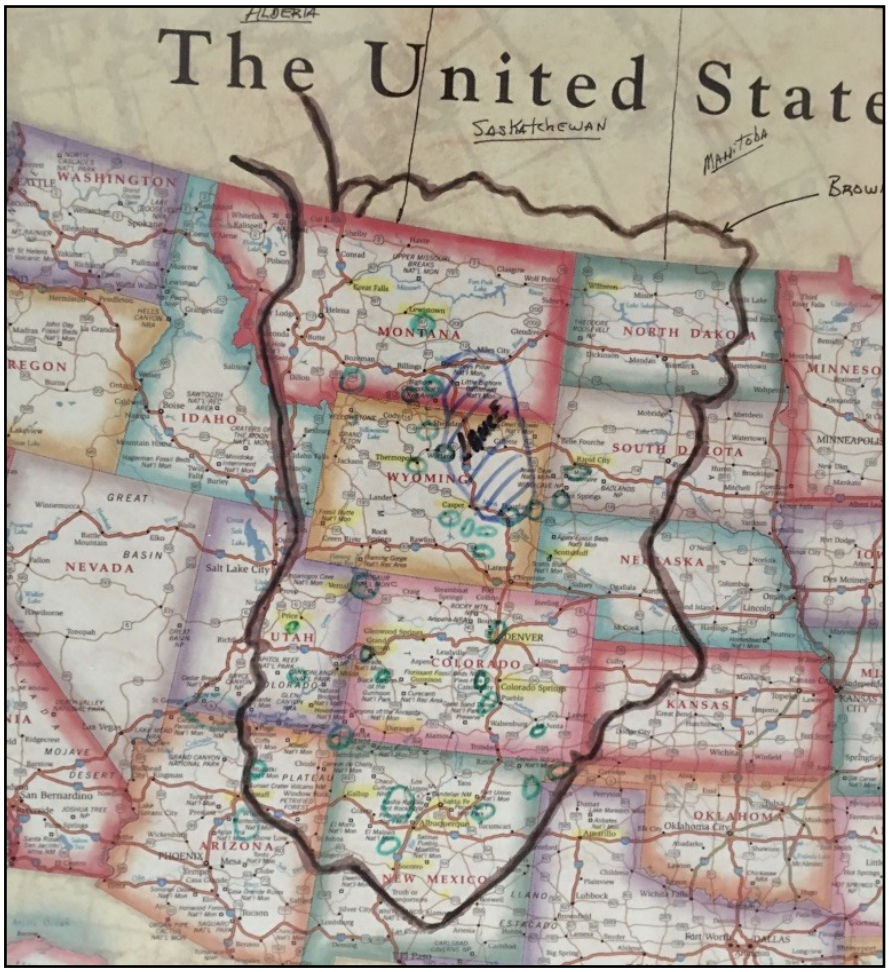


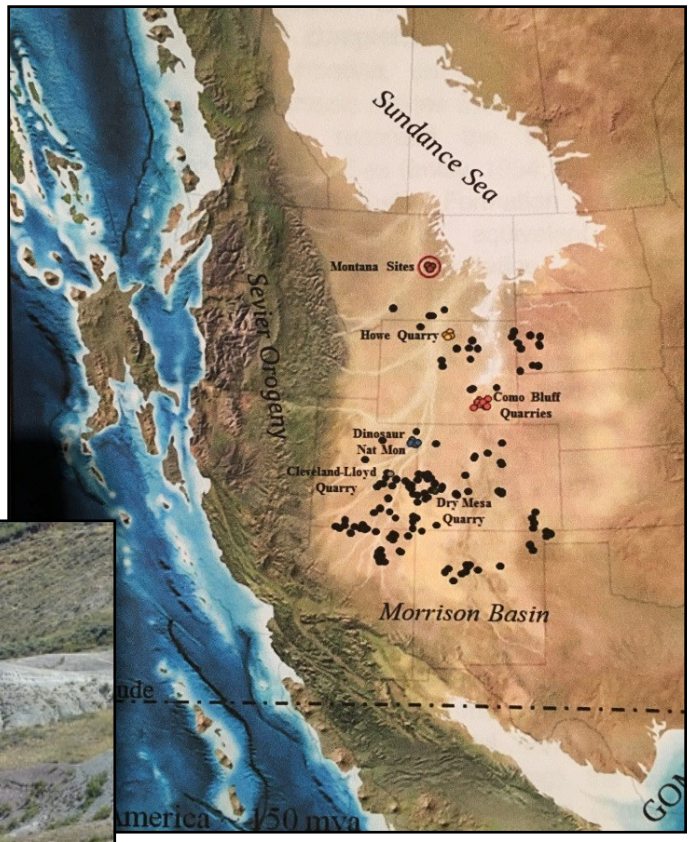
Exhibit 2

(Cont. on pg.14)

