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EVO NEWS

# Paleontology and Evolution in the News

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Have the dinosaurs so often depicted in nature programs, animated shows and movies, and museum exhibitions lost some of their cachet? Yes, says Neil Genzlinger in a review of a new series *Jurassic Fight Club* (*New York Times*, July 29, 2008, page E3 and www.nytimes.com/television) on the History Channel (http://www.history.com), which also has a dinosaur guide, episode guide, and videos). He indicates that in the early 1990s "thanks to the unlikely combination of *Jurassic Park* and *Barney and Friends*, dinosaur fever swept the land." Youngsters were especially taken with them and it was not uncommon to hear an 8-year-old sounding off the names of all known sauropoda." While this was cute, it eventually became annoying and in time approached dino-mania. In his review Mr. Genzlinger's notes that "*Jurassic Fight Club* makes dinosaurs entertaining again, thanks to convincing computer generated beasts and an over-the-top frontman." The premise of the series is to use paleontological and other evidence to imagine what it must have been like when various kinds of dinosaurs did battle. He exclaims that the fight scene at the beginning of the first show "is a doozy." Want to see some sex? It's all here too, and "awfully engaging." However, Mark A. Perigard's review of the series in the *Boston Herald* (http://news.bostonherald.com) is for the most part descriptive, but he does say that "the first rule of *Jurassic Fight Club* is that everyone gets hurt." Kids will want to watch, but he says "don't let them." One of the battles may be rated R in a movie theater. By the time you read this column the 12-part series will be partly over, but as usual there will be repeats and probably eventual DVD availability.

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The University of Alberta provided the following information to *ScienceDaily* (http://www.sciencedaily.com/releases/2008/06/080612144558.htm) about the partial dinosaur skeleton that was excavated in 1971 in a remote mountain site in British Columbia, Canada. The skeleton was stored until 2004 when the bones were donated to Dalhousie University. Study of the well-preserved dinosaur, the most complete skeleton found in British Columbia and the first found in the Skeena mountain range, shows that there are similarities to other dinosaurs, although an arm bone does not look like one that has been seen before.

Martin Proulx reports in *ExpressNews* (www.expressnews.ualberta.ca/print.cfm?id=8562) that a dinosaur bone bed in southwest Edmonton, Alberta, Canada, which served as a feeding area for the ancestor of *Tyrannosaurus rex*, has revealed that two dinosaurs thought to be living in different times actually lived at the same time. Scientists digging for bones at the site discovered fossils of *Edmontosaurus* and *Saurolophus*, both plant-eating species. Prior to this time these dinosaurs were usually found at two different levels. At the site lots of teeth from the meat-eating dinosaur *Daspletosaurus*, a direct ancestor to *T. rex*, were found, indicating that *Daspletosaurus* used the place as a feeding area. Like most other meat-eating dinosaurs *Daspletosaurus* replaced their teeth every year-and-a-half to 2 years. As their teeth loosened, they "would fall out and get mixed with the bones of the animals they were eating." These animals lived during the late Createaceous time, between 80 and 73 million years ago. Dr. Phil Currie, a University of Alberta paleontologist, calls the bone bed in Alberta one of the best in the world. "There are a few sites in China where they have thick bone beds like this."

In the previous issue, this column reported on a new dinosaur exhibit at the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania. In a news article in the *New York Times* by Sean D. Hamill (*New York Times*, Monday, June

