M·A·P·S Digest

Official Publication of
Mid-America Paleontology Society

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Oct. – Nov., 2007

January

The January MAPS (Mid-America Paleontology Society) meeting will be held in Room 125 of Trowbridge Hall at the University of Iowa on January 12. The regular business meeting will run from 1:00-2:00 p.m. followed by a program by Brian Witzke of the Iowa DNR on the Pennsylvanian material in the Klein Quarry (Devonian bedrock) in Coralville.

February

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 by Bill Hickerson on the fossils of the Cedar Valley Formation. (Bill is familiar to many of you for his work on the Silurian soft-bodied fauna from Eastern Iowa)

ABOUT THE COVER

This month's cover photo is of a 2 1/2" x 2" plate from the upper Ordovician Mifflin Formation from Dixon, Illinois. On the left is gastropod *Trochonema beloitense*. On the right is gastropod *Lophospira serrulata*. Monoplacophoran "*Scenella compressa*" (Tentative name) is perched on the *Lophospira*. A small cephalopod is at the top of the piece.

Note the detailed ornamentation preserved on theses mollusks.

Photo by John Catalani.

National Fossil Exposition XXX

Spnsored by

Mid America Paleontology Society (MAPS)

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2007/11 DUES ARE DUE

Are your dues due? You can tell by checking your mailing label. It reflects dues received by December 8, 2007. The top line gives the expiration date in the form of "year" followed by "month" – 2007/11 means 2007/December. Dues cover the issue of the Digest for the month in which they expire. We do not send notices but will let you know if you are overdue by highlighting your mailing label and stamping your Digest. We carry overdues for two issues before dropping them from our mailing list.

Please include on your check your due date and name exactly as it appears on your mailing label - or include a label.

Dues are $20 per U.S./Canadian/Overseas household per year. (Non-U.S. members: Please send a check drawn on a United States bank in US funds; US currency; a money order; or a check drawn on an International bank in your currency.) Library/Institution fee is $25.

Make check payable to MAPS and mail to:
Sharon Sonnleitner, Treas.
4800 Sunset Dr. SW
Cedar Rapids, IA 52404

SEND UPDATED INFO FOR DIRECTORY

The MAPS Directory is an important tool for many MAPS members, and it's much more useful if member information is up to date. So please check your information. Are your address, phone (including area code), zip, and blurb all correct. If not, please send updates to the Treasurer by March 1, 2008. (If you have changed address/phone since the 2007 Directory was published and already notified the Treasurer, you do not need to resend.)

Sharon Sonnleitner, Treas.
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Expo information will be mailed in the December Digest in mid-December.

MAPS BOARD & REGULAR MEETING – NOVEMBER 10, 2007

Board Members Present: Marv Houg, Charles Newsom, Dale Stout, Steve Holley, Allyn Adams, Chris Cozart, John Catalani, Sharon Sonnleitner

There were no minutes from the last meeting.

Treasurer Sharon Sonnleitner reported balances of $1, 977.39 in checking and $$17,273.68 in savings. Motion was made by John and seconded by Chris to accept the treasurer's report.

DONATIONS: Following discussion on the Expo auction receipts, it was resolved to:

Reallocate funds to give PRI $500, up the Strimple donation to $250, keep the Paleontology Society scholarship donation at $2,500, and keep the University of Iowa at $500. (Motion by John; second by Charles; carried unanimously)

Proceeds from the auctioning of the dinosaur dig trip will be allocated with donations from 2008, after the winner has taken the trip.

EXPO: It was noted the University price jumped $1100 in 2007 due to overtime. Any work that is done on the weekend is billed as overtime and is not covered in the advance payment.

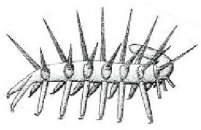
Tom Williams, who will be the 2009 Expo chair, has William I. Ausich lined up as the 2009 keynote speaker on crinoids, which will be the theme in 2009.