(Cont. from pg. 13)

There are many more sites – see Exhibit 3 a diagram of the Morrison Basin at 150 MYA (The Basin includes Southern Alberta, Saskatchewan, and Manitoba provinces of Canada, and parts or all of MT, WY, ID, CO, UT, AZ, NM, ND, SD, NE, KS, OK, and TX. *Note: the black dots which correspond to Jurassic dinosaur sites.*

Exhibit 3 (Ron Blakey, Colorado Plateau Stratigraphy and Geology and Global and Regional Paleogeography.) comes from a website for Montana Jurassic Dinosaurs. It is an ongoing research study of Montana Morrison Formation and paper being developed by Dean Richmond - Geologist, Nate Murphy of the Judith River Dinosaur Institute, and Robin McQuinn – photographer, paleontologist. The exhibits on the website provide interactive links to the huge number of Morrison dinosaur finds. I urge those of you who want more information to view this site and consider helping to fund the research (GoFundMe).



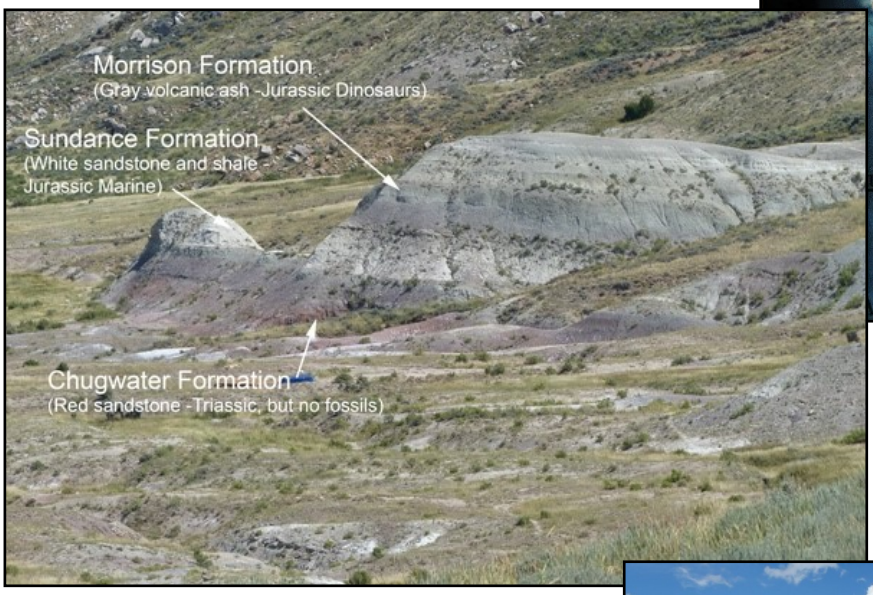


Exhibit 4 is a photograph by Jack Pollock, commercial artist and member of the dig crew at Nail, showing the Morrison/Sundance layering. It is typical and was taken near Nail Quarry. It is self-explanatory.

Exhibit 5 is a great photo of the thick layering of the Sundance exposure that is a half mile North of Nail. The fossiliferous layer is the grey/yellow crumbling sandstone above the red shale. Clouds were shading the colors when I made the photo.

(Cont. on pg. 15)

(Cont. from pg. 14)

Finally Exhibit 6 is a photo of the Nail Quarry to the right and the exposure of the Morrison/Sundance to the left.

I spent many hours researching for this article. Since this article won't be published other than sharing with NARG members in this newsletter, I won't include a detailed bibliography. However, Google and Wikipedia provided ready access to many articles, papers and pictures. Specific references thru Google search turned up the Morrison Research Institute (Colorado State University), www.Researchgate.net, www.dinodatabase.net, and www.Montanajurassic.net. These are excellent learning resources.