16, 2008, www.nytimes.com) Matthew C. Lamanna, an assistant curator at the Carnegie Museum boasts that their *T. rex* is the superstar of the exhibit. This *T. rex*, the main attraction, is one of the most important examples ever discovered. “What may never be resolved completely is why this 66-million-year-old specimen ended up in Pittsburgh.” This specimen is a holotype, the “first specimen of its kind to be scientifically identified and to which all others found afterward have to be compared.” The Carnegies' *T. rex* was found in 1902 in Hell Creek, Montana, by Barnum Brown, the legendary dinosaur hunter for the American Museum of Natural History. Then in 1941 Mr. Brown found an even more complete *T. rex* and offered the original for sale. Yale University turned down the offer, but the Carnegie Museum jumped at the chance to buy it since it had many dinosaurs but no *T. rex*—and for the bargain price of $7000. The American Museum of Natural History claims that it was sold because the museum was worried that New York might become a bombing target during the Second World War. “But Carnegie officials said that as far as they knew, their Cretaceous creature was sold for financial reasons only.” Considering the fact that the Field Museum in Chicago paid $8.3 million a few years ago for Sue, their *T. rex*, Dr. Lamanna says “for $7000 I think we got the steal of the century—or even in the last 66 million years.”

Once fossils such as dinosaurs are removed from their sandstone environment they begin to deteriorate, especially if soft tissue was preserved. Microbes, as well as temperature, air, and moisture all play a role to alter and degrade the specimens. A mobile laboratory has now enabled scientists who dig for dinosaurs in eastern Montana to chemically analyze fossils the same day they are excavated and before alteration begins (www.sciencedaily.com/releases/2008/06/080606145623.htm). The biochemical lab, originally built by the U.S. Army for use at Superfund sites, is the first of its kind and will be used by paleontologists from Montana State University, North Carolina State University, and the North Carolina Museum of Natural Sciences. The unit contains a clean laboratory that will require users to don lab coats, lab shoes, gloves, and hairnets before entering. The rest of the truck contains microscopes, work stations, and a computer. Next year, it may contain a scanning electron microscope and a mass spectrometer.

Traditionally it was thought that Africa and South America separated from eastern Gondwana—which included Antarctica, Australia, India, and Madagascar—some 138 million years ago. Australian animals were isolated from life on other Gondwana landmasses during most of the Cretaceous because of geography and climate. An article by James Owen for *National Geographic News* on June 10, 2008 (http://news.nationalgeographic.com/news/pf/16627154.html) reports that a rare fossil of an arm bone found in Australia suggests dinosaurs were able to traverse the vast prehistoric continent of Gondwana. The fossil, a 100-million-year-old specimen, belonged to a two-legged meat-eater, or theropod, closely related to *Megaraptor namunhuaiquii*, a giant big-clawed carnivore from Argentina. If this is correct, it means that animals could travel across Gondwana during all of the Cretaceous Period and suggests that Gondwana broke up later than traditionally thought. This alternative interpretation shows that Africa separated first. Other paleontologists are more cautious, suggesting that these sweeping generalizations about biogeography should not be made based on the occurrence of a single bone.

Cat-sized reptiles once roamed Antarctica some 245 million years ago during the Early Triassic. The evidence comes in the form of preserved burrow casts discovered in the Transantarctic Mountains, although no bones were found. The burrows were filled with fine sand deposited by an overflowing river, Jeanna Bryner reports on June 7, 2008 (http://news.yahoo.co/s/livescience/20080608/sc_livescience). The burrows, 14 in. long, 6 in. wide, and 3 in. deep, were inclined, and some are associated with scratch marks. They are nearly identical to tetrapod burrows found in South Africa. One of the South African burrows contained a complete skeleton of an extinct mammal-like reptile *Thrinaxodon liorhinus*. During the Triassic, Antarctica was ice-free with a cool temperate climate, and the animals that dug the burrows were probably using them for protection against the weather. Today, there are no land-based animals living in Antarctica.