A new clause in our current contract with the University states "No animals are allowed in the facility unless medically necessary. If animals are found within the facility, the owner will be responsible for removing such animal from the facility. Failure to comply will result in the Office of Public Safety being called and assisting the owner in removal of said animal."

MISC: Marv brought attention to a notice from the IRS sent to Karl Stuekerjuergen regarding a new requirement to file an Annual Electronic Notice by the 15th day of the fifth month after the close of our tax period each year beginning after December 1, 2006. Sharon retained the letter.

Steve is the new webmaster.

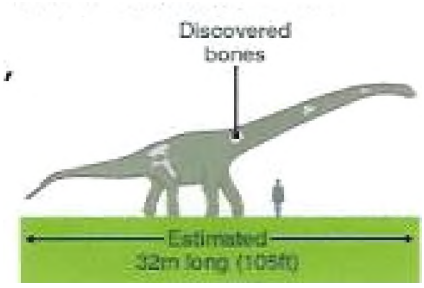
Respectfully submitted, Sharon Sonnleitner, Acting Secretary



Paleo News Items

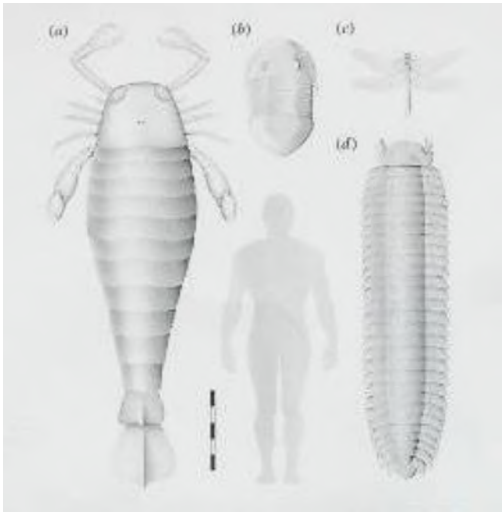
By Karen Nordquist

Another Huge Sauropod Found in Argentina – *Futalognkosaurus*



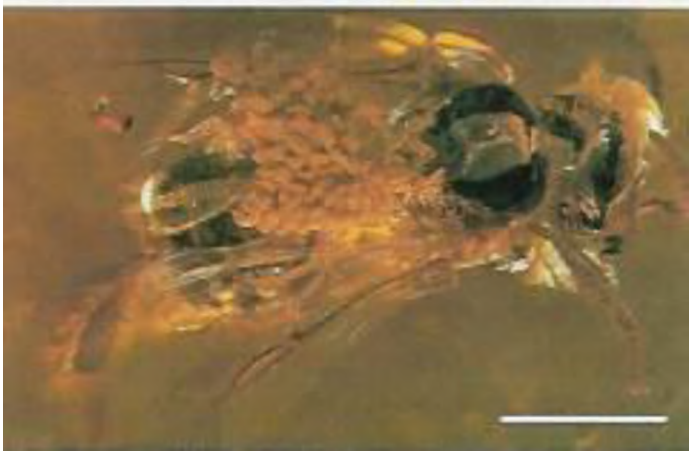
This one is a titanosaur that lived some 88 MYA and is believed to have measured about 105 ft (32 m) long. That is a big one. Its name means "giant chief of lizards" in the language of the Mapuche Indians for whom it is named *Futalognkosaurus dukei* (pronounced foo-to-long-koh-sohr-us). The genus name is for Duke Energy Argentina which helped to fund the excavation. The skeleton was found in Patagonia in 2000 and consists of neck bones, hip bones, back bones and the first tail bone. The neck alone would have been about 56 feet long with a tail about 49 feet long and the dinosaur would have stood about 43 feet tall. One neck vertebra was over three feet high. Because the structure of the neck appears to be unique they believe that it is a new species. They believe that it was washed into a river and created a barrier because there were some 1,000 remains of other plants and animals found along with this dinosaur. Keep in mind that this would compare to other fossils of *Argentinosaurus*, and *Supersaurus* and *Seismosaurus* in North America of about the same estimated length. (Calvo et al in **Annals of Braz Acad of Sci**)

