Fossil of the Month –
Eocene turtle skull

By J.P. Cavigelli, Tate Geological Museum Collections Specialist

Early this year I got an excited call from Ben Shoup. Ben works for Arcadis, a huge international consulting firm in Buffalo, Wyoming doing paleontology surveys before pipelines, roads and mines are constructed. He had just found a nice site in the Powder River Basin while doing a uranium mine survey. He called me while we were digging up a Triceratops skull to tell me that he had found an Eocene (about 50 million years old) soft-shelled turtle four feet in diameter, and it looked like it had legs and a skull, and there were gar skulls in the area as well. He thought it would all be a great addition to the Tate Collections. Complete Eocene turtle shells are not common, and with legs and skull even less so. I agreed with Ben.

Paleontologically speaking, the Eocene of the Powder River Basin is known for being rather unfossiliferous, especially compared to other Eocene basins in the state. So a report of complete soft shelled turtle and gars was pretty exciting. The fossils were on BLM land and we needed a permit to collect them. Ben and I worked with Brent Breithaupt, the BLM paleontologist in Cheyenne, to get permits pushed through.

On September 24, 2013, with permits in hand, a group from the Tate met Ben and two folks from the Buffalo BLM office to scout the site out and begin collecting. Ben showed us the site and we did a quick analysis... how much could we get done in the three days we had set aside? The turtle shell itself would need several days to collect and there was only room for one person (maybe two) to work on it. We focused on some of the smaller pieces... the turtle skull and a few of the gar skulls. Ben had originally reported two gar skulls, but in doing some more exploring, we found 19 gars. The project just got bigger. I should say 19 occurrences of articulated or associated gar scales and bones. Most of the 19 actually seem to be skulls. Gar scales are common fossils in the Eocene rocks of Wyoming, but skulls are not, and articulated scales are not either, so even without the turtle, this is a unique site.

But back to the turtle(s?)? The skull that Ben found was about 20 feet from the shell he found, so we had a bit of a discussion as to whether or not the skull belongs to the same animal... and then moved to collect it. Al Fraser and Lynne Swank worked for two days on the sandstone face to collect the skull, while others explored some of the gars. Al and Lynne had to carve themselves footholds so as not to gently slide to their imminent deaths three feet below the skull. They pedestaled the skull and then jacketed it. Upon rolling it over, we saw that the bottom side had a lot more bones. We could not say what the bones were yet, but the project just got bigger.

Steve Pfaff has since prepared the skull and it is featured here as this month’s Fossil of the Month. The skull is a bit crushed, but seems to be mostly present. Since we do not know what additional bones we have on the bottom of this jacket, and the skull is slightly crushed, I had Steve leave the skull in the sandstone. We plan to take this to a CT scanner and see if the bones on the bottom side are identifiable. If they are random bones, the final project will be different than if they prove to be neck vertebrae, which would imply maybe another complete turtle in the sandstone face. In which case, the project just got bigger.

The skull is about five inches long. In this photo, the snout is on the left, and the two maxilla bones are split so the nasal opening is exaggerated. The large round opening is the eye hole (orbit). Below the orbit are a series of foramina (small holes) that in life would have provided the horny covering on the beak with nutrients. Below that, in the sandstone, is a bone with many small holes that look like alveoli... tooth openings, turtles have no teeth, but it seems softshells have nutrient foramina where the teeth should go, so that is likely the lower jaw. Soft shelled turtles have a long extended sagittal crest which sticks out from the back of the skull, our little guy’s sagittal crest is broken, and that’s on the right side of the specimen. I have included a photo of a modern snapping turtle skull for comparison.

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Office assistant now housed at the Tate Geological Museum:
We are pleased to announce that Lindsey Craig, is now housed at the Tate in Room 104 with Patti and J.P. This makes it much easier for employees in the school on the south end of the campus to receive assistance. Thanks to our Dean, Grant Wilson, for making this change and making our lives easier.

Summer Passport Winner:
One of the grand prize packages for the Casper Museum Consortium Passport To Adventure was the Museum Membership Package, which entitled the winner to family memberships and passes for all the participating museums. The winner of the package and our newest member is Lindee Szewczyk. Congratulations Lindee and family.

2014 Summer Conference:
We have chosen the theme for our summer conference, which will be held June 6, 7 and 8, 2014. The theme is “Prehistoric Predators.” When you do a search online you get such terrifying names as sabre-tooth, terror bird, giant bear, killer pig, razor jaws, dire wolf and monster shark. Attend the conference to hear the latest research on many of these well-known beasts and some lesser known ones. Just be glad none of them have survived to present day.

SAVE THE DATE: Saturday, September 20, 2014
The date for our biennial fundraiser has been changed from spring to fall. After a hectic summer, school starts and our lives settle down to a more sedate pace. We often need a lift and our fundraiser will provide that. Set this date aside now and make plans to attend. We will keep you posted as the planning proceeds.

