



JANUS

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

2008 Number 4

2009 Spring Calendar

January

18 NCFC Meeting - Dr. Jeff Cohn, Vice President "Lyme Regis and the Jurassic Coast of Southwest England", NCMNS, 11 West Jones Street, Raleigh. 1:30 pm, Level A conference room.

April

25 Norwood Arbor Day and Fossil Fair Contact: Ruffin Tucker at 704-784-1672 or paleotck@netscape.net. See right.

Outgoing President's Column James R. Bain

My greatest pleasures serving as your President these past two years have been the chance to meet such a diverse group of folks and the opportunity to make so many new and interesting friends. Our Club does much to promote knowledge of North Carolina's distant past, and we should take considerable pride in that. I truly enjoyed working with our core of active volunteers at such events as school and town fossil fairs, where we always made sure that children were able to take some fossil loot home with them. As I leave you, I want to send a special thanks to our volunteers, including our Officers and to those of you who led field trips.

Human fascination with fossils is probably as old as our own species. Regardless of how one intellectually processes these stony doodads, many fossils are aesthetically pleasing, even compelling, and we should not feel too much guilt about hoarding some. After all, who can resist shark teeth, echinoids, and trilobites, to name a few? Archeologists in England have long found fossil echinoids associated with ancient human sites, often far from where the fossils are found in nature.* The tenderness of a young Bronze Age woman and her child buried with hundreds of heart-shaped echinoids in Bedfordshire speaks to us across the ages. Whether as toys, charms, jewelry, tools, or just plain old household knickknacks, who wouldn't relish a pile of handsome echinoids? So let yourself go. Rock on. Keep dragging those fossils home, and endure the teasing from your family and friends with a smile.

Please join me in welcoming Mary Boulton as our new President. Mary has served as a volunteer at professional fossil digs on several continents. A true friend, she has for years been a tireless volunteer at North Carolina fossil fairs and similar events. Her enthusiasm is infectious, and I know she will do a fine job for the Club.

*McNamara K.J. "Shepherd's crowns, fairy loaves and thunderstones: The mythology of fossil echinoids in England," in Piccardi L and Masse WB (eds.), *Myth and Geology*, Geological Society, London, Special Publications, 273: 279-294, 2007.

New Officers Elected

Our President for 2009 is Mary Boulton, Vice President is Jeff Cohn, and new Board Members are: Sharron Edwards, Jonathan Fain, Jodie McDaniel, and Eric Sadorf (joining with the Board Members whose terms expire in 2009: Rick Bennett, Joy Pierce Herrington, Jim Mahoney, and Diane Willis.) Of course, James Bain will replace Cindy Muston as the Immediate Past President.

Norwood Arbor Day and Fossil Fair

It will be held in downtown Norwood in a tent in front of the City Hall. Barbacue Chicken or pork will be provided by the Norwood Fire Dept. The NC Museum will bring its model of the *Acrocanthosaurus* skull and the Aurora and Schiele Museums are coming too. The town will pick up a dump truck load of Aurora material for the folks to search. The Fair will run from 9AM to 5PM.

Incoming President's Column Mary Boulton

Happy 2009 to all of us! We have an exciting year ahead of us, and I'd like to present some challenges as well (just to keep it interesting).

First and foremost - our dig schedule. The biggest open question is the status of the Spring season at Aurora. I have not received any updates as of this publication; I'm hoping for something before our meeting. My continued gratitude to our members who so graciously arrange and guide our expeditions to the "usual" sites.

Speakers: we have some excellent speakers lined up for the first few meetings; I'm looking forward to being educated and entertained by them. As always, we are looking for topics that extend our knowledge about our familiar environs, who expose us to topics and areas new to us, and who can keep us current with the latest discoveries.

Events: as I meet people around the country who are involved in this field, the level of community involvement and sheer effort the NC Fossil Club members expend continues to impress (and shame) other groups. Congratulations - you folks are the best. Our calendar for 2009 is already filling up, with two events imminent: the Schiele Fossil Fair on Feb. 21, and the Creekside Science Fair Mar. 9-12.

Now the challenges:

Digs: let's continue our tradition of setting up extended trips to new areas - although last year's expedition to the Green River Formation will be tough to match. Some ideas - a repeat to the AL sites; another pillage & plunder along road cuts in IN & KY; a trip to the Chesapeake area; other???

Speakers: We have a wealth of knowledge and experience within our own ranks. Please, consider sharing with the rest of us - we're a friendly audience, and rarely throw shoes at anyone.

Events: Simply maintaining the level of our current participation will be a significant accomplishment, but wouldn't it be marvelous to extend it into other areas? I still have my goal of getting something significant going in Mecklenburg county.

I have a personal challenge as your new president: performing to the standards set by my predecessors. Thank goodness we have such a seasoned team as our officers and board members - I rely, and will continue to rely, upon them for guidance and inspiration. See you on Jan. 18!

Time to Renew

This is the last issue for 2008. Send your 2009 dues to the Storys. Please note the **renewal** amounts: \$15.00 for individuals and \$20.00 for families.

Mini Fossil Fair - Ellerbe, NC - 9/6/08

To be honest I had never even heard of Ellerbe when Ruffin Tucker announced that he and Tony Furr had arranged for a mini fossil fair to be held at the Rankin Museum there on September 6. A quick trip to Google Maps showed it to be a small, crossroads community about 10 miles north of Rockingham. I thought it might be fun to participate and it would also get me thinking about my exhibit at our regular Fair in November. Joy Herrington was also planning to participate and we agreed to share a ride.