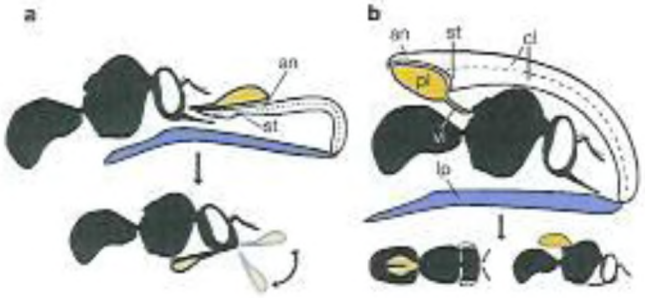
Largest Eurypterid Found – *Jaekelopterus*



Gigantic arthropods are always of interest and so the finding of a gigantic claw of a eurypterid (sea scorpion) is no exception. The claw (chelicera) is 46 cm (18.1 in.) and was found in the Early Devonian Willwerath Lagerstatte of Germany. This would mean that the animal was about 2.5 meters (8.2 ft.) long or the **largest arthropod** ever to have evolved. The picture at the left shows (a) *Jaekelopterus rhenaniae*, (b) the trilobite *Isotelus rex*, Late Ordovician, Manitoba, Canada, (c) the dragonfly *Meganeura monyi*, Late Carboniferous, France, (d) the millipede *Arthropleura armata*, Late Carboniferous, Europe. Scale bar = 50 cm. Included is the image of an average human male. The higher oxygen level is the usual explanation for the larger size for land animals, but it is harder to explain the larger sea creatures. These predatory chelicerates have been known to have been the largest extinct arthropods and are probably the aquatic sister group of scorpions or possible all arachnids, including the largest extinct spider, *Megarachne*. Over 40 pterygotoid species are known from all continents except Antarctica ranging from 428 to 391 MYA and were most diverse in the Late Silurian. They were at the top of the food chain for about 37 MY with their powerful first pair of appendages – their chelicerae – or prey catching organs. Factors affecting their large size might include predation, courtship behavior and competition. The authors believe that this large eurypterid is a derived form because of its later appearance in the fossil record and its larger size therefore would follow Cope's Rule. (Braddy et al in **Biology Letters** 2007)

The Origin of Orchids Based on a Fossil with its Pollinator





What is the most diverse plant family on Earth? It is the Orchidaceae or orchid family. But it lacks a definitive fossil record explaining its evolutionary history. Now there is a fossil from the Miocene amber of the Dominican Republic of the well preserved orchid pollen of *Meliorchis caribea* on the body of an extinct sting-less bee, *Proplebeia dominicana*. It is pictured at the left. This is the first clear fossil of the orchid family and the first direst fossil observation of the interaction of the plant and its pollinator. Darwin would have loved it, knowing his love of orchids and their pollinators! The position of the pollen on the bee made it possible for the researchers to make inferences about the structure of the flowers of *Meliorchis* even though they did not have the flower itself. Here the pollen is not attached to the mouthparts of the bee but to the dorsal surface of the thorax indicating that the flower was gullet-shaped. This meant that the bee would have had to enter the flower completely to reach the nectar as seen in (b.) at left. The drawing (a.) at left shows a bee with a modern orchid *Goodyerinae* and where the bee would get pollen on its mouthparts. The study of the pollen now allows them to calibrate a molecular phylogenetic tree taking orchids back to the Late Cretaceous (76-84 MYA) in origin. Their dramatic radiation would have begun shortly after the K/T boundary. (Ramirez et al in **Nature** Vol. 448 8/30/07)

