



JANUS

The Newsletter
of the
North Carolina
Fossil Club
www.ncfossilclub.org

2006 Number 3

2006 Fall Calendar

September

17 NCFC Meeting - Museum of Life and Science, 433 Murray Avenue, Durham. Speaker TBA. Sign-up for November Fossil Fair.

October

5 Castle Hayne - Contact John Everette 919-847-4485 (ncjde@aol.com). Meet 11:00; Hardhat required.

November

2 Rocky Point - Contact John Everette 919-847-4485 (ncjde@aol.com). Meet 11:00; Hardhat required.

4 NCFC Fossil Fair and Board Meeting - NC Maritime Museum, 315 Front Street, Beaufort. Contact Cindy Muston 252-830-8897 or fossilgal@hotmail.com.

Note: It is possible that other trips will be scheduled but serious time constraints forced us to go to press before they could be finalized. Information on trips which are scheduled too late for this publication will be dispersed via the NCFC website (<http://www.ncfossilclub.org>), by email, or by postcard.

General Rules

Always contact the leader in advance of attending any trip. In advance of any new or out of state trips always maintain close contact with the leader for special instructions and last minute changes. Be certain that accurate phone and/or email addresses are given to the leader and updated as needed. Some trips may be limited in size at the option of the leader.

Castle Hayne and Rocky Point begin at 11:00 AM and hard hats are usually required and not furnished by the company. The terrain is rugged and can be somewhat dangerous and demanding for persons not used to climbing or physical exertion.

Always arrive early. Be sure to fully understand rules and instructions. Safety is our main concern – Never do anything which might endanger you or any other collector. Children, where permitted, must always be under your direct control and supervision.

Safety rule violations are a sure way to lose all fossil collecting privileges at any site.

It is absolutely imperative you communicate with the contact person if you intend to go on a trip.

President's Column

Greetings fellow NCFC members, I hope this issue of Janus finds you all doing well and looking forward to the fall 2006 collecting season. In this column, there are a couple areas of concern that I have addressed.

First of all, due to the ever evolving mine operations and reclamation of the general pit collecting area in the PCS mine, there will not be a fall collecting season for the NCFC and other fossil collecting groups. Due to the restricted collecting area, the decision was made by mine management to allot the small number of slots to the Friends of the Aurora Fossil Museum this season. I wholeheartedly agree with the decision to call off the fall collecting season this year due to the above factors and I hope everyone will understand this news. I am grateful to Curtis Ormond Sr. and fellow mine personnel that have taken the time and energy to come up with a solution. Although it is not the solution that most would like to hear, we need to be understanding of this decision and appreciate the fact that we have (and will possibly in the future) be granted access to this wonderful collecting area.

As for the NCFC members that displayed and helped at the Aurora Fossil Festival this year, the priority for obtaining slots for this fall's PCS trip will be voided and unfortunately, will not carry over into the next season. Thus, to gain priority to any available openings during the spring 2007 collecting season, you will need to either display or help out during the NCFC November Fossil Fair which will be on Saturday November 4th at the NC Maritime Museum in Beaufort, NC. Sign-ups will begin at the September 17th meeting which will be held at the Life and Sciences Museum in Durham, NC. I will take names for remaining tables and helper positions beginning Monday September 18th by email at fossilgal@hotmail.com or by telephone at 252-830-8897.

In closing, if you have any questions, comments or concerns about anything in this column (or any other issue), please don't hesitate to contact me, I will do my best to resolve them. Again, I hope everyone is looking forward to a prosperous fossil collecting season this fall and I hope to have the opportunity to meet and talk with a lot of you. Until then, be safe and happy fossil hunting!!
Cindy

Below: *Cylindracanthus*: a spine tip from a bony fish
(Middle Eocene – Castle Hayne Formation)



Lost and Found Ray and Trisha Smith

On a recent visit to the home of the author of our Declaration of Independence and third President of the United States, Thomas Jefferson's famous "Monticello", in Virginia, we were surprised to see prominently displayed in the grand foyer the lower jawbone of a fossil mastodon and several teeth in very good condition. If Jefferson were alive today, he would have fit very comfortably into our Fossil Club: he was also bitten by the fossil bug and would have been happy to share his finds with his friends.

In early May we were walking the beach and were approached by a young couple who asked us to identify a fossil they had. It was unlike any we had ever seen and we could only guess at what it was. They lost interest in the bone and tossed it aside as they walked on. Trisha looked around and found it. She picked it up and said that maybe our expert Smithsonianians could identify it.

So, at the Aurora Fossil Festival we had a display table and Trisha had the bone identified. She was wide-eyed and excited to tell me that we had a toe bone from a giant "Jeffersonian" sloth. It was named after the person who discovered it, Thomas Jefferson. We had a piece of his own fossil namesake. What luck!