Not knowing precisely how long the drive would be, particularly since Hurricane Hannah had entered the picture, we decided I would pick her up at 6:00 AM. "It was a dark and stormy night; the rain fell in torrents—except at occasional intervals, when it was checked by a violent gust of wind which swept up the streets (for it is in Chapel Hill that our scene lies), rattling along the housetops, and fiercely agitating the scanty flame of the lamps that struggled against the darkness."¹ The wind and rain and darkness totally confounded me on finding Joy's house. I had been there several times but always in daytime. I felt I could wander forever in that warren of streets and cul-de-sacs but I eventually saw a familiar driveway, only about 20 minutes late. The rain providentially let up so we loaded her exhibit without it getting more than a little damp.

We managed to arrive in Ellerbe (after a Hardee's breakfast stop in Sanford) by 9:00. According to the 2000 census the town has an area of 1.5 sq. mi. and a population of 1021; we had no difficulty in finding the Rankin Museum. What surprised us was the quality and size of the Museum. Dr Rankin is an eclectic collector: 19th Century Americana; Native American artifacts, especially Inuit; Central and South American Indian material; hunting trophies, including a complete polar bear; fossils; rocks and minerals were displayed in overwhelming abundance.

The only NCFC members exhibiting were Ruffin, Tony, Joy, and I. President James Bain showed up with a pickup load of PCS reject material. When I say load, I mean LOAD: his front wheels barely touched the ground. It was the real star of the show, however. Several kids (and a couple of adults) seemed mesmerized by their ability to find shark teeth in the screens James provided. By the end of the reject material there was practically a swamp where the washing took place.

Given the size and remoteness of Ellerbe we had a pretty good turnout, around 200 visitors. Dr. Rankin (spry at 90) was there for the whole day. The Museum provided lunch and everyone seemed to have a great time. I can enthusiastically recommend a visit. It would provide an excellent day trip from almost anywhere in North Carolina and I guarantee you won't be disappointed by what you see. *Richard Chandler*

¹ Apologies to Sir Edward George Earle Lytton Bulwer-Lytton. This infamous passage (with a change of venue) is from his 1830 novel *Paul Clifford*.

New Publication

The Miocene Formations (Calvert, Choptank, and St Mary's) and their members and beds are described in detail and type sections are selected for each unit. Fence diagrams document the distribution of all 24 beds on the Chesapeake Bay, the Patuxent River, the Potomac River, and the Rappahannock River with supplementary sections on the Mattaponi and Pamunkey Rivers. Sections along the cliffs are fully illustrated in 72 figures. The beds at each locality are clearly marked on each figure. Eighteen localities are described on the Chesapeake Bay, 4 on the St Marys River, 20 on the Patuxent River, 18 on the Potomac River, 14 on the Rappahannock River, and 8 others on Breton Bay, the Mattaponi, and the Pamunkey.

Index or guide fossils to each bed are discussed and are illustrated on 16 plates

Jim Mahoney should have a copy at the January 20 meeting.

Trip Report - Castle Hayne

On October 2nd, the club members for the Fall hunt at Castle Hayne were greeted by cool, crisp, and sunny conditions. Sixteen members participated and were rewarded with a nice mix of Cretaceous and Eocene fossils. After a brief meeting in the parking lot to review safety issues, we were released at 10 AM to begin the hunt! Even though a few areas were off limits due to signs announcing "no fossil hunters beyond this point", we enjoyed having the remainder of the mine to ourselves. Luckily, no mine trucks were operating that day; therefore we had safe conditions to walk the mine roads. It was a productive day for everyone. Both Tracy Mayo and Al Klatt found nice *ariculatus*. Tracy also found a cretaceous sawfish tooth (*Ischyrrhiza mira*) while her husband Chris Mayo found a *Mosasarus* tooth and a beautiful *Cretalamna biauriculata*. Diane Willis found a nautiloid, ammonite section with good suture impressions, and a *Cretalamna biauriculata*. Terri Thomas found a beautiful large *Hardouinia kellumi* and Renee Long was rewarded with many *Hardouinia mortonis*. Trish Kohler found some fine *Hardouinia mortonis* as well as some "squid beaks" and brachiopods. Glen Jones found a large *Squalicorax* and Roxada and Robert Story found a large slit shell and some nice *mortonis*. It seems like everyone came home with a handful of *mortonis*. Larry Byars, Charlotte Jones, Lindsey Werden, Harriet Angelis, and George Zervos also participated. David Sanderson found a large *Unifascia carolinensis* as well as many nice *mortonis*.



Trip Report - Rocky Point

Eleven club members participated in the Fall trip to Rocky Point. Again this year we were greeted with cool and sunny weather. Todd Power was the hunter of the day with a perfect *ariculatus* and an absolutely beautiful *Serratolamna koerti* (see below) and some turtle bone. Some nice nurse shark teeth were found by Chris & Tracey Mayo. Diana Smith found a *Striatolamia macrota* while Roxada & Robert Story found some nice echinoids and brachiopods. John Timmerman found a large sawfish disk (*Pristis lathami*), an ark shell and a complete pearl oyster (*Isognomon* sp). David Sanderson found five *Hardouinia kellumi* (one was completely perfect and free of any matrix) and 10 *Hardouinia mortonis*. Eric Sadorf, Robert McDougall and Larry Byars also participated. *David Sanderson*



Mike Milton (1950 - 2008)

