# The Paleontograph

**A newsletter for those interested in all aspects of Paleontology**
**Volume 1 Issue 6 June, 2012**

## From Your Editor

Welcome to our sixth issue. I had some computer issues and had to replace mine. Of course, I had not backed everything up but it all seems OK now. I lost some old emails but I don't think we will have any problems.

The nice weather is here and I made my first trip into the field, (Kansas) and had a good time. It is always good to get out and hunt for fossils with friends. Coming home with some finds always adds to the good feelings. Please take a few minutes and write up your adventures and share them with us.

I've always taken a summer break from my past newsletter, putting out ten issues per year. I'm not sure what to do here. Maybe I'll put out one over the summer. I'll figure it out and you will find out what I decided when I do.

The Paleontograph was created in 2012 to continue what was originally the newsletter of The New Jersey Paleontological Society. The Paleontograph publishes articles, book reviews, personal accounts, and anything else that relates to Paleontology and fossils. Feel free to submit both technical and non-technical work. We try to appeal to a wide range of people interested in fossils. Articles about localities, specific types of fossils, fossil preparation, shows or events, museum displays, field trips, websites are all welcome.

This newsletter is meant to be one by and for the readers. Issues will come out when there is enough content to fill an issue. I encourage all to submit contributions. It will be interesting, informative and fun to read. It can become whatever the readers and contributors want it to be, so it will be a work in progress. TC, January 2012

**Edited by Tom Caggiano and distributed at no charge**

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# Exploring Red Hill, Pennsylvania, and the First North American Tetrapod Discovery

***Bruce Edward Litton***

Compared to other places we have searched, the Red Hill site yielded few fossils that were harder to work for. Situated in Clinton County, Pennsylvania, adjacent to the West Branch Susquehanna River, we hammered and chiseled, carefully extracting sedimentary sections, for relatively little evidence of late Devonian flora and fauna while light drizzle glazed red mudstone with September temperatures in the low 50's. My family's best find was a fish scale about three fourths of an inch diameter, almost certainly an instance of the large predator, Hyneria. Other members of New York Paleontological Society found similar scales, pieces of plant stems, and a large section of fish vertebrae along the impressive, red-toned highway cut. But the scarcity of fossil finds paled in comparison to the importance of the rock we worked upon.

By invitation from Douglas Rowe, who stewards the site in conjunction with Ted Daeschler of The Academy of Natural Sciences, Philadelphia, Curator of Vertebrate Zoology, the group traveled to north-central Pennsylvania in 2009 to collect, then stay in nearby Renovo and Hyner hotels for the night and resume collecting in the morning. The mo
od was somber as the weather and arrival of the fall season coupled with this fairly isolated region of Pennsylvania, but everyone seemed to feel pleased to be treated the opportunity with legendary Doug Rowe. This site is restricted to invitation only, and significant finds are released to Rowe and Daeschler, but Hyneria scales, isolated vertebra, plant matter, and possibly other minor finds were ours to keep.

Having finished collecting together late in the afternoon the day of our arrival, we caravanned to Rowe's local museum, an enormous collection of fossils including some of the first North American tetrapod finds at Red Hill. Douglas Rowe is credited with Ted Daeschler for the very first North American tetrapod discovery in the early 1990's at Red Hill. By synchronicity of interest and endeavor, Ted Daeschler happened upon Rowe pursuing his hobby at about this time along the road cut near Hyner and Renovo, deeply absorbed in both his authentic ability and the significance of this exposure of the Catskill Formation.

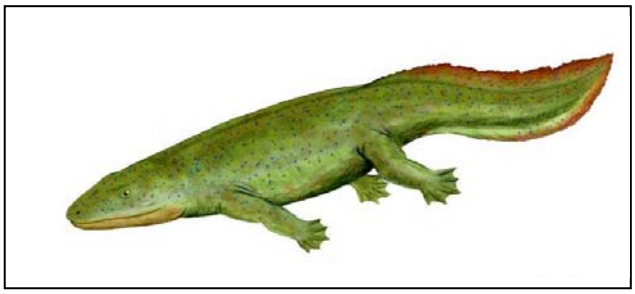
Rowe has since received the 2007 Harrell L. Strimple Award for contributions to paleontology. One of two species of tetrapods discovered here, Densignathus rowei, is named after him.

Tetrapods are extremely rare finds along the one kilometer Red Hill site; usually a shoulder piece or jaw is found rather than complete skeleton. The predominantly red mudstone is a deep deposit from a wide lowland river bed and flood plain of the Catskill Formation, which emptied into the inland Catskill Sea having flowed north and west from highlands. The tropical or sub-tropical climate produced a flourishing of plant life, and remains often found in the much less frequent green sandstone present along the cut suggests the ancient presence of ponds on the flood plain.