Below is a USGS reference which provides more detail of the various layers of the Morrison, Sundance, Unkpapa and Gypsum Spring formations. As you can see, rock colors aren't enough to define any stratigraphic layer.

Morrison Formation, Unkpapa Sandstone, Sundance Formation, and Gypsum Spring Formation (Source: USGS)

Morrison Formation (Late Jurassic)- Light-gray to green and variegatedred, brown, yellow, or lavender, silceous claystone, shale, and siltstone containing interbedded sandstone and fresh-water limestone lenses. Thickness up to 150 ft (46 m). Unkpapa Sandstone (Late Jurassic)- White, massive to thin-bedded, fine-grained, argillaceous sandstone. May be variegated to banded red, yellow, brown, or lavender. Thickness up to 267 ft (81 m). Sundance Formation (Late to Middle Jurassic)- Greenish-gray, yellow, tan, red to orange, and white, variegated, interbedded, fine- to coarse-grained sandstone, siltstone, clay, and limestone. Thickness 250-350 ft (76-107 m). Gypsum Springs Formation (Middle Jurassic)- Massive white gypsum and minor maroon siltstone and shale. Thickness up to 40 ft (12 m).

I'm a neophyte amateur paleontologist and struggling neo-geologist. I'm enthralled with my research efforts and suspect that I could have made some errors in recording data both on my tablets as well as in my brain. I'm willing to discuss/argue anytime. I hope you enjoy reading this and learn something about the Morrison Formation. Wow!
Jerry

Summer 2016 Exploration of the Brisbois Formation (Bernie's Resting Spot).

By Greg Carr

This summer three of us went back to the original excavation site in Central Oregon where the Thalattosaurs were found . We were myself (Greg Carr), my daughter Gloria and Eric Meitz, the University of Alaska (Fairbanks) student studying these thalattosaurs. Our intent was to study the actual dig site (for Eric's classification paper) and other available sites in the same formation.

An essential part of a proper paleontology paper is the stratigraphy (geological setting) of the site or organism being studied. In our case, we know the formation (Brisbois member of the Vester formation), the approximate age of the formation (Carnian Age Triassic) and the exact location of the find. What we lacked is the geological layering at the burial site. So we were off to do some exploring!

First of all we packed up the old Suburban and travel trailer and headed out after shopping. Five hours of travel and we end up at an unimproved campsite in the National Forest just a few miles north of the dig site. The weather, being high desert in the summer, offers a wide variety of life, including the butterflies.

The first job was to clear off all the loose soil at the site where the block was recovered. Naturally, this took shovels and brooms and brushes. Here are 2/3ds of the work crew - Eric and Gloria.

Here they are with some of the underlying strata exposed. You can see the layering in some of the soft shale.

Here is a close up of the entire excavation. The exact details of the strata will be in Eric's paper. In summary, the layers of deep-water shale are tilted up at almost the same dip as the road cut. There are layers of soft and hard (indurated) shale underlying a slide deposit. The slide deposit can be identified by a non-laminated shale layer that has numerous rocks in it. Bernie's bone block was in this slide layer. In fact, the slight depression right above the hat is where the block was sitting!

Here an overview pictures of the site. The white object on the pole is our Totem - a 3D printed skull of Bernie! It was later presented to Miriam Bernard as a thank-you gift.

After doing the proper scientific investigation, we spent 3 days driving around and walking around all the available out-croppings of the Brisbois formation. By the way, the proper local pronunciation is "brizbo" - not at all like the original French would say it. I think Eric was rather awed by the large amount of area we covered while finding almost nothing! It makes you appreciate how unique this find is. Being summer in Central Oregon, there were several thunderstorms in the evenings.