*The Bournemouth Daily Echo* (www.bournemouthecho.co.uk/misc/print.php?artid=2335216) reports that Dorset museums in England have scooped a chunk of a £200,000 lottery windfall to boost a Jurassic Coast project. The Dorset County Museums Advisory Service, backed by coastal museums in Dorset and Devon, made a bid called Jurassic Life to the Heritage Lottery Fund for cash to buy and display fossils in museums. “It is very good to see a wide partnership of large and small museums working together to improve their collections and bring new stories and treasures to museum visitors.” The funding will put spectacular, locally discovered fossils in local museums for the benefit of residents and visitors. David Tucker, county museums advisor, said “I think it is marvelous that people will be able to see such startling evidence of amazing animals near the seas in which they once lived.” Richard Edmonds, earth science manager, said “As well as funding the purchase of fossils, the cash will make sure that they are displayed and made accessible to all and there will also be a range of learning programmes and events associated with the Jurassic Life project.” The Jurassic Coast of southwest England was designated a World Heritage site in 2001 due to the continuous exposure of geological strata along a 95-mile stretch of coastline. The cliffs are continually eroding, sometimes in a spectacular way, as evidenced by the dramatic landslide that occurred on May 6, 2008, between Lyme Regis and Charmouth. Of interest is the fact that the boundaries of the World Heritage site run from the top of the cliff down to the low water mark, so as the cliff retreats, the boundary moves with it.

In 2005, Museum Victoria's expedition to the Gogo fossil sites in northwestern Australia, led by Dr. John Long, made some spectacular fossil discoveries, including that of a complete fish, *Gogonasus*, showing unexpected features similar to early land animals. On May 29, 2008 the team announced its latest discovery (http://museumvictoria.com.au/About/MV-News/2008/Mother-fish/): a remarkable 380-million-year-old fossil placoderm fish with intact embryo and mineralized umbilical cord. The discovery, published in *Nature* ((Long, J. A. et al. (2008), "Live Birth in the Devonian" *Nature*, vol. 453, pp. 650–652)), is one of the most significant ever made by Australian scientists, making the fossil the world's oldest known vertebrate mother. It also provides the earliest evidence of vertebrate sexual reproduction, wherein males (which possessed clasping organs similar to modern sharks and rays) internally fertilized females. The fossil has been named *Materpiscis attenboroughi*, meaning "mother firs", in honor of Sir David Attenbourough, who first drew attention to the significance of the Gogo sites in his 1979 series *Life on Earth*. The web page also contains images of the site and fossils.

All those wooly mammoths depicted in natural history museum displays look pretty much the same—curved tusks, long hair, and heavy-footed. Paleontologist Thomas Gilbert, one of the main authors of a study published in the *Proceedings of the National Academy of Sciences*, says there were actually two genetically distinct groups of mammoths that inhabited Siberia. Analyzing sequences of DNA in tufts of hair found in Siberian permafrost, researchers discovered that the two groups diverged genetically about one million years ago. By mapping the geographic distribution of the hair tufts, they found that one group that went extinct about 40,000 years ago lived in a small area of the arctic, while the other group lived in a much larger area until 10,000 years ago. Why the first group became extinct is not known, but speculation is leaning towards disease or climate change. For further information see http://blogs.discovermagazine.com/80beats/2008/06/10/129/.

New fossils of extremely primitive four-legged creatures that close the gap between fish and land animals are described in *ScienceDaily* (http://sciencedaily.com/releases/2008/06/080625140643.htm) from material supplied by Uppsala University. New, exquisitely preserved fossils from Latvia cast light on a key event in our evolutionary history when our ancestors left the water and ventured onto land. Swedish researcher Per Ahlberg from Uppsala University and his colleagues have reconstructed parts of the animals and explain the transformation in an issue of *Nature* (*Nature*, vol. 453, 719: 1199). It has been known that the first backboned land animals—the ancestors of amphibians, reptiles, birds, and mammals, including ourselves—evolved from a group of fishes about 370 million years ago during the Devonian period. What was missing was a fossil that was an example of the intermediate steps in the transition. In 2006, the situation changed dramatically with the discovery of an almost perfect intermediate fish-tetrapod, *Tiktaalik*, but even so, a gap remained between this animal and the earliest primitive tetrapods. New fossils of the extremely primitive tetrapod *Ventastega* from the Devonian of Latvia now cast light on this key phase of the transition. Reconstructions have shown that it is more fish-like than any of its contemporaries, such as *Acanthostega*.

