

M.A.P.S *Digest*

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A LOVE OF FOSSILS BRINGS US TOGETHER

February MAPS Meeting

The February MAPS(Mid-America Paleontology Society) meeting will be held in Room 125 of Trowbridge Hall at the University of Iowa on February 10. The regular business meeting will run from 1-2 p.m. followed by a program presented by Paul Liu and Bob McKay (research geologists from the Iowa Geological Survey) entitled "The Middle Ordovician Winneshiek Lagerstätte from the St. Peter Sandstone in northeast Iowa". This is one of the most significant fossil finds in Iowa history (from a paleontological perspective). Don't miss it!

The National Fossil Exposition - Dinosaurs!

March 30 - April 1, 2007
Western Hall, Western Illinois University
Macomb, Illinois

Friday Keynote Speaker: Peter Larson
"The Night of the Living Dead: Reconstructing T. Rex Behavior"

Show Chair - [Steve Holley](#)
Co-Chair - [Gil Norris](#)

Burpee Museum, Rockford, IL
PaleoFest 07
February 17 and 18

Join us for Burpee Museum's 9th annual PaleoFest and discover how some of the nation's top paleontologists use research and technology to piece together the mysteries of the past! Fascinating lectures and fun-filled workshops make PaleoFest a dino-blast for all ages.

- **Lectures** are recommended for ages 10 and up.
- **Family Workshops** are geared towards children and their families

Please go to Burpee.org for more information.

DIGEST CONTRIBUTIONS WANTED

Articles and other materials of paleontological interest are needed for future issues of the Digest. Soft copy in Microsoft Word is preferred. Please email materials if possible to either:

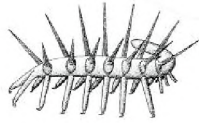
fossilnautiloid@aol.com

cdcozart@aol.com

ABOUT THE COVER

Image by Barry Sutton

This month's cover photo is Devonian brachiopod *Theodossia hungerfordi* found in the Lime Creek Formation, Cerro Gordo member, Rockford, Iowa. The specimen was collected by Barry Sutton and measures 3 cm. A colony of an auloporoid coral and individual *Spirorbis* worm tubes are attached to the brachiopod.



Paleo News Items



Karen Nordquist, ESCONI

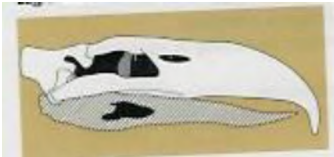
A new Middle Ordovician Lagerstätten in Iowa



New fossil vertebrates and invertebrates including soft tissue have been found in the St. Peter Formation in northeast Iowa in the shale unit of the middle Ordovician. It is a new Konservat-Lagerstätte called the Winneshiek Lagerstätte (after the county where it is located) and reveals a look at a community around the Laurentian seaway. It includes conodonts, eurypterids, jawless fish, and other indeterminate fossils. There is hope that more may be learned of the mysterious conodont animals from

this site. Since 1983 there have been three sites where partial to complete conodont animals have been found – the Lower Carboniferous of Scotland, the Silurian of Wisconsin and the Upper Ordovician of South Africa. Although some of the features found in those three sites like the large eyes and notochord lines seen in Scotland and the V-shaped muscle lines seen in Wisconsin have not been found at this new site, there are wrinkles and spine-like structures that may be similar. More fossils may prove to show more consistencies with the other sites. The photo shows one of the assemblages with one pair of elongate elements surmounted by a connected series of small denticles, and two pairs of elements bearing larger discrete denticles. (Liu et al in *Geology* Nov. 2006)

Huge Terror Bird Found in Patagonia



The top predator in South America for millions of years was a bird that was very much like a *T. rex* in appearance (big head, short arms, long legs) according to John Flynn of the American Museum of Natural History in New York (formerly of the Field Museum). He is talking about the terror bird that finally died out about 2 MYA.