Werner Wildlife Museum “Nature” Art Show and Open House
Artists who are currently Casper College students or employees were invited to enter their artwork in the annual art show and open house at the Werner Wildlife Museum. The open house took place on Friday, Nov. 15. Mike Olson’s advanced class, once again, provided ceramic pieces as the centerpiece of the show. The open house also introduced our newest exhibit on taxidermy. This exhibit is modeled after an old-time taxidermy shop complete with text explaining the steps taken to preserve our natural heritage. The “Nature” art show will be at the museum until March 13, 2014. If you didn’t make it to the opening, you have a lot of time to visit the Werner Wildlife Museum during its normal operating hours. Also, if you haven’t been in the museum lately, you will want to take a look at “Dan” our newest black-footed ferret.

Thank you:
We want to thank John Stevenson, of Wyoming Taxidermy, who spent hours helping us plan and assemble the taxidermy exhibit at the Werner Wildlife Museum and contributing tools and mounts, in various stages of completion. Big thanks also goes to VanDyke’s Taxidermy Supply, based in North Carolina, who contributed supplies for the exhibit.

Save the Date: Saturday, December 14, 2013
The Tate Museum’s holiday open house will be held on Saturday, Dec. 14 from 10 a.m. to 4 p.m. We will have activities such as Face Painting, Ornament Workshop with Russell, Scavenger Hunts, a shark hunt and T-rex toss. Santasaurus will attend the festivities and it will be a great time to do your Christmas shopping in the gift shop. We furnish free gift wrapping with all gift shop purchases. We will also be giving tours of the museum, prep lab and Lee Rex barn. Bring your phone or tablet and participate in our new QR code game (See Patti’s article for more information). There is always a lot to do at our holiday open house.
My name is Dominique Maestas and I am the new gift shop manager at the Tate Geological Museum. My little sister and I were raised by my wonderful mother here in Casper, Wyo. I graduated from Kelly Walsh High School and attended the University of Wyoming/Casper College Center.

As a child, I would visit the Tate Geological Museum numerous times with my classmates or family. Mesmerized by the assorted dinosaur bones and beautiful rocks, I always had a liking for the museum.

The museum and gift shop have grown tremendously since my childhood visitations and I’m only 22 years old. I’m ecstatic to be a part of the Tate and witness as it grows more and more. It wouldn’t have felt nearly as welcoming without the fantastic faces around the building.

I can’t wait to get to know each one! A supportive, knowledge-filled team, an interesting museum, and Dee the Mammoth hovering over me, what more could I need?

For a better comparison, there is a viewable soft-shelled skull on the Internet at http://digimorph.org/specimens/Trionyx_triunguis/, and, if you can play movies on your computer, you can play around with the skull.

The final photo shows the site and a few of us working on the site. Dwaine Wagoner is swinging the pick to allow access to the four foot turtle shell while Al and Lynne work on the skull. Susan Carson appears as a shadow to Al’s right. Each numbered piece of paper marks the location of one of the gar specimens. (We did collect one skull that day, but that is another story).

Thanks to Ben Shoup and Brent Breithaupt for making this project possible. Thanks also to our field helpers, Doug Tingwall (BLM), Allison Barnes (BLM), Patricia Clark, Helen Hoff, Dwaine Wagoner, Al Fraser, Lynne Swank and Susan Carson. This turtle skull was collected under BLM permit number PA13-WY-214.
History of Paleontology Class

By J.P. Cavigelli

In May 2014, J.P. Cavigelli and Melissa Connely will be offering a class: “The History of Paleontology.” The class will be a field trip to Europe to visit museums and some classic sites for arm-waving and collecting. The plans are still being worked out. At this point we will start in London at the British Museum, and visit Charles Darwin’s home, then travel to Lyme Regis on the coast to see where Mary Anning collected many of the first ichthyosaur and plesiosaur specimens. We will spend some time beachcombing for ammonites and whatever else the Jurassic fossil gods offer. Then off to Paris to visit the Natural History Museum where Cuvier came up with the very idea of extinction. The museum is a classic glass and wood space with as much stuff crammed into it as possible, including the original mosasaur from Holland. Then we will go to Bavaria to see at least two Archaeopteryx specimens and the quarries from whence they came. We will also visit other museums and collecting sites along the way. Details are still being finalized. We are hoping to keep the cost around $3000 including lodging and flights in and out of Denver. Contact us if you would like to get more detailed info as it becomes available.

Recent Field Outings

By J.P. Cavigelli

On Saturday, September 7 the Tate Museum held a Members Only Kids Field Day at Alcova. Russell and J.P. led 24 people into the Jurassic ocean beds to look for belemnites and shells. It was a beautiful day and everyone found a few good specimens.

A little while ago, a young fellow here in town donated some rocks to us that had bone impressions in them. He had found them at Alcova, so I organized with him and his father to see the site. We are interested in collecting whatever else may be there, but we need to apply for a permit for this one. Next year.

A few of us also joined a BLM archeology crew north of town for a few hours on Aug 29th. The archeologists had reported some old bones on BLM land so we went to check it out. Yup, sure enough, they had found some bones. Of what we don’t know yet, but we marked the spot and will apply for a permit to collect them. That’s for next year, too.