This Fall we lost an extraordinary fellow fossil collector and contributor to the field of paleontology. Mike Milton was one of those rare fossil collectors that had a grasp of virtually every aspect of paleontology. Mike could converse with fossil collectors whose interest was shark teeth, echinoids, crabs, amber or even trilobites. His multi-faceted knowledge in the field of paleontology was freely given. In the nineties Mike served as a guide to several out-of-state paleocarcinologists interested in our Peedee (Cretaceous) and Castle Hayne (Eocene) decapoda. To honor Mike and Barbara Milton for their efforts, Dr. Rodney M. Feldman of Kent State University (1998) named a species of fossil crab, *Matutites miltonorum*. To quote from the etymology for *Matutites miltonorum* in Paleontological Society Memoir 48; "Etymology.—The trivial name recognizes the contributions to this work of L. G. "Mike" and Barbara Milton, Durham, North Carolina. They collected many of the specimens that form the basis for this work and guided the authors into the field to examine localities where crabs had been collected." Mike also worked with Keith Sturgeon of Duke University who was researching an abundant occurrence of *Avitelmessus grapsoides* in the Peedee formation. Mike was involved with many other researchers.

We first met Mike at the Lanier Pit in Maple Hill in the early spring of 1993. We had been collecting small crab carapaces from the heaps of marl then produced by the active pit. As we shared our finds with Mike he offered to take us up the road for fossil crabs in the Peedee at the East Coast Limestone quarry. Many of the fossils we were to acquire at East Coast over the years were finds of a lifetime. This is but one example of the generosity with which Mike disseminated information. He was unexcelled as a comrade in the field and a very capable preparator and researcher at home. We'll miss him.

Don Clements



Look what I found! Bec Clements shares an exciting find with Mike and Barbara. Photo courtesy Don Clements.



Matutites miltonorum - 18 mm = 0.7"

Reference:

Feldman, Rodney, et al, 1998, *Decapod Crustaceans from the Eocene Castle Hayne Limestone, North Carolina: Paleoceanographic Implications*, Journal of Paleontology, Volume 72, Supplement to No. 1, The Paleontological Society, Memoir 48,

Editor's Note: Long-time members will recall that Mike and Barbara were Membership Chairpersons from the fall of 1994 until 1998. As Editor I worked very closely with them and I can attest to the extreme demands of that particular Board position. The North Carolina Fossil Club is very fortunate to have had the services of Mike and Barbara.

New Reprint

President James Bain recently received this from Robert Wolf. Hello Jim

My book *Fossils of Iowa A Fieldguide to Paleozoic Deposits* has been reprinted. Originally published in 1983 by the Iowa State University Press, the book has been reprinted in its original form by Backinprint.com. It lists more than 150 collecting sites in Iowa and adjacent parts of Minnesota and Nebraska. There are 30 plates of illustrations. The book is available for \$16.95 from www.backinprint.com and other places.

It can be ordered direct from me for \$16.95 plus \$4 shipping. Iowa residents add 6% sales tax. A self-produced CD is available from me free of charge that updates the information in the book. It is included when people order from me, or I can e-mail the file. Also, if you already have a copy I can send you the update.

www.robertcharleswolf.net or midnightwriter@frontiernet.net

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Tell me a Story!

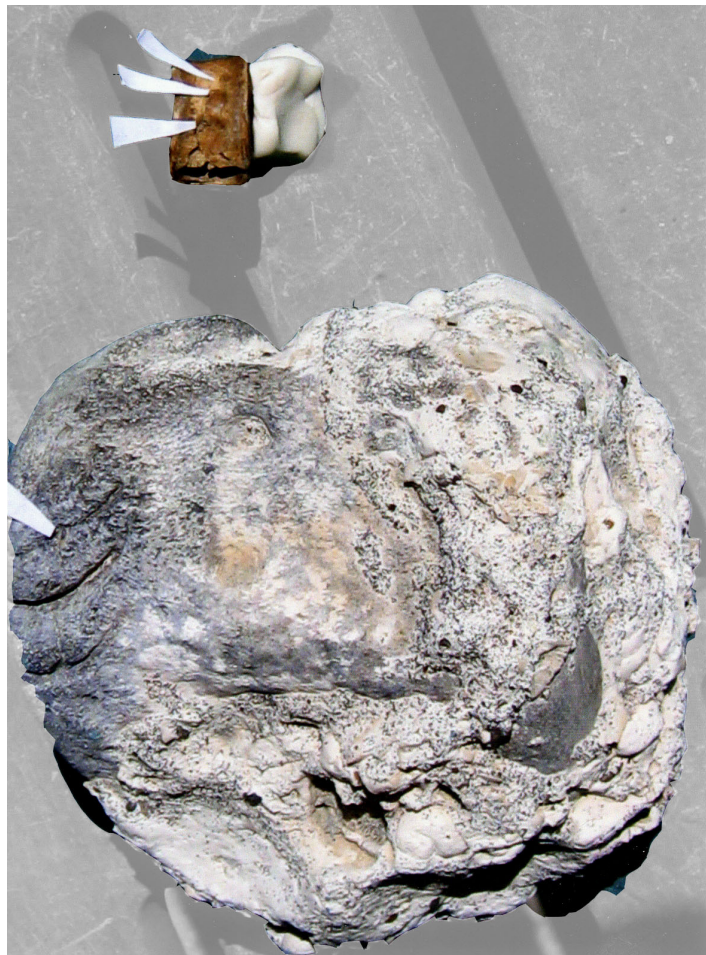
David Grabda

When we started to collect shells we would always look for the best but it seemed like every shell we picked up would have a hole drilled into it. Who or what did the drilling? It turned out the culprit was another mollusk, a moon snail. The snail would drill a hole, drop a straw in and have lunch on its victim. We even found moon snails with holes. AHA! Cannibalism!