A new skull has been found in Patagonia that reveals them as bigger and faster than was thought. Luis Chiappe reports on the find as a member of the Phorusrhacid family of large headed warm blooded very active birds. It stood over ten feet tall and was probably as fast as a greyhound and could easily compete with the dog-like mammalian predators and lion-like marsupials around at the time. The skull measured 28 inches long, 10% longer than any other known. It had a long tapering beak with a curved hook at the end. (Chiappe in *Nature*)

Museum Now Offers PhD Program

The American Museum of Natural History in New York has now established the Richard Gilder Graduate School and established a PhD granting program in comparative biology within the Museum. This is the first time an American museum has been granted the authority to award its own PhD degree. The program covers the origins, history and range of life on Earth and is grounded in the Museum's scientific resources including its collections, of more than 30 million specimens and cultural artifacts, its independent natural history library and staff of curators who will serve as faculty. (amnh.org)

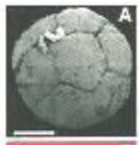
New Fish Fossil on Line to Tetrapods – *Gogonasmus*



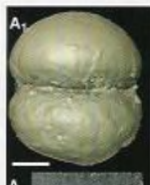
First they found only a part of the fish – the snout and part of the skull – and then they found a complete fossil last year in the limestone of Western Australia. The animal had the middle ear and limbs of a land vertebrate, making it a very important specimen. It was found in the Gogo Formation buried in layers of shale and was named *Gogonasmus andrewsae*. It had a big hole in its head called a spiracle opening, the cavity leading down into the gill chamber used for breathing, which is thought to be the forerunner for the

middle ear in modern land animals. There was also the beginnings of a wrist joint and a complete front fin with the same arm bones found in other vertebrates – the humerus, radius and ulna. The fish is about 12 inches long and was an ambush predator. It could push off with the bones in its front fins. It calls for a reshuffling of the evolutionary lineup of fish to land animals with *Gogonasmus* closer to tetrapods than *Eusthenopteron*, another fish with tetrapod features. It had less advanced front limbs than *Tiktaalik*, the most amphibian-like fish so far found. The line-up is getting more interesting. The photo above shows a model. (Long et al in *Nature* Vol. 443 10/19/06)

Ancient Animal Embryos Found in China



James Hagadorn and associates claim to have found many embryos of early animals at a Chinese site in the Doushantuo Formation in China. They are dated to the Late Precambrian (635 – 551 MYA) and include blastulae, gastrulae, larvae, and minute adults in the deposit. There are also many problems caused by taphonomic and diagenetic processes with postmortem decay, organic matter degradation, dissolution and other developments. There were several techniques used including x-ray computed tomography (CT) with scanning electron microscopy (SEM), transmission electron microscope (TEM), and thin section petrography to study the morphology in three dimensions. The first photo shows a SEM photo of a 16 cell embryo and the lower shows a two cell embryo. They studied 162 fossils and the internal embryos ranged from a few to 1,000 cells. (Hagadorn et al in *Science* Vol. 314 10/13/06)



Monster Pliosaur Fossil Found Off Norway

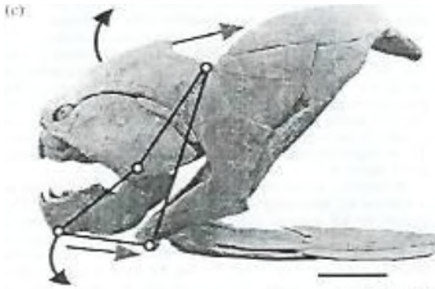
A 150 MY old graveyard has been located off an Arctic island near Norway. In 11 days they found the remains of 28 plesiosaurs and ichthyosaurs and among them is one that is very large indeed. Joern Hurum from the University of Oslo estimates the pliosaur to be 33 feet long. At the time, these animals were swimming several hundred miles further south nearer to where Oslo is now. They believe that the skeleton is fairly complete with vertebrae as big as dinner plates and teeth as big as cucumbers ([www.msnbc](http://www.msnbc.com) and Time).