Then, at the July meeting of our fossil club in Raleigh at the NC Museum of Natural Sciences, after an interesting lecture by our own Richard Chandler, we toured the Museum. What a surprise we had! In one of the display rooms, in a savannah setting complete with growls, stood the very same "Giant Jeffersonian Sloth", in all its bony splendor. We looked to see if its toe bone was the same as the one we had and Eureka!, it was the same.

It's one thing to find a fossil and see pictures of what the creature might have looked like but quite another feeling to stand in front of the animal itself.



Paleozoic Plant Fossils Alan Lipkin

Located nearby there are abundant deposits of high quality and readily available fossils where carrying them out is probably the most serious problem encountered. Sound like paradise? To a dedicated fossil hunter, it certainly is!

Paleozoic plant fossils are in fact part the nation's number one energy resource. Millions of tons of coal are taken from deep mines and strip mines and hauled by the trainload from the hills of PA, KY, WV, VA, and TN on a daily basis.

Coal Mining. Coal is in fact fossil plant material. It is recovered by three general methods. Strip mines physically remove the overburden, exposing the coal layers surfaces one by one. Coal layers are individually scraped and hauled away by huge mechanical devices that continue eating their way downward, removing layer after layer. This results in large, devastated areas framed by man-made cliffs called high-walls. Since the '70's, strip mines have had to be reclaimed by law. The mine is filled with the overburden, covered with topsoil and planted. This hastens recovery of the landscape, but ruins the area for fossil hunters.

There are two general types of deep mines. Continuous mining is accomplished by scooping a vein of coal, following it through the earth, leaving pillars of coal to support the roof. The coal is removed by continuously scouring and carrying it away with conveyer belts, often assisted by blasting.

Long wall mining chews its way through a coal seam by mechanically supporting the roof, scraping the resulting wall, then moving the support further into the mine allowing the roof to collapse behind, often deforming the surface. This process may also use blasting. Miners always have interesting stories to tell about this type of mining!

Pennsylvanian Life. Coal is the remnant of vast, ancient swamps that existed throughout Earth's history. In our part of the country, these swamps existed about 300 million years ago during the Pennsylvanian Period of the Paleozoic Era. Indeed, the period was named for the huge deposits first found in PA. During this time the area was located near the equator where hot, wet conditions were perfect for primitive plants. These are considered to be the first extensive forests on Earth. Layers of coal sandwiched between sedimentary rock formed over thousands of years. Fallen leaves, branches, plants and trees were periodically buried under layers of mud and sand. Over millions of years this resulted in vast coal deposits with thicknesses from a few inches to over twelve feet. It's been estimated that one inch of coal is the result of hundreds of years of forest growth.

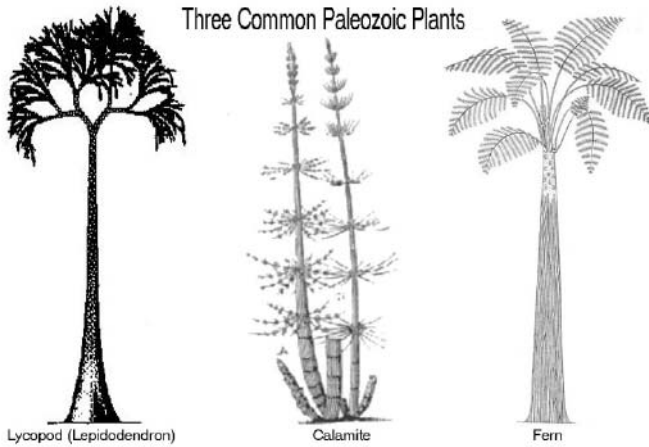
The most advanced land vertebrates of the time were primitive lizards that were preyed upon by large amphibians that resembled giant salamanders. Dinosaurs were still to come in about 100 million years and birds and mammals much later than that. The dominant land animals were huge insects whose ancestors crawled from the sea about 50 million years earlier. Among other giant insects, there were eight inch cockroaches and two foot dragonflies which still exist. They are thankfully much smaller, but otherwise unchanged. Indeed, the Pennsylvanian is often referred to as "the age of cockroaches".

In the oceans, fish were abundant. Sharks were the top of the food chain and had developed often bazaar appearances. Trilobites and primitive ammonites, the "shelled octopi" that became dominant during the time of the dinosaurs, were abundant.

To me, the beauty of Paleozoic fossils is reflected in their total unfamiliarity. That is, they really look like fossils and bear little resemblance to modern plants and animals. Even a "normal person" (one who collects no fossils) will instantly recognize that Paleozoic fossils are relics of life long gone. They look, and in

fact are, primitive by modern standards. They are certainly the most abundant, truly ancient fossils.