**Matt Litton Red Hill: Matt Litton makes effort on the Red Hill slope with safety goggles, hard hat, hammer, and chisel.**

**Red Hill Cont'd**

Red Hill is one instance conveniently exposed by highway construction of a larger unit of like rivers forming the Catskill Delta produced by erosion of the Acadian Orogeny—mountains that lay to the south and east. Alluvial deposits extend from southeast New York, through Pennsylvania, Maryland, West Virginia, and northwest Virginia. Marine deposits associated are to the west into Ohio, and southward into Tennessee. The late Devonian continent of Euramerica, 365-370 million years ago, was distinctly characterized by the inland sea, and no doubt, fish forming appendages to venture upon land is the most important value we encounter from that time.



**Hynerpeton**
**A tetrapod from Pennsylvania**

**Red Hill:**
**The Red Hill site is an elevated slope composed mostly of mud stone about a kilometer in length along Route 15.**

# ON THE ROAD
# Lemmon, South Dakota

***David Lukens***
***Eastern Missouri Society for Paleontology***

Lemmon S.D. is located on the north edge of S.D., just to the west of the Standing Rock Indian Reservation. It is about 90 miles south of I-94 or about 3 ½ hrs north of Wall, S.D. so it is a little out of the way, but not so far if you going to Montana.

The city has two sites with fossil related material. The first is the Petrified Wood Park in town that was built between 1930-1932 during the depression. It is reported to be the biggest P.W. city park in the world. The park is various structures built from P.W. including a wishing well, a waterfall, a castle, and many cone shaped structures. Some of the cones are made of the wood and others from concretions, dino bones were used in the castle construction. There is also a city museum in the park. It has a variety of antiques and fossils collected located including various dinosaur bones.

The other site is the Grand River Museum, this local museum has a number of displays on local history, Native American & cowboy history, and some displays on Creation Science. It also has parts of several dinosaurs on display that were found locally. This includes the left half of a Triceratops skull, parts of the back end of an Edmontosaurus, along with other scattered dinosaur bones.

If you are passing through the area, it is an interesting stop for a couple of hours. I was told there were places to collect wood in the area (big pieces) but I never found anything bigger than the end of my thumb. But I heard claims of “giant piles” free for the taking (yeah, sure).

# The Iridescent Feathers of Microraptor

***Bob Sheridan March 14, 2012***

Modern feathers have spherical or ovoid bodies a few micrometers in diameter inside the keratin called melanosomes. These contain the pigment melanin. Traditionally there are two types of melanosomes: phaeomelanosomes, which are ovoid or nearly spherical, and eumelanosomes are more elongated. The pigments in the first type are yellow to red, and the pigments in the second tend to be gray or black. About two years ago (Zhang et al. 2010), it was discovered that scanning electron microscopy could be used to inspect the melanosomes (or the spaces where melanosomes used to be) in fossil feathers. Therefore, by looking at the shape and size of the melanosomes, one might be able to reasonably guess the color patterns of fossil birds and dinosaurs.

This week in Science, Li et al. (2012) investigates the plumage of Microraptor. Microraptor is a small dromaeosaur with preserved "flight" feather impressions on the arms, tail, and legs. The last feature gave rise to the idea that there might have been a "four-wing" stage in the evolution of birds. The small size of microraptor also demolished the argument that dromaeosaurs were too large to be bird ancestors.

Electron scanning microscopy of the feathers of microraptor shows melanosomes that are very long: with an aspect ratio ~5.6, i.e. the length of the melanosomes is 5.6 times its diameter. These authors compiled a database of melanosomes from modern feathers. Modern melanosomes fall into more than just two categories. They may have an aspect ratio of anywhere between 1.8 and 5.7, and have a length between 50 to 100 micrometers. The modern melanosomes most like those of Microraptor belong to birds with iridescent feathers. The colors of iridescent feathers are not caused directly by their pigments, but by interference of light reflected within the structure of the feather, much as an oil slick or soap bubble produces colors. The authors reconstruct Microraptor has being black with bluish iridescent highlights, something like a starling or crow. They speculate that the iridescence was used as some kind of sexual display, and they especially make the point that the narrow fan of feathers on the tail as being a reasonable way of displaying the iridescent colors.

Sources:
Li, Q.; Gao, K.-Q.; Meng, Q.; Clarke, J.A.; Shawkey, M.D.; D'Alba, L.; Pei, R.; Ellison, M.; Norell, M.A.; Vinther, J.
"Reconstruction of Microraptor and the evolution of iridescent plumage."
Science 2012, 335, 1215-1219.

Zhang, F.; Kearns, S.L.; Orr, P.J.; Benton, M.J.; Zhou, Z.; Johnson, D.; Xu, X.; Wang, X.
"Fossilized melanosomes and the colour of Cretaceous dinosaurs and birds."
Nature 2010, 463, 1076-1078.