New research shows that the second most diverse group of hard corals first evolved in the deep sea and not in shallow-waters. Stylasterids, or lace corals, diversified in deep waters before launching at least three successful invasions of shallow-water tropical habitats in the past 40 million years. This finding, says Alberto Lindner, a coral researcher at the University of São Paulo, Brazil, provides the first strong evidence that this group of deep-sea animals invaded and diversified in shallow water (http://www.eurekalert.org/pub_releases/2008–06/plos–nsss061608.php). "When we look at the DNA and fossils of these animals, we can trace how these transitions from deep water to shallow habitats have popped up in different parts of the family at different points of time. We also see this story unfold in which the corals are building skeletal defenses, possibly in a long-running arms-race with their predators. Together, it shows us how wrong it is to think of deep-sea ecosystems as being isolated and static."

Joel Schwarz at the University of Washington (*http://uwnews.org*) reports that somewhere in the murky past, between four and seven million years ago, a hungry common ancestor of today's primates, including humans, did something novel. "While temporarily standing on its rear feet to reach a piece of fruit, this protohumanoid spotted another juicy morsel in a nearby shrub and began shuffling toward it instead of dropping on all fours, crawling to the shrub and standing again." A number of reasons have been proposed for the development of bipedal behavior, or walking on two feet, and now researchers from the University of Washington and Johns Hopkins University have developed a mathematical model that suggests shuffling emerged as a precursor to walking as a way of saving metabolic energy. Patricia Kramer, a co-author of the study at the University of Washington, believes that it was an empty belly, along with a need to conserve energy that prompted that early ancestor to shuffle. "There is nothing that will get you to do something you don't want to do other than food. That's why we bribe animals with food to train them." Because there is a huge gap in the fossil record, the study used chimpanzees—humans' closest relatives—as a way of looking into the past and testing other researchers' ideas about the origin of bipedalism. Using a model they devised, the authors calculated it would not be metabolically efficient for a chimp to use bipedalism for distances greater than 50 ft but that it would be efficient, and most shuffling would occur, for distances less than 30 ft. In addition, walking on two feet would be used most frequently for distances less than 3 ft.

In an article published in *American Journal of Physical Anthropology*, University of Arkansas anthropologist Michael Plavacan "takes us one step closer to understanding the relationship between canine teeth, body size and the lives of primates." He states that measuring and testing teeth of living primates could provide a window into the behavior of the earliest human ancestors, based on their fossilized remains. As reported in www.physorg.com/news133709182.html, the premise is that understanding more about the function of canine teeth can lead to new models for understanding human evolution. The author has been studying primate teeth and skulls for 24 years. This study compared the size, shape, and strength of canine teeth from 144 primates with similar measurements taken from 45 carnivores. It found that primate canines are generally as strong as or stronger than carnivore canines and that generally the canines of males and females were equally strong. Although hominids retain body mass sexual dimorphism, the difference in size in canine teeth between males and females is lost. "This goes back to the earliest hominids. In fact one of the few diagnostic characteristics of hominid evolution is reduction in canine size dimorphism while maintaining strong body mass dimorphism."

Researchers from the European Molecular Biology Laboratory's European Bioinformatics Institute have come one important step closer to answering evolutionary questions such as, "What makes a human different from a chimp?" They have uncovered systematic errors in existing methods that compare genetic sequences of different species to learn about their evolutionary relationships (www.sciencedaily.com/releases/2008/06/080619142102.htm). They present a new computational tool that avoids this error and provides accurate insights into the evolution of DNA and protein sequences. The results challenge our understanding of how evolution happens and suggest that sequence turnover is much more common than assumed. Nick Goldman, group leader at the Institute, said "Evolution is happening so slowly that we cannot study it by simply watching it. That's why we learn about the relationships between species and the course and mechanism of evolution by comparing genetic sequences." Findings achieved with the new technique suggest that the letters of the four-letter code that constitutes the DNA are inserted in sequences more commonly than assumed, while frequency of deletions has been over-estimated.