Coal Fossils. There were three main types of Paleozoic coal-swamp plants, although there were many others. They were the lycopods, calamites, and ferns. Very large quantities of these fossil plants may be found associated with coal. Their detritus is what mostly composes coal. It is relatively common to find several museum-quality specimens on a weekend and over the years collectors have amassed literally tons of excellent fossils. The huge quantity of these fossils lessens their value to all but the collector who is generally only interested in finding them and would never consider buying one. It is unlikely that you'll ever get rich collecting coal fossils.



Perhaps the most common coal fossils are the lycopods. Today these primitive plants are small and inconspicuous. One, Creeping Cedar, is used for Christmas wreaths. But they grew to enormous size during the Pennsylvanian, as big as modern trees.

Their stems, branches and trunks are mostly preserved as casts that formed when a stem fell into the swamp, settled into the ooze, and was covered with sediment. As time passed, the sediment was compressed, very often flattening the rotting piece beneath. Over time, the wood completely decomposed leaving an open, water filled cavity. Sometimes a layer of coal, along with the stem's central stalk settled to the bottom of the void and is preserved. Very fine sediment slowly filled the space forming a detailed cast of the original plant stem, usually with some flattening and coal residue (A).



A. Lycopod Stems and Branches. Note the central stalk of the dark fossil. It fell to the bottom of the cavity as the fossil formed and was subsequently preserved. These fossils are found in a variety of shades and colors.

Lycopod casts may be found measuring from an inch or two to massive logs that are impossible to move without heavy equipment. They are usually located above a coal seam. They reproduced with fist sized masses of spores that were allowed to fertilize and disperse by the wind. The fossil remains of these sporophytes, along with detailed leaf prints, are relatively common.

Lepidodendron fossils are the most common lycopods. They are often referred to as snake or scale plants because the bark of many species resembled reptilian scales. Leaf scars are apparent and pockmark many kinds of lycopod stems (B).



B. Lycopod surface prints. Two at lower left & top center: Sigallaria. Center: Lepidodendron. Upper left and far right: Lycopods (unspecified).

Sigallaria are another group of lycopods. I've heard them referred to as "Ruffles Potato Chip Trees" because of their characteristic vertically ridged stems and trunks (B).

Both had roots which snaked through the earth to sprout new plants, just as Creeping Cedar does today. These fossil roots resulted in casts that can be followed many yards through the hardened sediment and are even more prevalent than the stems.

Calamites are easily recognized by their fine, vertically lined stems that grew in obvious sections. These sections were hollow and were the homes of the first reptiles. Again, they are most often preserved as detailed casts (C). They are related to the scouring rushes of today that resemble fat, green soda straws



C. Calamite stems. Note the central stalk of the upper right fossil.

growing near waters edge, but they grew as large as modern trees during the Pennsylvanian. They also reproduce with spores. Their fossil spore capsules and delicate leaf prints are easily recognizable.

Ferns made their presence known mostly with beautifully detailed leaf prints, often colored dark gray or brown on light colored sedimentary rock (D). Seed ferns evolved during this time. These were the first plants with true seeds, the plant world's version of parental care. No longer releasing millions of spores, which are the naked embryos of their children, the seed is an embryo within a protective shell with a supply of food and nourishment to help it get a start in life. Today, plants use many ingenious ways to disperse their seeds, but all owe their existence to the seed ferns from which they evolved. In a very real sense, the seed fern lives on today as successful modern plants.



D. Fern prints are often delicate and beautifully preserved.

The fossil seed casts from ferns are not as common as the sporophytes of the lycopods and calamites. They look remarkably like acorns without caps that grew from the end of their compound leaves. Many may have had fruitlike husks (E).



E. Seeds from Seed Ferns. The one on lower right is perfectly preserved and was first mistaken for an acorn, but no Oaks were present and it's made of stone!

All the fossils mentioned may be occasionally found preserved inside of concretions. These ovoid or flattened spheres are commonly found in slate and shale and usually originate around a fossil. They can be as big as a car or as small as a marble. Normally the fossil causing the concretion is obliterated (F).



F. Concretions. Right: Opened to expose a small calamite stem. The large one is a "kettle bottom" often stuck to the ceilings of deep mines. They may dislodge and are therefore dangerous. This one weighs 57 pounds and is probably a lycopod root.

Where to Find Them. The coal fields of the Appalachian Mountains are a vast, beautiful and undiscovered wilderness that comprises much of Western VA, Eastern KY, WV, and Southern PA. One passes dozens of both active and abandoned coal mines when exploring the area and there are obvious coal veins in the road-cuts. Fossils may be found in any of these sites.