***Ed. Note:***
***See Vol. 1 Issue 1 January, 2012 for two other articles on feathers.***

# Start Scratching: Giant Mesozoic Fleas

***Bob Sheridan March 10, 2012***

Fleas are insect parasites that are specialized for sucking the blood of mammals and birds. Extant fleas are small (a few millimeters), wingless, and narrow from side-to-side (presumably for slipping between hairs). They have very long and robust hind legs and can jump large distances. Genetic evidence indicates the closest relatives to fleas are scorpion flies, which, despite their fearsome name, eat only nectar and pollen as adults.

Huang et al. (2012) describe 9 specimens of fossil fleas from China. These fall into two genera. One genus is from the Jiulongshan Formation in Mongolia (~165 Myr--Middle Jurassic). The other is from the Yixian Formation (~125 Myr--Early Cretaceous) in China. The specimens are preserved as part and counterpart imprints in limestone. One can distinguish male and female specimens. These are not the first Mesozoic fleas discovered, but they are very well-preserved.

These new fossil fleas have a large and broad wingless abdomen, which seems flattened from top-to-bottom instead of side-to-side, and the males have large exposed genitalia. In this they resemble a Mesozoic flea from Australia called Tarwania. All have tube-like "siphonate" mouthparts similar to fossil scorpion files like Mesopsychidae, consistent with the divergence of fleas from scorpion flies.

The new fleas have compact antennae and long legs. However, the hind legs are not specialized for jumping as in modern fleas. The most notable feature of the Mesozoic fleas is that they are very large: 10-21 millimeters long.

The authors suggest that although scorpion flies originated in the Permian, it took until the Jurassic for fleas to appear because it was then that animals began to develop hair or feathers for the fleas to cling to. It was then that the siphonate mouthparts of fleas were adapted for sucking blood instead of nectar. It is not clear what the hosts of the Jurassic fleas would be. The fleas seem too large, and have very robust mouthparts for the mouse-sized mammals around at the time. One speculation that pterosaurs or feathered dinosaurs would be a more likely host in the Mesozoic, and that fleas switched to mammals as hosts in the Cenozoic.

Sources:

Huang, D.; Enger, M.S.; Cai, C.; Wu, H. Nel, A. "Diverse transitional giant fleas from the Mesozoic era of China."
Nature 2012, 483, 201-204.

# The First Complete Dinosaur Skeleton Found in Europe

***Frank Haase***

SPIEGELONLINE (www.spiegel.de/wissenschaft/natur), 12 October 2011, reported the existence of a 135 million-year-old theropod skeleton that is 98% complete. Oliver Rahut, Conservator of the Bavarian State Collection for Paleontology and Geology, says it is the best-preserved dinosaur ever found. Not only that, but it shows traces of skin and fibrous material that is interpreted as hair! This is hailed as the greatest discovery since *Archaeopteryx*. Because of its proportions and the texture of the bones, it is thought to be a juvenile,approximately 28 inches long. The skeleton is said to come from Kelheim, a city at the confluence of the Altmühl and Danube Rivers. Neither the locality nor the date of the find nor its owner has been identified.

The specimen has been given status as a German Cultural Heritage, thereby coming under the authority of the State and preventing export. This has understandably upset some dealers and speculators. Since October, the specimen has been sequestered, supposedly for scientific study.

From the accompanying photograph, the skull, hands and feet are large relative to the body. The teeth seem very small. The cranial bones appear fragmentary or disarticulated. The orbit is occupied by a large sclerotic ring. The hyoid apparatus supporting the tongue is large, about half the length of the mandible. Articulation of skull with cervical vertebrae is a reminder that the swan-neck pose of reconstructions is an artistic artifact.

There seems to be a clavicle. Coracoid and scapula are unfused. The limb bones are short. Terminal phalanges of hands and feet indicate large, sharp claws. The pelvis is small. Visible are ten cervical, ten dorsal, two lumbar, and 59-60 caudal vertebrae. Post-cervical vertebrae are amphiplatyan.