In the Lee Creek Mine we would always look for that perfect bone. We soon realized that the gnawed, chewed up bone was such more interesting. I'd pick up a bone or bone bit as I walked along, glance for teeth marks then lightly run my fingers over the bone feeling for a bit of wedged-in shark tooth. This could be done while scanning for other fossils. On one trip in the mine it was getting late. I hadn't collected much and found myself on the trail that forms as everyone meanders over to the easiest way out. I was two hills away from the bus when I came across several small whale vertebrae in rough stages of preservation. Someone's load got heavy and they dumped the worst vertebrae along the path. One caudal (tail) vertebra was still in pretty good shape. It had some whitish gray Pungo River chalk on it that told me it was about twelve to fourteen million years old. The three inch long vertebra had well-fused end disks meaning the whale was an adult. The vertebra had a deep gash on one side and the other side had slash marks with a tip of a shark tooth imbedded in it. Hung up on the bone, the shark thrashed about until he broke off the tooth. If the shark attack came horizontally the whale was already dead and on its side and the shark was probably acting as a scavenger. The deep gash in the vertebra brings to mind a Great White Shark but I'm more inclined to think it was done by a large Tiger Shark because of the shape of the bit of tooth left in the bone. Bob Purdy (Smithsonian) said the only way to really tell what shark did the damage was to dig out the tooth fragment but I feel that would hurt the uniqueness of the fossil. One fossil hunters throw-away turned out to be my best find of the day.

Flash forward two years. I'm sitting down on the porch to go thru a soda flat box of Aurora fossils that Lucille washed and set out in the sun to dry. I'm sorting the fossils into three piles. The first small pile are fossils I'll keep. Perhaps one will find its way into a display. The second small pile are fossils good enough to trade or sell. The third and largest pile are the fossils that are more common or damaged in some way and will be given away at schools or fairs. I pick up a shark disk. It's split from the center to the side edge. I'm about to toss it on to the third pile when something catches my eye. On the upper sides of the disk are five evenly spaced round indentations, two on one side of the top of disk and three on the other side, Suddenly I knew what happened, as a Jacques Cousteau episode flashes thru my mind. A shark got too close to a baby dolphin and the mother rushed in to nip the shark on the spinal column just in front of the tail. That shark took off like a jet propelled corkscrew with a wisp of blood trailing behind it. So three or four zillion years ago this same scenario played out and the damaged shark disk shows where the dolphin nipped the shark. Ouch, that had to hurt! After finding so many aquatic mammal bones gnawed with bits of shark teeth in them its nice to see evidence of "The Dolphin's Revenge".

Next time you are hunting in the Lee Creek Mine keep an eye out for details on that bone you pick up and maybe you too will find a fossil that will "tell you a story"! Good Hunting!



Jim Mahoney found this nice *Hexanchus gigas* on the Friends trip to PCS.

A Great Find By Bonnie McDaniel

I was searching in the dim cave light
Looking for signs of a pre-historic fight
Of a saber tiger or dinosaur
Searching for bones, teeth, or more
Triumphant, I spied a coprolite

Tall Tales from the Trails, No. 15

Paleozoic invertebrates along Highway 87, above and below the Mogollon Rim, Coconino and Gila Counties, Arizona

James R. Bain, Bahama, NC

Summary: A driving tour with side trips for collecting marine invertebrates in Arizona's high country.

Difficulty and access: One ☒ to five ☒☒☒☒☒ on a scale of five. Some sites are adjacent to parking areas. At others, such as Hill 5026, one must climb steep limestone slopes through chaparral, where some shrubs have wicked, curved thorns. Elevations range from more than 7,400 feet in tall Ponderosa Pine forest south of Clints Well (where we begin) to a low of 4,600 feet among desert scrub and riparian trees on the East Verde River north of Payson (where our drive ends). Snow regularly closes the higher portions of this drive (and hides the fossils) in winter. The US Forest Service (USFS) closes many roads above the Rim for mud in the spring. During times of extreme forest fire danger in summer, the USFS sometimes closes all unpaved roads. Barricades are easily bypassed, but please respect them—the USFS enforcement Rangers have become bullish about ticketing scofflaws. Heat can be extreme at the lower elevations in summer and autumn, as we found on our ill-fated ascent of Hill 5026 with children in July 1997 (below). Consult locally with the USFS seasonal information kiosk at Clints Well (Coconino National Forest) or the ranger station in Payson (Tonto NF). Fees must be paid to camp or even park in some areas. Mule Deer and Elk (Wapiti) are hazards on the roads at night, especially the latter, which are huge and a real danger to motorists.

Geology: We will start in the high country just above the southern lip of the vast Colorado Plateau and descend the Mogollon (pronounce “Mug-Ee-Yawn”) Rim, passing to the south through several Paleozoic strata. The Mogollon Rim is an enormous geologic feature in Arizona and adjacent New Mexico, visible to the untrained eye on satellite images, dividing high plateau country with scattered volcanic fields to the north from dissected desert mountain ranges to the south.

From top down, driving south on Highway 87 from Clints Well to Payson, the following “layer cake” of geology is exposed.

