



Triassic Treasure In Tucumcari

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Imagine an early morning in New Mexico. The sun breaks over a mesa, and warm rays slowly descend the eastern face of a canyon wall. Scattered sparsely across the rugged slopes, red petals of a thousand cactus flowers lift and open toward the sun. A striped lizard known as a Whiptail emerges from a hidden crevasse and postures atop a rock, still damp from the previous night's unseasonal rain. Ten feet below the weathered caprock, in a distinctly colored and textured layer of ancient sediment, drying particles slowly crumble away exposing a small protrusion of smooth speckled bone. This one anomaly in the long striation of compacted mud announces a cache of fossils hidden only a few inches below— a Triassic treasure that until now has remained buried for 200 million years.

Since the debut of the movie Jurassic Park, there has been a steady swell of fascination with dinosaurs and the science of paleontology. My own four-year-old grandson talks about nothing else. His room is festooned with dinosaur toys, puzzles, mobiles, and posters. If you simply mention the Ross Perot Museum in Dallas, his eyes widen and he shouts “They have dinosaurs there! Can we go?”

Having recently retired, and with no excuse not to start working on my growing bucket list, I made the whimsical decision to “do” a dino dig. Over the last two centuries there have been many fossil discoveries all over the United States. And currently both commercial and academic excavations are conducted at many sites, primarily during the summer season. So, at my wife’s suggestion I spent a couple of hours on the Internet searching for digs that welcomed guest participation. I found several, located variously from California to Florida, and from Texas to Montana. And after a few phone calls and a few pages of hurried notes, I made my choice.

Dr. Axel Hungerbuehler is a science professor at Mesalands Community College in Tucumcari, New Mexico, and curator of the college’s Dinosaur Museum. Educated in Germany and the UK, Hungerbuehler is an expert in paleontology and in particular the great Triassic reptiles that preceded the dinosaurs of the Jurassic Period. Enthused by a lengthy phone conversation with this intriguing German scholar, I made a commitment to join his Geology 120-01 class called Paleontology Field Discovery. With three months to prepare, I hurried off to Half-Price Books to find a few relevant texts in order to “bone up” on the subject. After all, as a college professor myself, albeit it in an entirely different field, I did not want to appear an ignoramus when I engaged this course with a batch of young astute fossil hunters. I shuttered at the thought of sitting in a lecture theater among a hundred students, all twenty-



something and all laughing at me for asking something like: “Can we really get dino DNA from a fossilized mosquito?” Of course, I should have known that there is far more information on this subject than I could absorb in a short time, but I dived into the books as if I were cramming for finals.

The geological history of New Mexico is fascinating. The many layers visible on the slopes of mesas, include sandstone, silt, red mud, and aggregate stone, which represent various changing conditions over long periods of time. And during each of those periods, a great variety of flora and fauna lived and died. In recent geological history, as the caprock has eroded away, fossil bearing layers have been exposed. Some fifty million years ago, during the early Cenozoic Era, a large portion of western United States was covered by freshwater lakes, stretching from New Mexico to Montana. Fossils of fish and crayfish in relatively consistent layers in various regions are evidence of that fact. Long before that, during the early Mesozoic Era (consisting of three periods called Cretaceous, Jurassic, and Triassic), many species of dinosaurs developed and lived all over the United States, and New Mexico has yielded ample fossils of their remains. The Jurassic Period (145 to 200 million years ago) was the time of the great dinosaurs, the ones reincarnated in numerous films like the Jurassic Park series. Their time on this planet ended with the great extinction level event commonly believed to have been at least one large meteor impact off the coast of the Yucatan peninsula.

Before that, during the Triassic Period (200 to 250 million years ago) eastern New Mexico was covered by a network of marshes and waterways, and the creatures that developed and thrived there included some rather large reptiles called archosaurs, both carnivores and herbivores. They were the predecessors of the great dinosaurs of current fame. There is no clear evidence of any catastrophe that led to the extinction of the archosaurs. On the contrary, their disappearance seems to have occurred



gradually, phasing into the Jurassic Period. In recent years what has been termed the Redonda Formation in New Mexico has yielded significant numbers of Triassic fossils, and the animals of this period were clearly distinct from the dinosaurs. The phytosaur, for example, resembled a modern crocodile, but was not

related and was much larger. Like all archosaurs, the phytosaur had certain anatomical features very distinct from the later dinosaurs. And unlike all *crocodilia*, its nostrils were just below the eye sockets, rather than at the end of the snout.