Aside from the mysteries of what is it, where is it, and who has it, I see some problematic aspects of this specimen. It lies curled into a typical death pose on a block of matrix measuring about sixteen by twelve inches. Matrix has been cut away from the bones so they lie elevated on a kind of pedestal. The matrix has been shaved very close to the skeleton, which makes no sense for a specimen believed to have skin and hair. The entire block has been transected by at least seven, fine, horizontal cuts that slice through the skeleton without regard for anatomy. This is aesthetic nonchalance with a vengeance and makes no sense for either the extraction of the slab from the quarry or for purposes of preparation. It looks like the owner had the skeleton professionally prepared as an objet d' art for display rather than for its scientific value. The prominence of the scleral ring of bony plates is anomalous. "The plates are not known in the carnivorous Saurischia…"[1] However, like modern birds, they were possessed by *Archaeopteryx*.[2]

Kelheim is surrounded by Upper Jurassic limestones; the most famous of which is the Solnhofen formation that has so far produced ten birds (unless it pleases you to think of *Archaeopteryx* as a dinosaur) and one dinosaur, *Compsognathus*. This formation dates to about 146-147 mya. The matrix of the new dinosaur as seen in the photograph does not look like Solnhofen stone. If the date given, 135 mya. is accurate, then the mystery dino belongs to the Lower Cretaceous and not the Jurassic sediment of Kelheim.

Altogether there are a number of strange things about this creature, beginning with secrecy about provenence and leading to a mismatch of anatomy, matrix and age. The fact that offhand I don't remember any theropod with a sclerotic ring, nor do I recall any Cretaceous deposit in the vicinity of Kelheim proves nothing. Either the mystery dino is really something special, or it's something suspicious. Unhappily, this question must remain unanswered indefinitely.

References:

1. Romer, Alfred Sherwood, 1956. Osteology of the Reptiles. The University of Chicago Press. pp. 771.

2. Wellnhofer, Peter, 2009. Archaeopteryx The Icon of Evolution. Verlag Dr. Friedrich Pfeil. pp. 208.

# Two Recent Examples of Fossilized Behavior

***Bob Sheridan March 17, 2012***

Fossils that can plausibly be used to infer the behavior of an extinct animal are rare enough that is a surprise to come across two reports about that sort of thing in the same week, in this case from the same journal, PLoS. The first story involves a new fossil from the Solhnhofen limestone in Southern Germany, a classic lagerstatten. The limestone is thought to represent a shallow lagoon in the Middle Jurassic. The fossil as described by Frey and Tischlinger (2012) consists of a gar-like (i.e. "ganoid") fish Aspidorhynchus in contact with a pterosaur Rhamphorhynchus. By "contact", I mean one of the wing bones of the pterosaur is actually between the long beak-like jaws of the fish. The relative sizes of the two are important: the wingspan of the pterosaur is as large as or larger than the length of the fish, which is about two feet. It is common to find fossils where a larger fish had tried to swallow another fish too big for it and died, but this is much more interesting. As icing on the cake, there is a small fish in the throat of the pterosaur. The authors suggest the following scenario: The pterosaur had just finished skimming a small fish out of the ocean, when the large fish plucked it out of the air. The pterosaur was too big to swallow, and the fish's beak was entangled in its wing membrane so it could not easily let go. The fish dove underwater and tried to shake off the pterosaur. This drowned the pterosaur and partly disarticulated its wing. Why the fish died shortly after that is not clear, but the authors suggest it swam into an anoxic water layer in the lagoon and suffocated. Both animals, still locked together, fell to the lagoon bottom. The fossil implies:
Rhamphorhynchus was able to feed by skimming the surface of the ocean.
Aspidorhynchus fed at the surface of the water and perhaps spotted prey above the water.

The second story is about a fossil from the Posidonia Shale near Dotternhausen in southern Germany, which represents another marine lagerstatten, this time from the Early Jurassic. Klompmaker and Fraaije (2012) describe the remains of three lobsters inside the shell of an ammonoid Harpoceras. The ammonoid is about 9 inches in diameter, and the lobsters are about 1.5 inches long. The lobsters seem to be in close contact with each other, touching each other at the tailfan. The authors feel the lobsters walked into the ammonoid shell of their own volition, as opposed to being washed into it as corpses; they are far from the shell opening and they are all oriented "ventral side down". Does each lobster fossil represent an intact corpse or the moulted carapace from an animal long gone? Since there are no large splits up the back of any of the three carapaces, and since lobsters quickly eat their discarded shells after moulting, this would suggest they are not discarded shells. Either the lobsters used the ammonoid shell as a permanent residence, or moved in there temporarily as a place to safely moult, but died before they could do so. Modern lobsters seek secluded spots to moult because their soft new bodies would be very attractive to predators. The interesting thing about this fossil is that three lobsters are living together. Gregariousness in modern lobsters is known, and this is evidence for it as long ago as the Early Jurassic.

Sources:
Frey, E.; Tischlinger, H.
"The Late Jurassic Pterosaur Rhamphorhynchus, a Frequent Victim of the Ganoid Fish Aspidorhynchus?"
PLoS ONE 2012, 7, e31945.

Klompmaker, A.A.; Fraaije, R.H.B.
"Animal Behavior Frozen in Time: Gregarious Behavior of Early Jurassic Lobsters within an Ammonoid Body Chamber."
PLoS ONE 2012, 7, e31893