Traveling Lucy is Causing a Stir



The famous Lucy fossil is stirring things up. She is the famous 3.2 MY old fossil skeleton in Ethiopia that the government is thinking of sending on a tour to the Houston Museum of Natural Science in 2007. The tour will consist of Lucy's actual bones and some 200 other artifacts and may tour other cities in the US. The skeleton is 40% complete and is currently kept in a vault in the basement of the Ethiopian National Museum in Addis Ababa. Many scientists agree that bones of this significance should not travel, but should be kept safe and available for research. But others argue that a traveling exhibit can bring much needed funds to the home country and raise its profile. Another example mentioned was that Kenya was planning to send the *Homo erectus* fossil, Nariokotome Boy to the Field Museum in exchange for the Tsavo lions – a report that stunned Neil Shubin of the Museum. No such deal had been proposed and there was no plan to return the lions. The real Lucy would not be welcome at the American Museum in New York nor at the Smithsonian out of concern for the remains, but Ethiopia is hoping for a ten city tour that will generate \$5-\$6 million. Even Meave Leakey wonders why this is being done. If people can see the fossils in the US, why would they come to Ethiopia? (Dalton in **Science** Vol. 444 11/1/06)

Big Bite from a Big Fish – *Dunkleosteus*



A new study out on this fascinating fossil fish shows that this was a predator to deal with in the Devonian 415-360 MYA. This Placoderm or armoured fish dominated its ecosystem with its bladed jaws and rapid mouth opening as shown in a new report from the University of Chicago and the Field Museum. The researchers developed a biomechanical model to show the force and motion during feeding of this fish that revealed a highly kinetic skull with a four-bar linkage system as seen in the photo above during opening (scale bar is 20 cm). This allows the fish to open its mouth very rapidly similar to modern fish that use suction to capture prey. The powerful jaw closing muscles are very strong with an estimated bite force of 4400 N at the tip of the jaw and over 5300 N at the rear of the plates. The high force is focused into a small area of the fang tip or the blade edge so that it could puncture and fragment hard materials. These are based on a large fish at 6 meters long and 1,000 kg. This would make it the most powerful for all fish living or fossil and one of the most powerful for all animals. The only larger bites are from large alligators and dinosaurs. Other animals found with the placoderms included ammonites, sharks and arthropods, all with hard shells and speed. This would mean that *Dunkleosteus* was a well prepared predator for its environment. (Anderson & Westneat in **Biology Letters** 2006)

Speculations on the Future of Paleontology

By John A. Catalani

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So, now that the new millennium is finally here (I have consistently maintained that, since there was no year "0", the new millennium didn't begin until January 1, 2001), what direction do you think paleontology should take into the 21st century? I am sure that some believe the future of paleontology lies in adapting the latest computer technology to the analysis of data collected (you know, fossils). While the computer is a useful tool, I certainly do not believe that computers or sophisticated mathematical algorithms alone are the answer. As you probably know from reading these somewhat biased essays, I have a real concern with the use (overuse?) of such new technologies in both education and paleontology. Let me be specific, I have nothing against new ways to analyze previously collected data but I do not believe that such rehashing of old data over and over ad infinitum is the way in which paleontology can remain viable. Additionally, we need to make paleontology attractive to those students who are inclined toward science careers so that they choose paleontology over other science-related professions thereby continuing the lineage of dedicated professional paleontologists.

In my opinion, we can insure that significant advances in paleontology will continue by following two paths: the constant supply of fossils that can only be accomplished by aggressive collecting in the field and thoughtful speculation that arises from insightful human analysis of the fossil specimens collected. And it is gratifying to see that at least one professional is advocating a similar direction for paleontology. Jere Lipps has recently published several essays in the electronic journal *Palaeontologia Electronica* that outline his assessment of the direction paleontology should take in the future. Now before you look up at the by-line to make sure you are reading the correct essay, let me assure you that, yes, I do keep up with paleontology on the Internet. The latest advancement is electronic journals that have circulation restricted to the Internet, although I have always preferred, and always will prefer, paper-based journals both for their convenience of reading anytime/anywhere and their portability in the field.

Despite my preferences, I am certainly not anti-computer having employed one (ancient by today's standards but still in use in my home office since after this much time the machine and I are as one) before the Internet was popular to catalog both specimens and collecting localities. My family's latest machine even allows us to compose word documents by speaking into a microphone connected to the tower. Although I have yet to employ this vocal capability (I compose all of my essays using the traditional keyboard), I expect, with my Alan Grant-type luck with computers, to get the same reaction Scotty did in *Star Trek IV* when he said, holding the mouse like a communicator, "Hello computer!"--total silence. I did, however, use one of the software packages that was included to design and print my own business card complete with a cute little nautiloid graphic.