Up on the plateau, Quaternary basalts rest unconformably upon the marine Permian Kaibab Formation (~255 million years old). Often erroneously called a limestone, the Kaibab along our route includes much cherty dolomite. Silicates are locally heavy. Some say these tough silicates are largely the result of sequestration in spicules of the wispy glassy sponge, *Actinocoelia*, a favorite fossil of mine. Along our route, silicified animal burrows erode out of the Kaibab in crazy, twisty shapes often mistaken for fossilized bones by the public. I once tried to etch some of these siliceous things with concentrated hydrochloric acid, and I did not even get a little fizz—no carbonates here—many of these big trace fossils are so mineralized with silica that they give a bright “tink” sound when struck with steel. The Kaibab resists erosion, and because of this it forms the strong rimrock of many of our Southwestern canyons, including Grand Canyon itself, and the resistant bottom layer of the canyon of the Virgin River in Utah's Zion National Park. Native Americans knapped the beautiful cryptocrystalline quartz of the *Actinocoelia* fossils for use as arrowheads. I do not normally touch pottery, lithic scatter, or other artifacts, but I have kept a few *Actinocoelia* arrowheads I found in Loy Canyon northwest of Sedona as a youth. These diffuse sponges are interesting, and I like to carve and polish them in lapidary, but the fossils that delight children the most over a vast region of Kaibab exposures are the large productid brachiopods. In life, these big boys were spiny and lived on their “backs” in the lime mud of the seabed. Spines are rarely preserved. Instead, one finds a striated, homely, double-

domed brachiopod resembling plump human buttocks. I call a common one, *Dictyoclostus* (Janus 2004, number 1), the “Big Buns of Death, *Gluteus maximus fatalis*”. One reason kids like these things is that while they are convex on the dome side, many are concave of the reverse side, and that concave surface is often coated with silicate or calcite crystals, giving the finder both a recognizable fossil and a geode. Another reason is that in some areas they occur free of the rock matrix. They can be locally hyper-abundant. Other productids are numerous here, too, including *Peniculauris*, *Waagenoconcha*, and *Derbyia*. Look for the coarse fluting on *Meekella*. Small and medium size ammonites, pelecypods (including *Schizodus*), scaphopods (*Prodentulum*), gastropods, corals, bryozoans, crinoid plates, and big bumpy echinoid spines are less abundant, and trilobite pygidia (“tails”) are quite rare.

Just below the Rim, we traverse the terrestrial, eolian (wind-deposited) sandstones of Permian Coconino Formation. Both the Coconino and the Kaibab are cliff-formers in the canyons of this region. Elsewhere in northern Arizona, the buff, cross-bedded sandstones of the Coconino contain footprints of [?] mammal-like reptiles, including the [?] synapsid track, “*Laoporus*”. Immediately below the Coconino, the soft, bright red sandstones of the Permian Supai Group make a brief appearance, but they do not form the spectacular spires for which they are famous west of here at Sedona.

Just south of the small, twin towns of Strawberry and Pine, the highway cuts through the Upper Pennsylvanian Horquilla Formation, Naco Group (~310-290 million years old). The dark red-brown limestone here contains abundant brachiopods, crinoids, and other invertebrates. Some of the small, red-jasperized brachiopods resemble berries scattered on the forest floor. Geology and fossil fauna of a similar Naco site near Winkelman in southern Gila County was described in detail in Janus 2003, number 3.

As we descend toward the East Verde River, the thickly bedded, Lower Mississippian Redwall Limestone crops out. This limestone is the biggest of several cliff-formers in Grand Canyon, and anyone contemplating a new Canyon climbing route to descend from the rim to the Colorado River must consider how they will get through the Redwall. Most of Grand Canyon's famous caves, many of them Pleistocene fossil sites, are in the Redwall. Marine invertebrate fossils are locally abundant, but much of the Redwall is comparatively barren of macrofossils. This strong carbonate is actually gray when freshly broken. It takes its name from the red stain it picks up on exposures when iron oxides flow onto its outer surfaces from water running off the softer, younger Paleozoic rocks above it.

Finally, at the lowest elevations on our drive, the hills around the Highway 64 bridge over the East Verde River north of Payson expose the Devonian Martin Formation (~370 million years old). The unconformity between the two formations is not obvious here, but beds in the Martin are thinner than overlying beds in the Redwall. Corals are excellent. I have lots of “secret” fossil spots in my home state of Arizona, and these Martin hills are among my favorites, spiny as the shrubs can be (below). Look for the *Pachyphyllum* coral, which resembles a fanciful asteroid pockmarked with craters; *Hexagonaria*, which resembles the “Petoskey Stone” of Michigan; and *Thamnopora* (= *Coenites* = *Cladopora*), which resembles fat chow mein noodles. Numerous other invertebrates are present. Collectible calcite, quartz, and gypsum crystals occur locally, and some are large and spectacular, though widely scattered. Fossils also occur in patches—expect to need to do some exploration.

Driving tour, fossicking for fossils. Historically, the US Forest Service has permitted limited collection of common marine invertebrate fossils for personal use. District Rangers now have discretion in this, and regulations are in flux in Washington, D.C.

(Janus 2008, number 3), so please consult locally before picking up any rocks on these, your public lands.

Start at the small community of Clints Well southeast of Flagstaff, at the junction of Highway 87 and Forest Highway 3 (Lake Mary/Mormon Lake Road to Flagstaff), and begin driving south on 87 toward Payson. The cool pines attract many people from Arizona's giant desert cities in summer. Expect to follow big RVs on the highway.