Reclaimed strip mines are not particularly good fossil locations since most of the fossil material is buried under a layer of topsoil, but some fossils, especially fern prints, may be found scattered about and with a little luck an overburden dump site may be located with abundant fossils.

Rarely will active mines allow fossil hunting, but sometimes they will allow fossil hunters to look through tailings where the overburden is dumped and there is no mining activity. This is great since the overburden is where most good fossils are found.

Abandoned deep mines are excellent fossil locations. Mine tailings, overburden, and substandard coal are commonly dumped nearby and make outstanding fossil locations. Fossils are almost impossible to find inside an abandoned deep mine and it is fruitless and dangerous to try.

Many of the towns of the area have been relocated onto previously abandoned strip mines. Pikeville, Harlan and Hazard, KY are examples. Here the old high-walls are still standing. Often fossils abound in the high-walls behind modern shopping centers and housing districts. Locals rarely are collectors since fossils are so common in the area. Even if heavily collected, the sites are routinely replenished when a big storm washes out fresh fossils.

The same holds true of road cuts with obvious coal veins, especially away from the main highways on back roads.

Far-and-away, the best fossil locations are the un-reclaimed strip mines that were closed prior to the '70's. There are hundreds of them throughout the coal fields all accessible by rough, dirt roads that originally accessed the mine and today are commonly used by hunters, off-road vehicles, and picnickers. Many have depressions that were left below the high-walls that have filled with water. They are now ponds stocked with fish with lovely picnic areas maintained by locals. These ponds make excellent swimming during the summer and are a fossil hunter's delight. In one location we'd swim along the high-wall and dive for fossils.

I've found that these areas are located simply by asking locals at gas stations, stores and other public locations. They are a wealth of information. Sometimes they even know there are fossils!

In my opinion, the best place to find fossils of all types are at the base of the high-walls. Sometimes they have many levels and you can work your way along each level, back and forth where fossils are abundant at each level. They weather out of the cliff and literally fall at your feet. When one is found or a trace is found, you look up and very often spot a magnificent specimen lodged in the cliff, although sometimes it's a challenge reaching 'em. Broken pieces may be easily rejoined with epoxy glue. Sometimes there are logs that are too big to lift and all you can do is sit on them for a rest and admire them ☺.



G. Large lycopod tree trunks. The one on the right weighs 55 pounds.

Advice. The coal fields are way out there. That is, there is little 'civilization'. It is sometimes a problem finding food and lodging and consideration should be made.

When collecting, I generally walk beneath a high-wall with a bunch of white plastic shopping bags, zip-tops and a five gallon bucket. I fill a bag as I go and when it gets too heavy, I'll leave it in a conspicuous place and mentally count it. White bags stand out nicely. When I'm done collecting and heading back to the car, I'll stop at each stash for a culling session. I discard most, leaving them in piles for future fossil hunters. The keepers I'll put in the bucket to carry back. It's common when returning to a location to find my old stashes and take home a few I previously discarded wondering how I could have left 'em behind in the first place.

Aside from carrying all the rocks, culling your finds is the most difficult aspect of the hunt. You simply can't take 'em all home with you and the 'big find' at the beginning of a hunt almost always diminishes greatly as you proceed. I therefore usually have one last sorting of the fossils I've collected and leave a good portion. Even when I'm very picky, rarely will I leave an old strip mine with less than a dozen excellent fossils.

To date, I have not found a fossil Paleozoic vertebrate or land creature, although fossil fresh-water clams, snails and aqueous worm burrows are common.

About the Author. Dr. Lipkin is a retired professor of Chemistry and Natural Science. He has taught at small colleges throughout the Coal Fields and the Southern Appalachian Mountains. Favorite fossils are from the Paleozoic Era, specifically the Cambrian, Ordovician and Pennsylvanian Periods. Email questions, comments, or fossil talk to neoguru@aol.com.

Aurora Fossil Festival – 2006 Photos by Trish Kohler



Trisha and Ray Smith preside over their very popular exhibit.



Joy Herrington explains some finer points of porpoise periotic identification to Sam Schmidt and Rick Bennett.



A portrait of the artist as a fossil exhibitor.

Tall Tales from the Trails, No. 10

Middle Ordovician marine invertebrates, the Great Beatty Mudmound, Meiklejohn Peak, Beatty, Nye County, Nevada

James R. Bain, Bahama, NC

Summary: A bioherm with a rich Ordovician fauna of brachiopods.