I had previously accessed the *Palaeontologia Electronica* website and was quite pleased that the premier issue included an article on ammonites--close enough to nautiloids to peak my interest--as well as, believe it or not, a "movie" of endoceroid nautiloids swimming. I must admit, although contrary to my personal preference of paper-based journals stated above, that the advantages of an electronic journal in terms of virtual instant distribution and fast turnaround time for papers makes the delay in the distribution of traditional journals seem archaic by comparison.

Each issue of *Palaeontologia Electronica* contains several editorial essays that always provide me with thoughtful comments on the state of paleontology and Jere Lipps is a frequent contributor--two essays by Lipps (2000a; 2000b) provided the incentive for this essay. I had previously met Jere when he spoke at the 2000 MAPS EXPO. So it was with interest that I read his two essays in the electronic journal. The future of paleontology is obviously a topic of concern to not only professional paleontologists interested in furthering the science (and maintaining a job market) but also amateur paleontologists who are also interested in promoting the science but are additionally concerned with access to our collecting sites (since most of us do not have professional credentials that often assures access) that are increasingly shrinking in number due to governmental, insurance, and other factors--after all, our passion centers around the *collecting* of fossils.

In his first essay, "New Millennium Paleontology", Jere reasons that the future of paleontology will involve a "heavy dose of creativity". He then proceeds to outline several requirements for creativity such as imagination and contemplation. I was delighted that the creativity Jere was calling for seemed to parallel the freethinking speculation that I have championed in several of these essays. In addition, Jere indicates that one of his requirements, new ideas, can come from a variety of sources that includes new field data (collecting), new interpretations (speculations based on the data), and new technologies and equipment (computers and other technologies can greatly assist in the process of analysis by efficiently number-crunching the data). New data can also include, of course, a reexamination of existing specimens. This is precisely what happened when John Ostrom examined a specimen that had for years been labeled as a pterosaur in the Teyler Museum in Haarlem, Holland, and recognized it as a previously unidentified specimen of *Archaeopteryx*. We can only imagine the exhilaration John must have felt when he made the connection--what a special moment.

Jere continues this theme of creativity in his second essay, "Creative Paleontology". Here he cautions that creativity should involve an open-minded attitude (and maybe a bit of chutzpah in proposing new ideas) as well as multiple hypotheses so that creativity is not limited or conservative.

As I see it, if we want to encourage our brightest students to consider paleontology as a career choice we inspire them by maintaining and promoting the free expression that leads to the type of creative speculation that excites the imagination. (Needless to say, such speculation must be derived from an analysis of real specimens and other paleontological data.) Speculation is where a scientist's individuality and creativity can be accessible so that colleagues can consider and evaluate his conclusions--a process that will, in turn, hopefully serve as an incentive to foster additional fieldwork, research, and revised speculations by those scientist's that both agree and disagree with the original conclusions. In fact, speculation is often an incentive for many of us to do a bit more research on a topic that is not all that familiar to us.

Case in point. I obviously have an affinity for invertebrate fossils, particularly nautiloids (but you knew that, didn't you), for several reasons. Growing up in the mid-west (specifically northern Illinois) more or less determined the direction my collecting would take--not many dinosaurs in Illinois. Additionally, as I found out later in my career, the care and feeding of invertebrates is a whole lot easier than for vertebrates particularly those high-maintenance dinosaurs. However, the recent discovery of feathered dinosaurs and primitive birds in China and the growing debate over the origin of birds provided me with incentive to compose an essay on this topic (Catalani, 1999). I was intrigued by both the photographs of those beautifully preserved fossils and the possibility (now almost a certainty) that theropod dinosaurs gave rise to the birds.