Portland Regional Gem and Mineral Show

By Dan O'Loughlin

This year's Portland Regional Show was a colossal success! I can't recall when we had a better turn out. Our exhibitor area was at capacity with people buying at every booth. NARG was in charge of the Demonstrators and the Host/Hostess areas. I changed the demonstrators around so that they all faced the crowd. This seemed to keep them more visible and interactive with the public. The host/hostess position was so busy we had to place 3 people up front to help manage people. The exhibit cases fell a little short of our 100 goal but we still had fantastic cases. It was fun to wonder around and listen to the many compliments the NARG cases were receiving. NARG made its presents known by filling enough cases to capture an award for most linear feet of cases for our membership. Bruce Thiel had a very dramatic case featuring crabs from the Pacific Northwest which won the People's Choice award. In addition, Greg Carr managed to walk away with the President's Award for his four adjoining cases featuring "Bernie" the Thalattosaur. His 3D printed skeleton ran through one case to another for nearly 16 feet! At the NARG booth, we were kept very busy answering questions. Our booth quickly ran out of free fossil handouts, so we had to make a plea for more items Sunday. Greg Carr had his 3D printer running. Joe Cantrell could find little down time with all of the specimens being presented to him for photographs. NARG members did a nice job of volunteering and staying flexible to help fill in where needed. Linda Frennette (NARG member) is President of Portland Regional this year and next so let's keep up the tradition of participation in a very lovely show.

Robert R accepting award for NARG from Linda F.

Greg C accepting the President's Award.

Bruce T display of Fossil Crabs from the PNW won the People's Choice award

(Cont. on pg. 20)

(Cont. from pg. 16)

NARG's Booth at Portland Regional

(Cont. on pg.21

(Cont. from pg. 17)

NARG Member's Displays

Fossil Crabs of Oregon by Greg Gentry

Plant Fossils of Klondike Formation in Republic, WA by Peg Johnson

Vertebrate Fossils from John Day Formation, Oregon by Larry Purchase. Photo by Larry

(Cont. from pg. 18)

Oregon Fossil Wood by Robert Rosé

Fossil Lake, Oregon Vertebrate fossils and Photo by Larry Purchase

Fossil Teeth and photo by Larry Purchase

Fossils from Anguilla Formation, Anguilla, British West Indies by Peg Johnson

Opening Concretions Artfully

By Greg Gentry

When i joined NARG several years ago we would collect concretions at "crab camp" and break them open with a hammer on Bill Sullivan's side walk or put them in a microwave. This usually resulted in many random pieces, often with damage to or loss of parts of the internal fossil structures, making reassembly difficult. Bruce Thiel and I have come upon a technique which minimizes this damage and makes reconstruction less challenging.

1 Choose concretion.

2 Wash and inspect.

3. Mark the concretion and cut a groove with air scribe.

4. Place on cinderblock and cleave. with a sharp blow.

5. Coat areas to be cemented with Vinac. This reduces micro-damage and helps adhesion.

6. Orient and align the halves,mark positioning with marker.

7 Pre-prep the halves prior to cementation.

8 Glue with superglue and clamp. [I use adhesive accelerator that woodworkers use to speed adhesion]

9 Prepare specimen.

10 Finish preparation for detail.

Agate, Fossil Finding Clinics on Central Oregon Coast Led by Famed Expert

Published 12/06/2016 at 5:23 PM PDT
By Oregon Coast Beach Connection staff

(Lincoln City, Oregon) – She's the Alpha of the Agate, Queen of the Quarry, and Maven of the Marble for the Oregon coast. And she'll be hosting clinics for finding fossils, minerals, agates and such in Lincoln City. (Agate photo above courtesy Laura Joki, Rock Your World)

Local expert Laura Joki will be heading up Lincoln City's brand new Beachcombing Clinics, starting this winter. In January, the Lincoln City Visitor & Convention Bureau in partnership with Joki, invite visitors to learn how to beachcomb for fossils, minerals, rocks and gemstones. Affectionately known as Lincoln City's "Head Dirt Nerd," Joki is excited to bring her passion and experience to the new program.

"I've been collecting and studying beach fossils and minerals for years, and can't wait to share my knowledge with visitors," said Joki. "The geology of the Oregon coast is simply fascinating. Each natural treasure you can find on our beach has a story behind it, dating back millions of years."

After a winter storm on the Oregon coast, the sand erodes to reveal a treasure trove of discoveries. Fossils in the form of sand dollars, petrified wood and shells are commonly found above the surface. But "rockhounds" and amateur geologists seek more colorful prizes. Minerals in the form of agates, jasper, labradorite and amber are eagerly sought by budding treasure hunters. These are just a few of the coastal collectibles visitors can uncover and learn about at the Beachcombing Clinics.