Our final dig session from September 9 through 13 was fairly successful. We spent more time on the Merle hadrosaur site. We got some jackets started on some of the bone accumulations. As has happened in the past, as we tried to isolate bones, we ran into more bones, thus, making a complicated excavation. In addition, some of the sandstone, which had been fairly soft so far, was better cemented in the areas we worked. We made forward progress, but less slowly than we had hoped, which leaves more digging for next year.
Well, that’s a mouthful, isn’t it? And what exactly is a “Tate Geological Museum Scarab Hunt QR Code Game” anyway? Let’s take it apart and see. The ‘Tate Geological Museum’ part is easy. The ‘Scarab Hunt’ is the company that manufactured the game. ‘QR Codes’ are those little square codes that are on everything from Pepsi cups to magazine inserts to advertisements. ‘QR’ stands for quick response, and when you scan these quick response codes with your smart phone or tablet they take you, via the internet, to more information, or advertisements, or websites or anywhere else the creator could dream up. Ours takes you to a ‘seek and find/ Q & A’ type game all about the exhibits at the Tate!

When you enter the museum, there is an entry QR Code at the front desk to start the game. Scan this and you are on your way. Find the 15 copper QR Codes around the museum and scan them one at a time. You will be given a question about the exhibit that the QR code is attached to. All of the answers are in the exhibit itself, so all you have to do is look at it carefully (and, yes, read the text) to find the answers.

You (or someone accompanying you) need to have a smart phone or tablet to play the game. Don’t have a QR Code reader on your smart phone or tablet? You can download a free one at your app store. There are some older apps that don’t work, so if your QR Code reader doesn’t work, don’t despair, just download another one.

Just a heads up, we are beta testing (being a Guinea pig for) this game. We encourage you to come down to play it. If you run into any problems or have any questions, please let us know! We can’t help the company fix the glitches if we don’t know what the glitches are. One of the problems someone pointed out is that there isn’t a counter in the game to let you know you have found six of 15, for example. The company liked this suggestion and plans to fix it soon. So any suggestions or ideas are welcome!

Tater Travels:

At the beginning of October, Patti went to Lincoln, Neb. for MPMA’s (Mountain-Plains Museums Association) annual meeting. She participated in many sessions and meet ups and was fortunate enough to present a session for a colleague that wasn’t able to make it. She is excited about the things she learned and can’t wait to try out some new ideas.

At the end of the month Melissa Connley, J.P. Cavigelli and our work study Steve ‘Fluffy’ Bennett went to the annual SVP (Society of Vertebrate Paleontology) meeting in Los Angeles, Calif. Fluffy participated in a photogrammetry workshop while J.P. and Mel attended sessions and did some networking.

Patti Wood-Finkle, far right, with Heather and Henry at the MPMA annual meeting.
Q: What was the first true bird?

A: *Sigh* Until recently, answering this question would have been simplicity itself. I would have written just one word – Archaeopteryx – and then devoted the rest of this page to – oh, I don’t know, gardening tips or something. But a lot has changed in the last few years…

To start answering this question, we first need to define our terms: what, exactly is a true bird? The late Larry Martin Ph.D. used to say ‘if it has feathers, it’s a bird.’ But this definition doesn’t help us much because feathers usually don’t fossilize. Fortunately, paleontologists have come up with a more precise, cladistic definition: a bird is anything that is more closely related to a modern English sparrow than to the sickle-clawed dinosaur Deinonychus.

The diagram on the lower left illustrates a view that has been held by many paleontologists for the last couple of decades. In this scheme, the Late Jurassic (152 million years old) genus Archaeopteryx is indeed the first true bird – as you can see, it’s more closely related to modern birds (see the sparrow?) than to Deinonychus. However, although Archaeopteryx may be the oldest known bird, it is not necessarily the most primitive. In many ways, Archaeopteryx is more advanced than the primitive flightless bird Protarchaeopteryx from the early Cretaceous (124 million years ago) of China. If this diagram is correct, then birds even older than Archaeopteryx surely await the spade of some lucky paleontologist, perhaps in rocks of middle Jurassic age.

But in recent years new fossils of more primitive birds and more bird-like, feathered dinosaurs have turned up, mostly in China. In 2011, a paleontologist named Xing Xu presented an alternative hypothesis based on these discoveries. I’ve illustrated his view in the diagram to the lower right. As you can see, Archaeopteryx is now on the branch of the family tree that leads to Deinonychus. If Xu is right, Archaeopteryx isn’t a bird at all – it’s a little flying dinosaur! As for the first bird, that turns out to be the weird little critter Epidexipteryx from the Daohugou formation of northern China. It hasn’t yet been determined whether the Daohugou formation is Late Jurassic or Early Cretaceous, but Epidexipteryx is almost undoubtedly older than the next bird on the tree, the 124 million year old Sapeornis. Unfortunately, Xu did not include Protarchaeopteryx in his study, so I’m not sure where it fits into this new scheme.
2013 Tate Museum Event Calendar

November
28  Closed – Thanksgiving

December
14  Tate Geological Museum Holiday Open House
25  Closed – Christmas
31  Closed – New Year’s Eve

January 2014
1   Closed – New Year’s Day

Scan to find out more about the Tate Geological Museum!