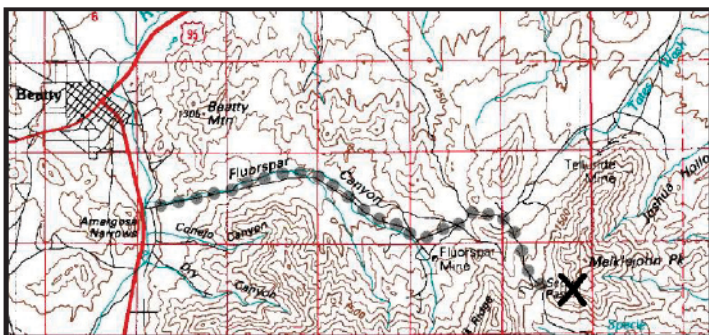
Difficulty: From $\times\times$ to $\times\times\times\times\times$ on a scale of five, depending on how high you try to climb.

Geology: A bioherm is a hill made by living organisms, typically algae that trap sediment and weld it together by secreting calcite. Such carbonate mounds often contain cavities, attracting animals seeking shelter. Galeta Point in Panama is thought to be an example of a modern bioherm (Macintyre 1983). Fossil bioherms attract economic interest because they are sometimes associated with petroleum deposits. Collectors of fossil invertebrates perk up their ears at the sound of the word. Some of my best times rock-hounding in the American West have been spent crawling on eroding bioherms, marveling at all the little critters made of stone.

A prominent lime-mud bioherm in the lower member of the Antelope Valley Limestone, Middle Ordovician Pogonip Group (lower Whiterockian or perhaps uppermost Ibexian, ~480 million years old), is exposed on the southwestern flank of Meiklejohn Peak, near Beatty, Nevada.

Doctor “Rube” Ross (1972: 1) mentioned similar bioherms nearby on the Nevada Test Site and the former Nellis Bombing and Gunnery Range (now Area 51), both of which were “not comfortably accessible” to him, a federal government geologist, during the Cold War. Access to those sites is of course still restricted (Krause et al. 2001).

Divergent ideas have emerged about whether the Great Beatty Mudmound formed in the shallows or at depth. To some, disarticulation of nearly all the trilobites, abrasion of many brachiopods, and sorting of biologic debris suggested waves acting on a very shallow bar—the bioherm might have even been intertidal (Ross 1972). Li and Droser (1999: 217) proposed that this deposit was from the inner or middle ramps at the continental margin, subtidal, but still subject to reworking by wave action, especially during storms. But Krause et al. (2001: 189) concluded that this bioherm “grew on a carbonate ramp tens to hundreds of kilometers offshore. This ramp extended from the northwest margin of Laurentia into the open waters of the ancestral Pacific Ocean to the north. The mound developed in an outer ramp environment, in relatively deep and cold water.” Note that under some scenarios, plants and animals were passive participants in the growing mound, and so it would not fit the narrow definition some geologists use for “bioherm.”



Map to the Great Beatty Mudmound, based on the public-domain National Map, courtesy of the US Geological Survey

Today, the mound has many small caves, potholes, and grooves. A striking, wavy “zebra stone” comprises bands of dark wackestone (with grains of crinoidal hash) and dark mudstone alternating with bands of white sparry calcite. Zebra structures

are invaded in places by stromatolites (large, ramifying networks of cavities filled with coarsely crystalline calcite spar). I have never before seen anything like this swirled, porous, crazy mass of carbonate minerals, and I wish I had a chunk of it right now to slice on my rock saw. Depositional origins and precise definitions of stromatolites and zebra rock have long been debated, and arguments have often focused on the minerals of the Great Beatty Mudmound (e.g., Ross et al. 1975, Bathurst 1977, Jaanusson 1978, Krause et al. 2001, Woods 2002, DiFilippo et al. 2003, Krause et al. 2004).

Did you hear the one about the two geologists who dropped acid at Meiklejohn Peak? They were testing for carbonates.

One group of investigators recently invoked carbonate deposition associated with freeze-thaw cycles of gas-charged ice to explain the strange patterns of mineralization at the Great Beatty Mudmound (Krause et al. 2001; dissenters include Woods 2002 and DiFilippo et al. 2003). Under the right conditions of pressure and temperature, water molecules can crystallize around a hydrophobic gas molecule, such as carbon dioxide or methane, trapping it in a 12-faced geometric solid called a dodecahedron, the crystalline faces of which are all perfect pentagons. Such systems, in which gas molecules are caged within ice, are called gas clathrate hydrates, from the Latin clathrare, “to equip with a lattice.”

Krause and coworkers proposed that frost-heaving by carbon dioxide clathrate hydrate explains the geometry and mineralization of the Beatty mound, based on diverse chemical and physical data, including resemblance of structural patterns to those seen in soils that undergo freeze-thaw cycles.