Side trip: the Rim Road. Little more than 9 miles below Clints Well, turn left off of Highway 87 onto dirt USFS #300, the Rim Road (US Geological Survey 7.5' topographic map, Kehl Ridge). In summer, one can take a long drive on this road to the east, much of the way on the very lip of the Mogollon Rim, with wondrous views to the south toward the rugged and largely uninhabited mountain ranges of central Arizona. Among many other features, one can see the Mazatzals, beginning nearby and stretching south toward Four Peaks near Phoenix. The Superstitions, east of Phoenix, can be seen on a clear day. Productid brachiopods and other Kaibab invertebrates are locally abundant along the road (and in the very substance of the roadbed—poor brachs!). Be patient with the young volcanics as you climb over the flank of Baker Butte, where the road climbs to almost 8,000 feet, you will soon be back in fossiliferous Paleozoic rock as you emerge onto the Rim heading east. Chert in the Kaibab tends to create a knife edge when freshly broken, one reason the Native Americans used it for stone tools and arrowheads. Slowing down on cherty Kaibab roads can reduce the risk of lacerated tires. I once got three flats while driving on Kaibab roads and carrying a single spare, but that is another story (Janus 2005, No. 2). Fossil sites and spots for at-large car camping are abundant along this section of the Rim. About ten miles down the dirt Rim Road from the highway, I like to collect Kaibab fossils in the vicinity of the trailhead for General Springs and the monument to the Battle of Big Dry Wash, one of the last major encounters between the Apaches and the US Cavalry, July 1882 (topos Kehl Ridge and Dane Canyon).

Side trip: Pivot Rock Spring. About a mile past the turnoff to the Rim Road (USFS #300), turn right (north) off of Highway 87 at the highway department's pile of volcanic cinders onto dirt USFS #149. After a few hundred yards, take the right fork onto dirt USFS #616 and follow it north and east to Pivot Rock Canyon. Basalts crop out in a few spots, and the Kaibab is cooked and mineralized where the lava flowed on it, but fossils are found in the Kaibab here just below the cooked strata. (And the bake zone contains some zany mineralizations in the Kaibab.) Note the pillow basalt, formed when lava flowed into standing water. Pivot Rock Spring (topo, Pine) is a cave in the Kaibab with a flowing spring, rare in these high, dry forests. Using your GPS, your Coconino National Forest map, and your USGS topos (Pine, Kehl Ridge, Long Valley, and Calloway Butte), navigate a bit north from here to dirt USFS road #142 as it descends Tom's Canyon, a great place for productid brachiopods. Bain's Law of Topographic Maps postulates that if something is important, it will be on the intersection of two maps, and if it is really important, it will be at the point where four maps meet.

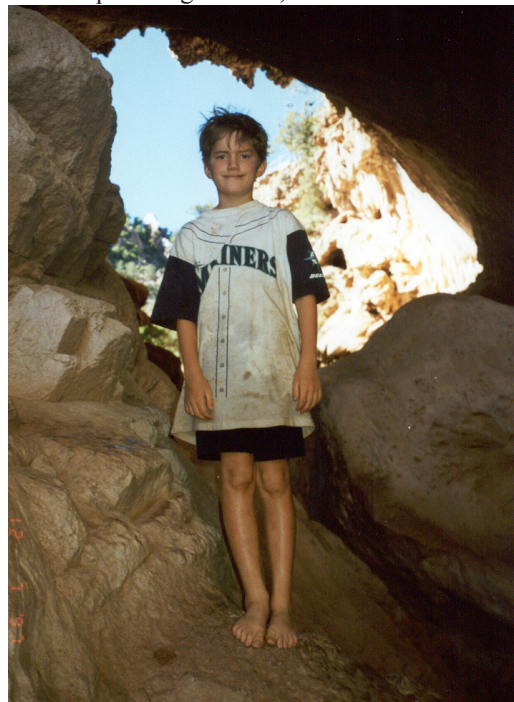
Side trip: Due west of Cinch Butte. At milepost 277.9, where the sign says "Junction 260 one half mile," turn right (NW) off of Highway 87 onto dirt USFS spur #3678 (topo, Pine). Keep the gate as it was (open if you found it open, closed if you found it closed). Make your way through the recent burns by vehicle or on foot to GPS locality 3812600 N, zone 12, 458600 E, for nice Kaibab brachiopods, sponges, and big echinoid spines. At all of these Kaibab sites above the Rim, stay oriented, since one ridge looks a lot like the next. Juvenile Horned Lizards, Phrynosoma, were active here in early August, 2008. Slopes have some thorny New Mexican Locust, Robinia neomexicana, and Arizona Rose, Rosa arizonica, but the ridges are mostly open Ponderosa Pine forest.

Side trip: USFS #608. At milepost ~277.1 on Highway 87, turn left (south) onto dirt USFS #608 (topo, Pine). Soon, take the left fork. Kaibab brachs are abundant in the piney duff here amid the Ponderosas, especially near the [?] sinkhole or [?] small, reclaimed quarry at 3810655 N, zone 12, 458533 E. This small depression is heavily overgrown with a thicket of baby Ponderosas, so keep your eyes peeled. A few pelecypods are found here.

Side trip: USFS #609, Sevenmile Tank. At milepost ~276.3 on Highway 87, turn right (north) onto USFS #609 (topo, Pine). There is a road sign with a squiggly arrow at this junction. Proceed to Sevenmile Tank, a few hundred yards to the north. The sandy Coconino Formation begins to crop out in this area, but look for Kaibab marine fossils on the ridges and in the float (loose rocks) in the drainages. Again, stay oriented—I managed to get myself a bit lost among the Ponderosas here in April of 2003.