After an eight hour drive from Dallas, I arrived at the museum in Tucumcari in time for orientation. The class consisted of seven males and three females, varying from high school students to retirees. Most were doing the course for college credit. Others, like me, were there for the experience. There are no specific prerequisites for the

course, although participants need to be academically competent and healthy enough for vigorous work in summer's heat. At that initial meeting we were introduced to Gretchen Gürtler, the energetic and highly knowledgeable director of the museum. A third project leader was Reg Tempelmeyer, a former US Army Air traffic controller and recently retired IT Manager with Oklahoma University. Although an amateur in paleontology, Tempelmeyer has volunteered with this program for the past ten years and, as I soon would discover, he is remarkably well-informed and proficient in excavation and fossil prep techniques. Additional guidance, in both field and lab work, would come from Hungerbuehler's assistant Vincent Grap, an engineering student at University of New Mexico Tech.



Among the details of orientation was a serious lecture on ethics. Fossils are part of the mineral rights of the land owner, and by written agreement all significant finds are donated to the museum. Therefore participants in a dig are bound by a code. No fossils can be taken for personal interest or for sale to other parties. Also, the name of the land owner and the location of the dig site are not to be disclosed, to help avoid trespassing and theft. However, Hungerbuehler

did take the time to share the history of this particular site. Specifically interested in the Redonda Formation, he and Tempelmeyer teamed up back in 2003 to explore eastern New Mexico in search of a good fossil bed and a landowner interested in supporting paleontological research. Out of the blue, a rancher contacted Hungerbuehler and said his children had found some bones. He wondered if someone from the college would like to have a look. Obviously, Hungerbuehler and Tempelmeyer jumped on it. They worked out an agreement with the rancher, and today, after ten years of tedious excavation, the dig site has proved remarkably productive.

So, I considered myself privileged to join this illustrious team for a week in the summer of 2015. On Monday morning we left the museum at six o'clock and headed out



in convoy to the dig site, about an hour's drive from Tucumcari. To our pleasant surprise, the many previous expeditions had left a distinct pathway from where the paved road ended, across expansive flat ranchland, then through rugged terrain, around boulders and cactus, in and out of mesquite groves, down into a gorge and up again, culminating on a bare rocky knoll. That's where we parked, only a few meters from the edge of the site, with a meandering gorge below and a majestic mesa in the hazy distance.

All the essential tools, knee cushions, water and sports drinks were provided. Overzealous, and expecting a long hike each day, I had brought a full alpine pack with first-aid kit, binoculars, poncho, water jug, ice packs, fire starter, field shovel



and machete. . . you know, the whole enchilada for wilderness survival. I was happy to leave it all in my car back at the museum and bring only my gloves and camera. All the essential tools, knee cushions, water and sports drinks were provided. Of course, we had been advised to dress for a day in the hot sun, preferably long pants and long sleeves for protection from prickly plants and various biting or stinging insects. Hats and sun block were also essential. For that I was prepared, except for bug spray which I had left in my pack at the museum. But someone else had plenty to share.

For the next five days, our routine in the field would be a combination of heavy rock excavation and delicate and tedious fossil extraction. So, the tools we used ranged from sledge hammers and chisels to fine brushes and dental picks. This project had never seen a back-hoe or any power tools. During those five days we found and retrieved an assortment of teeth, vertebrae, armor plates, and rib fragments. My best find was a large tooth or fang, assumed to be from a phytosaur based on other fossils in near proximity. In the general area, a few larger fossils had been located by previous groups and were clearly marked and covered. We also learned how to jacket larger finds to avoid breakage and extract them with the surrounding matrix intact. On the last day we loaded jacketed specimens into one of the trucks, and carried them back to the lab to begin careful removal and preparation. Much of that task would be done later by successive volunteers, under the supervision of the staff.