Methane clathrate hydrate can form in and obstruct natural-gas pipelines if water is not rigorously excluded. Today, in permafrost and under oceans, the energy contained in sherbet-like masses of methane clathrate hydrate is said to exceed the world’s remaining petroleum deposits. On television, I have seen people holding burning masses of methane hydrate as it melts at atmospheric pressure and temperature. (Let’s make some in the lab and play with it!) Sudden releases of large masses of methane from submarine clathrates are one of the kookier theories behind the alleged Bermuda Triangle. In that wacko hypothesis, effervescence sinks ships, while methane explodes aircraft engines.

Back here in the real world, where methane and carbon dioxide are greenhouse gases, some climatologists worry that methane and CO₂ evolution from submarine clathrates could be increased by oceanic warming. Higher atmospheric methane and CO₂ would then in turn cause faster warming. In another twist on the clathrate-hydrate story, some people are calling for disposal of the major greenhouse gas arising from fossil-fuel power plants, carbon dioxide, by submarine entombment of CO₂ as its clathrate hydrate. If Al Gore is right in his movie, “An Inconvenient Truth”, then those of you hoping for another Ice Age are in for a long wait.

Fossicking for fossils. At present, collection of reasonable amounts of common invertebrate fossils for personal use is allowed. This site might someday be closed to amateur fossil collectors by the US Bureau of Land Management (BLM), which administers the land. Be sure to check with the BLM field office in Tonopah, NV, before collecting in this area.

Paleontology of the site was described by Ross (1972), Rowell and Krause (1973), and Li and Droser (1999). Sadly, as mentioned above, trilobites are nearly all fragmented, and might more properly be called “trilo-bits’n’pieces.” Earlier this year, I observed a similar trilobite mulch at another site in the Ordovician Pogonip Group (Fossil Mountain, Ibex, Millard County, Utah). The Great Beatty Mudmound, a good spot for lovers of brachiopods, has yielded *Orthidium*, *Trematorthis*, *Pleurorthis*, *Cyrtonotella*, *Phragmorthis*, *Camerella*, *Idiostrophia*,

Ingria, and Isophragma, among others. Echinoderm hash is locally superabundant (most apparently from crinoids). Also abundant are cephalopods (including nautiloids), conodonts, and gastropods. Fewer algae, bryozoans, ostracodes, pelecypods, and sponges are found here. "All shelly fossils in the bioherm are encrusted with sparry calcite, which may be algal in origin" (Ross 1972: 1).



Pentagonal crinoid ossicle from Beatty, Nevada. Why do so many echinoderms have pentamerous (5-sided) radial symmetry?

Taphonomy, the study of death assemblages of organisms, can give insight into paleoecology. When considering Ordovician shell beds over a wide swath of the American West, Li and Droser (1999: 215) concluded that "Lower Ordovician (Ibexian) shell beds are primarily trilobite- and echinoderm-dominated and are taphonomically similar to Cambrian shell beds. In contrast, brachiopod, ostracod, and gastropod shell beds dominate Middle Ordovician (Whiterockian) strata." Here at Beatty, shell deposits seem to have elements of both, consistent with an age near the Ibexian-Whiterockian boundary. Ross (1972) likened the fauna to that observed in rocks of similar age in Quebec and western Newfoundland.



Coiled mollusk from the Great Beatty Mudmound. So how DOES one distinguish a gastropod from a small cephalopod?

I confess I have trouble remembering the geologic time scale. In science, I remember terms better if I have some clue as to their meaning. So I had to look up "Ordovician." The Ordovices were a Welsh tribe with whom the Romans fought. So were the Silures. And Cambria is Latin for Wales. So now maybe I can remember, from oldest to youngest, the Cambrian, Ordovician, and Silurian.

One mnemonic for Paleozoic and Mesozoic ages professes that "Campbell's onion soup develops Miss Pennsylvania perfectly to judges' criteria" (Drew *et al.* 2004).

Be prepared for steep climbing and sharp limestone. In the heat on August 13th, 2000, my son Edward (then 12) and I spent hours looking for fossils on the western face of Meiklejohn Peak without much success because I was mistaken about the location, and we were north of the mudmound. Though we were getting skunked, paleontologically speaking, we did find spoor of the Desert Bighorn Sheep, *Ovis canadensis*, on the higher ledges of Meiklejohn Peak. While scouting up high, I managed to roll a large rock onto my bad left ankle, and Edward sprained a hand. We were both bruised and bloodied a bit from taking hard falls while climbing. Those falls tore our clothes and damaged our gear. When we finally located the bioherm, an easy hike up from the car, we were out of water and too battered and hot and worn out to collect much beyond a few crinoid ossicles. Edward wanted to spend time in the video-game room back in our air-conditioned, casino-motel in Beatty, and his father needed a cold scotch and soda. So let us consider making a return trip.