Each clinic begins on the beach at the SW 33rd Street beach access in the Nelscott District of Lincoln City. These free clinics begin with a brief orientation by Joki, where she will describe the geology of the area and the types of fossils and minerals that are commonly found. Then, she will take participants on a guided beach tour. Clinics last for approximately 2 hours and participants are encouraged to ask questions and provide feedback.

"Visitors should prepare for an unforgettable beachcombing adventure," says Joki. "The best part about the clinics is that not only do they take home knowledge of our local geology, but they also get to take home what they find."
The first Beachcombing Clinic is on Monday, January 2, at 9 am. Public parking lots are available at SW 32nd and 35th Street, and also along SW Anchor Avenue. Attendees should plan to arrive 10 to 15 minutes early. Dressing in layers is encouraged.

The schedule for the rest of the season: Tuesday, January 31 at 9 a.m. Joki runs Rock Your World in Lincoln City, and she is the voice behind many intriguing and amusing videos that she posts on Facebook, outlining major beach changes, wild waves and agate hunting conditions practically in real time. Her videos have gone massively viral at times.

Those who love rocks and gems will love her store. Featuring locally sourced fossils, gemstones and rocks, Laura, along with her husband Mike, craft hand-made jewelry and gifts out of beach finds that customers have discovered. For more information, visit rockyourworldgems.com.
For more information on the Beachcombing Clinics, call 800-452-2151 or visit OregonCoast.org. - ***Where to stay for this event - Where to eat - Map and Virtual Tour***

Wednesday, February 8, 2 p.m. Thursday, February 16, 10 a.m. Friday, February 24, 3 p.m. Tuesday, March 7, 1 p.m. Wednesday, March 15, 9 a.m. Friday, March 24, 3 p.m. Tuesday, March 28, 4 p.m. Tuesday, April 4, 1 p.m. Thursday, April 20, 2 p.m.

Ethafoam

Conservators are always looking for that perfect item that meets their needs. Whether this is a label, adhesive, container, or support product, these items cannot add to the degradation of a specimen. Now days, most museums are using a medium density closed-cell foam called Ethafoam® (polyethylene foam) to cushion fossils against vibrations.

Ethafoam® products are resilient, giving them recovery characteristics that provide outstanding cushioning protection against repeated impacts. And Ethafoam® is available in a variety of densities, making them suitable for protecting products ranging from just a few pounds up to hundreds of pounds in weight. These foams are impervious to most chemicals, do not off-gas, and are long lasting.

Working with Ethafoam® is easy. It can be cut with a knife or hot knife. Adhesives used with Ethafoam® include hot glue guns or fusing pieces together using a heat gun. It is abrasive, so you usually need some polyester batting between the foam and the fossil. A recent observation suggested Ethafoam® may break down over time when exposed to fluorescent lights. There are several studies being done to investigate this fact.

Conservation Resources International, LLC
http://www.conservationresources.com/Main/S%20CATALOG/default.htm

University Products: The Archival Company
http://www.universityproducts.com/

Ashley Distributors
http://www.ashleydistributors.com/category/foam

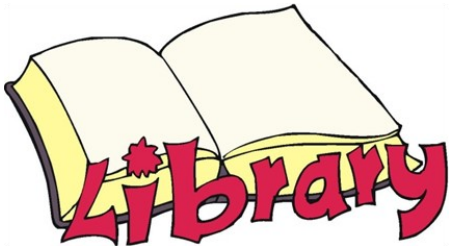
Gaylord Archival
http://www.gaylord.com/Preservation/Conservation-Supplies/Wrapping,-Lining-%26-Support-Materials/White-Ethafoam%26%23174%3B-Planks-(6-Pack)/p/HYB01367

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

-

NARG Membership

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

.

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**

- **January - Election of Officers Jan 6**
- **Fossil Festival Newport, OR Feb. 13**
- **FossilFest - Hillsboro, OR August 12**

NARG Officers:

President:	**Aaron Currier**	**(503) 364-2979**
Vice President:	**Dan O'Loughlin**	**(503) 866-5997**
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**

Honary Directors:

Michael Santino	**(503) 981-8902**
Larry Purchase	**(360) 254-5635**

Committees:

Newsletter:	**Peg Johnson**
	Aaron Currier
	Dan O"Loughlin
FossilFest:	**Linda Harvey**
	Dan O'Loughlin