And now for the particular example of speculation that started my thought process and resulted in the essay you are now reading. During one of my literature searches at a college library, I came across a paper (Jones et al., 2000) that reexamined one of those recently discovered feathered dinosaurs. The article concerned *Caudipteryx*, originally classified as a feathered but flightless (symmetrical feathers) theropod dinosaur. Using hind limb length, tail length, and center of mass, the authors compared *Caudipteryx* to “true” theropod dinosaurs and to present-day cursorial (ground-dwelling/flightless) birds. Interestingly, the evidence pointed to a closer relationship between *Caudipteryx* and extant cursorial birds than to theropods. Now, since present-day flightless birds evolved from ancestors that could fly, it seems reasonable to assume, so say the authors, that *Caudipteryx* also evolved from ancestors that could fly. The authors then proposed three speculations about *Caudipteryx* (the first two have, I believe, been previously suggested): 1) that *Caudipteryx* was in fact a ground-dwelling theropod with a suite of avian-type anatomical adaptations; 2) that *Caudipteryx* was a theropod descended from some unknown ancestor that possessed the ability to fly; 3) that *Caudipteryx* was in fact a Cretaceous cursorial bird derived from an earlier bird ancestor that possessed flight. This latter speculation, that *Caudipteryx* was secondarily adapted for a flightless lifestyle (which the authors state, in classic scientific objectivity, “deserves closer scrutiny”), would also seem to address one criticism of the bird-from-dinosaur scenario--that these feathered theropods that display what appears to be bird-ancestor characteristics are found in rocks millions of years *younger* than the first recognized true bird, *Archaeopteryx*. According to the authors, at least for *Caudipteryx* the answer makes perfect sense--they aren't bird-ancestor holdovers, they are in fact true birds. I'm sure you will agree that this third interpretation demonstrates paleontological speculation at its best. Could this conclusion eventually be proven wrong? Certainly, but that's immaterial at this point. It is the mere proposal of such an idea that will spark interest in the further analysis of these specimens and provide the motivation for continued collecting and research.

It is this type of creativity that Jere Lipps, in his “New Millennium Paleontology” essay, refers to as an idea that the rest of us, upon reading it, say, “I already thought of that!” That may be, but it was these authors that investigated the specimens and had the chutzpah to publish their speculations based on their interpretation of the evidence. I place such speculations, for those of us with less foresight, in the category of, “Oh, sure. That makes sense. Why didn't I think of that?”

As Jere says: “Creativity cannot be forced. Either people have it or they don't.” And in the next paragraph Jere states, “Creativity, then, requires certain kinds of people. They are commonly dedicated yet bold, thorough yet daring, careful yet adventuresome, knowledgeable yet mischievous, and practiced yet visionary. All too often, science training quells creativity because we do not allow adventure and risks in our labs or field areas, either for ourselves or for our students. We should be pushing the envelope all the time and bringing our students along with us. They need a certain free hand and encouragement to succeed, just as we do.”

It is thoughtful, creative speculation, therefore, that provides the ideas and incentives needed to further research and keep paleontology viable--a continuation of the freethinking tradition that has been a hallmark of paleontology throughout its history. Additionally, it is enticement needed to motivate students to consider a career as a paleontologist. As amateurs, students, or professionals, we can either agree with the interpretations presented in the literature and climb on the bandwagon or disagree and perform our own research to prove it wrong.

You can crunch numbers in any new way that comes along using every trendy algorithm available but ultimately it is the human imagination that makes paleontology a dynamic and exciting science. Together, the joys of collecting fossils in the field and the satisfaction of creative speculation cannot fail to provide a springboard that will propel paleontology into the 21st century and beyond.

REFERENCES

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- Jones, T. D., Farlow, J. O., Ruben, J. A., Henderson, D. M., and Hillenius, W. J. 2000. Cursoriality in bipedal archosaurs. *Nature*, 206:716-718.
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- Lipps, J. H. 2000b. Creative Paleontology. *Palaeontologia Electronica*, 3(2), 4p.
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New MAPS Website Up and Running

MAPS has a new website designed by Dave Board of Board Media Group and maintained by MAPS webmaster Charles Newsome. The site has pages for news, about MAPS, Fossil EXPO, Joining MAPS and contact information.

Our new address is <http://www.midamericapaleo.org>

Please take a moment to check it out.

Webmaster Charles plans to add a new page to post photos from MAPS filed trips. MAPS member should forward their photos to Charles at charles-newsom@uiowa.edu. Charles will include the names of the photographers with the photos.

Charles would also like MAPS members to submit photos of the best fossil that they have found on a MAPS filed trip. Charles plans to make a gallery of "Best finds" in the form of clickable thumbnails. Charles will select the best fossil from each field trip and the winning fossil and its finder's name will be posted to the "Best Finds" page. Winners will be awarded a free beer and pizza dinner at Charles' place after each field trip. For past trips, Charles will choose one winner per trip.