Navigation. The topographic map to carry in the field is Beatty Mountain, provisional edition, US Geological Survey, 7.5-minute series, 1987. To get to the site, turn east off of Highway 95 at Amargosa Narrows at the south end of Beatty, and drive east out of town on the dirt road that heads up Fluorspar Canyon. Pass the Daisy fluorspar (fluorite) mine on your right. In less than 4 miles, you will come to a major dirt road, which ascends Perlite Canyon from north of Beatty. Turn right (ESE). Soon, in 1.5 miles or so, the road has turned to the south, and is closed in by Razorback Ridge (with its radio tower) on your right and Meiklejohn Peak on your left. Here, at the summit of Secret Pass, pull off the road onto the steep, rugged parking area on your left. I had to put my old clunker F-150 Ford into four-wheel drive to get up the last little climb. I doubt that my current Subaru could make it. GPS coordinates at the parking area are zone 11, approximately 4081341 N, 529366 E. Ross (1972) gave the location of the bioherm as SW ¼ of the NE ¼ of section 24, township 12 south, range 47 east. From the parking area, facing east, look up and to your right. You want to head to the big, bulbous, porous, plantain-shaped "pod" of pale gray limestone/mudstone, between 250 and 300 feet thick and about 1000 feet long. Krause *et al.* (2001: 189) described its shape as "a large whaleback or dolphin back dome." As Edward and I discovered that day, those attractive looking ledges of harder, darker gray limestone directly above you and up on your left are relatively barren of fossils. Study portraits of the bioherm on the Internet or in Ross (1972) and Krause *et al.* (2001: 189) before visiting this site. Once you know where to look, the bioherm is visible from Beatty, and can even be seen from Daylight Pass as you escape from Death Valley, driving east, just over the line in nearby California, southwest of Beatty.

If prepared, one can car-camp near the collecting site. Of course, temperatures can be extreme here in the Great Basin Desert.

Things to see and do nearby. Beatty has affordable lodging in its casinos, and is a good base for day trips into Death Valley National Park. Keep your gas tank full. Even this old desert rodent has come close to running out of fuel on remote Nevada highways. Many of the "towns" shown on Nevada maps are the sites of former towns. If you see gas for sale, get in the habit of buying it, even when your tank is still half full.

The Amargosa River (such as it is) flows south-southeast from Beatty. Near Tecopa Hot Springs, the river makes a hairpin turn, flows northwest, and pours into Death Valley, where it ends at the Bad Water hardpan, the lowest spot in the Western Hemisphere (-282 feet). Near where it enters Death Valley, the normally dry river bed passes under Highway 127. In this desolate place, that bridge has "no fishing" signs on it. While standing at Bad Water,

look up at the hillside to the east and note the sign marking sea level. When Edward was a toddler, Bad Water was the first place where he tried to run. He liked stomping on all the salt crusts and gels that endlessly form and reform in the muck, and I know you will enjoy it, too. Death Valley is vast and beautiful. Let's make a winter trip to the area for geologic sightseeing. For fun, we can start a rumor that titantotheres still roam Titantothere Canyon.



Edward Bain toddling with his mother's help at Bad Water in Death Valley, January 1989.

Remnants of the real Old West, Beatty and a few other rural towns in Nevada are the only places in America where a certain form of entertainment is legal. In the summer of 2000 I did a double-take at the sign at the south end of Beatty that welcomes you to town. In addition to the service clubs that one normally sees listed on such signs, there were also the logos of several of those entertainment businesses. A drainage on the west side of the highway in Beatty is named Sober-Up Gulch. Relics of the Bullfrog Mining District are all around the town and its vicinity. These were silver boomtowns of the early 20th Century, but many other metals and non-metals have been mined near Beatty. Mineralization is often seen where carbonate rocks are intruded by volcanics. Meiklejohn Peak itself has telluride mines at its north end. The nearby ghost town of Rhyolite is said to be especially nice.

For those who like space aliens and atomic bombs, the (off-limits) Nevada Test Site and Area 51, both on Nellis Air Force Base, are nearby. So breathe in a little plutonium dust and help me autopsy this alien in the shade of that Joshua Tree over there.