As we drop off the edge of the Mogollon Rim on Highway 87, we suddenly pass out of the tall Ponderosa Pine forest and begin our descent into an open Pinyon Pine-Juniper woodland, which soon gives way to a scrubby chaparral farther below. Slow down as you negotiate the switchback turns here—this stretch is a favorite with motorcyclists and sports car enthusiasts, and the Gila County Sherriff deputies take note. Observe the soft, sandy Coconino (buff) and then Supai (red) Permian sandstones. Stop for groceries or chow or fuel in Strawberry or Pine, if needed. Just south of Pine, the drainages and low ridges on the NE side of the highway contain small caves, sinkholes, and fossils in the Naco Group.

Roadside stop, "Seashell Hill" at Control Road junction (topo Buckhead Mesa). Just north of milepost 265 on Highway 87, the dirt Control Road (USFS #64) heads east, giving access to a vast region with lots of caves and fossils, especially in the Devonian Martin Formation. But here at the highway, tucked in the northeast corner of the 87/USFS #64 junction, park in the little lot and hike up small Hill 5804 to the northeast for nice Pennsylvanian Horquilla-Naco fossils, including brachiopods (Composita, "sprifer" types, and Antiquatonia), gastropods, glass sponges, and more. Some of the crinoid ossicles have five-pointed stars in their central canals. The parking area is at 3801977 N, zone 12, 461048 E. Generations of local kids have collected "seashells" here, but I found plenty of goodies during a brief stop on August 10th, 2008.



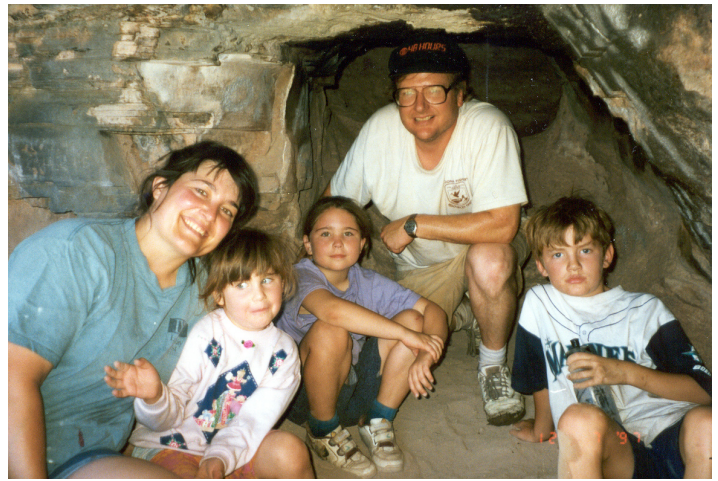
Side trip, Tonto Natural Bridge State Park. All that carbonate rock, set about with volcanics, with water as a solvent, produced what is possibly the world's largest travertine bridge on Pine Creek. Turn left (W)

Tonto Natural Bridge on Pine Creek was a childhood favorite of Edward Bain's.

off of Highway 87 near milepost 263 and descend off Buckhead Mesa down to the bottom of Pine Creek, a drive of little more than two miles. This spur road to the State Park is paved (topo, Buckhead Mesa). The admission fee is nominal. You are parked on top of the enormous natural bridge. Javelina, pig-like animals, which are normally quite skittish about being approached by humans, are unusually tame here, and have come to be a symbol of this Park. Steep trails allow one to descend to Pine Creek and explore the massive bridge from inside. Diverse desert scrub species are labeled—take your time and work on your botany. (How can those gnarled little shrubs with spiny leaves be oak trees?—Well, yep, they are covered with tiny acorns.) The cheeky little bird who laughs at you with a descending series of notes is the Canyon Wren. Children were formerly allowed to fish in the creek here, but the beautiful, golden, endangered Apache Trout has been reintroduced, and fishing is now forbidden. Geology is complex at this site, with basalt, sandstone, rhyolite (Precambrian), and travertine. Travertine always reminds me of Yellowstone, the ancient buildings in Rome (including the Colosseum), and the quarries at Tivoli just east of Rome, some of which remain active. Trace fossils of plants are often present in travertine, including the Turkish travertine tiles I used on the edge of my hearth in an ongoing, years-long, epic project to tile my house. Observe how much of the travertine at Tonto Natural Bridge was nucleated on plant matter, a process which continues today as the active spring pours off the bridge, making a cool spray in this shady spot in the desert.

Side trip: Hill 5026, immediately NE of the Highway 87 bridge over the East Verde River. I saved the best for last. I have been obsessing about this brushy hill for more than two decades now. Several approaches are possible. None of them is easy. Carry plenty of water. Judicious use of a short machete or a pair of hedge loppers might save your tail feathers in a pinch (below). Stay oriented with your GPS and the relevant topo (Payson North). For you gnarly hammerheads who want to scramble 400 vertical feet up steep Martin Limestone ledges, the south face is for you. Let us just call that the “sporting” approach. Cross over Highway 87’s bridge on the East Verde River, keep heading south, turn left onto Flowing Springs Road (USFS #272) at milepost 257, and follow the dirt road down to the USFS campground on the creek. Park here, wade the river (usually passable, but do not attempt when flooded), and climb Hill 5026, the steep face the north. Several times, I have stayed overnight at this campground, which is in a nice spot, but be warned that it is a major party spot for a gun-toting, pickup-truck driving, boisterous crowd, if you get my drift. (I have nothing against guns per se—for years I was a truck-driving, pistol-packing, fun-loving, liberal hippie boy myself—but not everyone who camps here on Flowing Springs Road is restrained about consumption of spirituous liquors while getting in a little target practice, discussing politics, howling at the moon, and so on....) I camped here on the night of 11-12 July 1997 with my son Edward (age 9), my friends, Dennis and Kathy Stone, and their two young daughters, Ashley (7) and Kyla (4). The following day, we ascended the steep south face of Hill 5026 as the sun emerged above the canyon wall.