Each day when we returned to the museum, around 2 pm, lunch was waiting, prepared or arranged by the museum director. I am glad no one took videos during those lunch meals. I ate with the unsightly



gusto of a ravenous coyote. And most days, by the time I finished lunch I was ready for a nap. But there was no nap time. At Hungerbuehler's signal, we all dutifully pushed back from the table and headed off to the lab for a couple of hours of fossil prep-work. Housed under the same roof as the museum, the lab is adequately equipped with several work tables, lamps, microscopes, and specialized tools. On the third day I was



excited to tighten the headband on my Optivisor and focus my attention on my phytosaur tooth. And I quickly discovered that removing composite with a pneumatic stylus, virtually one grain at a time, and without damaging fragile bone, is both challenging and tedious. So, in a matter of hours my respect grew exponentially for the countless students, professors, and lab technicians who have prepped the thousands of fossils currently on display in museums all over the world. One tooth took five hours to clean and prep. I can scarcely imagine the time required to reconstruct the entire skeleton of a much larger dinosaur.

Hungerbuehler closed out each day with a short lecture in the lab. Acutely aware that his class battled fatigue after ten hours of travel, packing gear, digging rock, and peering into a microscope, he still proved consistently interesting and animated. Waving fossils around and pointing at charts, he spoke of evolving hip sockets and overlapping armor plates, and each of us pledged to read more about it all when we got home.

Overall, I found the Mesalands dinosaur program to be impressive and well run. The staff members are clearly knowledgeable and committed to discovery and education. The week's course was physically challenging, but exceptionally rewarding. No one got hurt, and we saw no tarantulas, scorpions or rattlesnakes. The only snake encounter was a bull snake that slithered up the rubble slope one morning to see what all the clatter was about, and then hurriedly retreated back down and into the shade of a small juniper. One morning also while some of us stopped to photograph a cactus flower, the group ahead of us came upon a wild hog. It must have been a terrifying encounter, at least for the hog. It disappeared into the brush and was not seen again.

The dinosaur museum, although small, has a respectable array of displays from both the Triassic and Jurassic eras, as well as more recent flora and fauna of New Mexico. And Gürtler, the museum director, is competent and personable as a tour guide. She is a member of various boards and committees relevant to local studies of meteorology and water, part of the curriculum of the college and very significant to the area. Needless to say also, the museum is one of the important tourist attractions in Tucumcari, along with various motels, shops, and restaurants that play on the Route 66 motif. The museum website, however, does not adequately represent the impressive

scope of the program. Yet, it seems inevitable that with time and more exposure interested parties will provide greater funding and better equipment for the dig site. Gürtler also participates in field work. There is an impressive photograph of her on-line, kneeling at the dig site next to a jacketed phytosaur skull, which is now on display at another museum. Here I have included a photo of her next to a cast of a Triceratops skull at the Mesalands Dinosaur Museum.

The remains of metoposaurs, phytosaurs, and the famous early dinosaur *Coelophysis* have been found in abundance throughout New Mexico. The latter was designated as the state fossil of New Mexico in 1981. The Redonda Formation, which is the focus of the Mesalands project, has produced no complete articulated skeletons as yet. However, it has yielded many fossils of both phytosaurs and aetosaurs, including the very distinctive skulls and armor plates. Some of the smaller fossils may prove to be from *Shuvosaurus*, a beaked poposaurid archosaur with a lot of convergently evolved similarities with dinosaurs. It lived in the region of Texas, Arizona and New Mexico during the Late Triassic period.



At the present, a number of discoveries are already jacketed *in situ* at the Mesalands dig site awaiting extraction. Who knows what else lies deep in unexposed layers of this ancient formation. Tempelmeyer expressed the opinion that “the current dig site may prove to be the most productive Triassic site in the world.” The fossil treasures of the New Mexico Mesalands beckon to all who are eager to explore, dig, and discover. Who knows what is still buried in the Redonda Formation, maybe just a few inches from the surface. This old fossil was excited to participate, and I plan to do it again.



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