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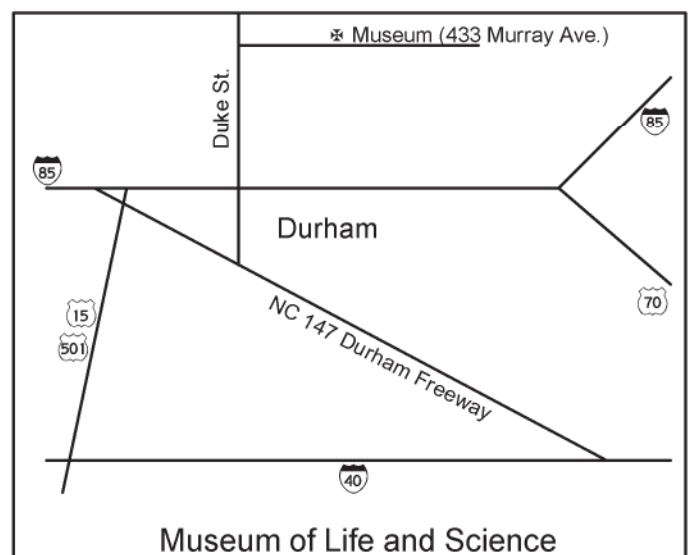
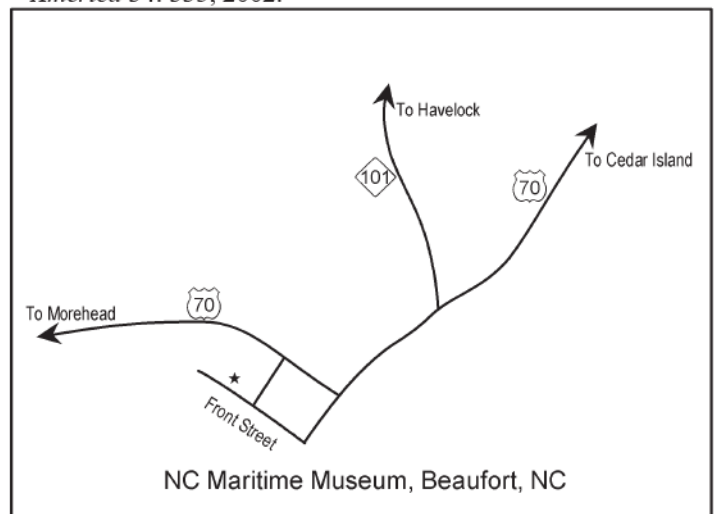
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SELECT ONE TYPE OF MEMBERSHIP	<input type="checkbox"/> INDIVIDUAL (NEW)	\$20.00
(ENCLOSE CHECK OR MONEY ORDER	<input type="checkbox"/> INDIVIDUAL (RENEWAL)	\$15.00
FOR THE INDICATED AMOUNT.)	<input type="checkbox"/> HOUSEHOLD (NEW)	\$25.00
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Children of NCFC members who are dependent minors and living at home may accompany parents on any trip *EXCEPT* PCS–Lee Creek or where otherwise noted.

Memberships are effective from January through December of the year (or portion of the year) of the date of application. For example, persons joining in August will need to renew their membership 5 months later in January.

NCFC Liability Statement

The Undersigned hereby acknowledges his/her understanding that fossil collecting is an inherently dangerous activity which can result in serious bodily injury or death, and/or property damage and hereby confirms his/her voluntary assumption of the risk of such injury, death or damage.

The Undersigned, in return for the privilege of attending field trips Related to the collection of and/or study of fossils, or any other event or activity conducted or hosted by the North Carolina Fossil Club (NCFC), hereinafter collectively and individually referred to as "NCFC Events", hereby releases the NCFC, NCFC Board members and officers, NCFC Event leaders or organizers and hosts, landowners and mine or quarry operators from any and all liability claims resulting from injury to or death of the undersigned or his/her minor children or damage to his/her property resulting from any cause whatsoever related to participation in NCFC Events.

The Undersigned agrees to comply with any and all rules and restrictions which may be communicated to the undersigned by the NCFC Event leader and/or landowner and mine or quarry operator and acknowledges that failure to comply will result in immediate expulsion from the premises.

The Undersigned acknowledges that this release covers all NCFC Events and will remain in effect at all times unless or until it is revoked by written notice to the current President of the NCFC and receipt of such revocation is acknowledged.

The Undersigned further attests to his/her intent to be legally bound by affixing his /her signature to this release.

Name _____ Signature _____ Date _____

Name _____ Signature _____ Date _____

MAIL To: NORTH CAROLINA FOSSIL CLUB, P.O. Box 13075, RESEARCH TRIANGLE PARK, NC 27709

North Carolina Fossil Club
P.O. Box 13075
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The grand old man of North Carolina fossil collecting, **Pete Harmatuk**, with NCFC President Cindy Muston and her mother, Trish Kohler took this great photograph at last spring's Aurora Fossil Festival.

Pete is a charter member of the NC Fossil Club and was one of the first people to collect the Lee Creek Mine. Over the years he has donated tens of thousands of shark teeth to the Smithsonian, including enough large *megalodons* to fully populate the reconstructed jaw on prominent display at that Museum. For a picture look at <http://www.150.si.edu/chap7/7jaws.htm>