Both Dennis and I have served as professional field biologists in the Southwest, and we know a few things about getting through rough country, but we quickly got in over our heads on this outing. As the trip leader, I take responsibility for what followed. Soon, we had consumed all of the water we were carrying, and we had left camp with quite a lot. Traversing ledges and climbing where we could, we often had to backtrack when confronted with steep climbs or impenetrable brush. (In the local parlance, we kept getting “brushed out” or “cliffed out.”) Soon, we began taking breaks in the shade of shallow shelter caves, when we could find them. We could see our camp (with our vehicles) and the river more than a hundred feet below us,



Our party takes shelter from the Arizona sun in a cave on the steep south face of Hill 5026.

but we did not give up and descend, as we should have, because I argued that it would be easier to attain the summit ridges and seek a gentler route back down to the northwest, based on the topography shown on the map. In time, we reached the ridges and began to walk in the chapparal, where we soon found nice coral fossils and crystals (including some near GPS coordinates 3792323 N, zone 12, 467240 E), but we became entangled in thicket after thicket of the spindly little Catclaw Acacia, *Acacia gregii*, with its curved thorns. Catclaw will grab you worse than almost any plant in the Southwest. That little curve on the thorns makes all the difference. (The similar Mesquite, *Prosopis*, can be a challenge to negotiate, but at least its thorns are straight.) Soon, all of us had many small tears in our clothing and little lines of bleeding spots on our skin from brushes with Catclaw. Dense stands of tangled Manzanita (*Arctostaphylos*) also slowed us down. We could not find an easy route down off the hill, and we meandered around quite a bit in the brush. The sun and heat pounded us. We escaped to the NW, hours later, and finally made our way off the hill, across a fast stretch of Highway 87, and down to a trickle of water in a tributary, Sycamore Creek. Kathy stayed with the children, encouraging them to play in the water to cool off but not drink it, while Dennis and I made our way down the Sycamore Creek and then up the East Verde River to fetch our vehicles from camp. I admit that I have led my son on some trying fossil jaunts, and my judgment has not always been great. But I got us so badly “brushed out” and torn up on Hill 5026 that, for the remainder of his childhood, when faced with a dubious proposal for some new outdoor adventure, Edward would ask, “Dad, are you going to make me crawl through Catclaw again?”



The children rehydrate in Sycamore Creek after our escape from Hill 5026.

I gave away most of the fossils the little kids carried down off the hill that day as “party favors” at a meeting of the North Carolina Fossil Club, Inc., held on March 16th, 2003 (Janus 2003, number 1).

Let me suggest an easier approach to Hill 5026. North of the bridge over the East Verde River, on a twisty and fast stretch of Highway 87, there are several pullouts on the west side of the road, largely hidden from the highway and perched above Sycamore Creek. This was an old homestead. With care, pull into this abandoned ranch site and park by the historic graves (GPS 3796573, zone 12, 466194, topo Payson North). Look around the parking area and in Sycamore Creek for fossils (Devonian in the bedrock, some Mississippian in the float) before committing to crossing the highway and tackling hill 5026. Scoria basalt and travertine are present in the float. One way up the hill is to deal with barbed wire and Arizona Grape vines and take the culvert under the highway and ascend that drainage, skirting Catclaw and cacti as needed. Another way is to cross the road on foot with care at grade level at milepost 259 on Highway 87 and walk up the steep powerline road to an ephemeral pond, Gravel Tank, and vicinity (GPS 3796975 N, zone 12, 466315). Fossils and crystals are present. Just south of that pond, see the rustic cowboy manger made of corrugated steel, logs of Arizona Cypress, and a cut-down 55-gallon drum. Small fossils can be liberated from Harvester Ant hills (*Pogonomyrmex*) in this area. Rattlers will warn you with a buzz if they feel threatened by your approach. Let me know what you find.



Hardouinia kellumi, Rocky Point style.



John Timmerman's *Isognomon* cast (Peedee Fm.)



Castle Hayne Finds: Roxada Story (left) with her very rare slit shell (*Entemnotrochus* sp.) and Trish Kohler with a nice *Hardouinia mortonis*.



Hardouinia kellumi, Castle Hayne style.

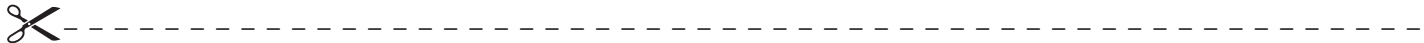


A pristine *Hardouinia mortonis* and a tray of Rocky Point echinoids.

NORTH CAROLINA FOSSIL CLUB, INC.

(Founded 1977)

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SELECT ONE TYPE OF MEMBERSHIP	<input type="checkbox"/> INDIVIDUAL (NEW)	\$20.00
(ENCLOSE CHECK OR MONEY ORDER FOR THE INDICATED AMOUNT.)	<input type="checkbox"/> INDIVIDUAL (RENEWAL)	\$15.00
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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
Research Triangle Park, NC 27709

A nice *Aturia alabamensis* found by Al Klatt on the Castle Hayne trip.