Psittacosaurus Dino Herd Found in China

A herd of baby *Psittacosaurus* dinosaurs has been found in China that sheds light on their social behavior. The six juveniles were found together and may have died from a sudden volcanic mudflow. They are in the Yixian Formation in northeast China. They are of different ages and not from the same parents and may be from a nursery or family grouping. They are probably aged from one and a half to three years old, measuring about 1.6 feet long and weighing about two pounds each. Adults would have been about 6.6 feet long and would have weighed about 62 pounds. They are dated to about 130 – 100 MYA. These beaked dinosaurs did not have horns or frilled like their relatives the horned *Triceratops*. (Barrett et al in **Palaeontology** Sept 2007)

Paleontological CSI

By John A. Catalani

I truly enjoy paleontology as well as trying to come up with catchy titles for these essays. My love for all aspects of paleontology is not exactly headline news to my friends, fellow collectors, and loyal readers. Not surprisingly, as befits my amateur status, my first love and primary interest in the science involves field collecting. It is clearly what motivates us amateurs and is how most professionals became interested in paleontology in the first place. The number of shoeboxes or plastic fishing-lure cases that have been filled with fossils collected by young "fossil hunters" must number in the thousands (millions?). But for many amateurs, myself and many of my collecting friends included, this is not enough. Early in my "career" I realized that, to truly appreciate and participate in the science of paleontology, one must delve into the meaning of fossils and what they tell us about the larger picture of the evolution of life on Earth.

One of my interests in paleontology that keeps me involved (despite the deplorable lack of recent access to some of my favorite collecting sites) is the deductions and speculations about the lifestyles and behaviors of extinct animals gleaned from the meager evidence of body fossils that are often poorly preserved and/or incomplete. Fortunately, associated data, such as the type of sedimentary rock in which the fossil is preserved, as well as more esoteric studies, such as those involving certain isotopes, aid in our assessment of the life habits of the living animals that have been left for us as fossils to collect and study. It's a bit like that television program CSI in which the forensic evidence always leads to the correct answer about the crime (although these scientists have it easy since they have the organic bits to work with and paleontologists rarely experience this luxury). Coincidently, in a recent issue of *Geology* there are two articles that use isotopic evidence to deduce lifestyle characteristics of several types of organisms. In the first (Jahren et al., 2003), the authors utilized carbon isotopes and, by comparing these to present day organisms, were able to detect lichen-type metabolism in the Devonian fossil *Spongiophyton minutissimum* and identify it as a true lichen rather than a bryophyte as it had previously been identified. In the second (Moriya et al., 2003), the authors compared oxygen isotopes in Late Cretaceous planktonic and benthic forams to that in ammonoids preserved in the same strata and concluded that the ammonoids were nektobenthic but that they did not engage in short-term (usually diurnal) vertical migrations as does *Nautilus* today.

Needless to say, the group that has benefited the most from such investigations is the dinosaurs. Now I have nothing against dinosaurs. But the amount of press and number of documentaries dinosaurs get is enormous compared to other organisms. Clearly, nautiloids are much more interesting and could provide hours of entertaining programming on PBS or the Discovery Channel. (There was a nice segment on *Nautilus* and the nautiloids in Episode 6 of *The Shape of Life* series on PBS.)

Three of the more significant aspects of dinosaur paleontology that have garnered much deserved public interest involve the nesting behavior of certain dinosaurs, the endothermic theory of dinosaur metabolism, and the discovery of feathers on some small non-avian dinosaurs. Jack Horner's discovery of hadrosaur nesting sites in Montana gave us a new view of the reproductive and social behavior of at least one group of dinosaurs. The arrangement of the nests in colonies, along with the evidence that the juveniles stayed in the nest for a time, placed dinosaurs, at least this particular hadrosaur, on a behavioral par with birds and mammals--they apparently cared for their young. Our view of dinosaurs would be forever altered based on the postmortem (see, I actually used some CSI jargon) scientific evaluation of this one site. Since then more evidence in the form of additional nesting sites, such as the Patagonian sauropod egg site, has surfaced. Additionally, a reinterpretation of the first dinosaur-nesting site, discovered by Roy Chapman Andrews and his

expedition to the Gobi, contradicts the original assumption that *Oviraptor* was stealing (hence the name) *Protoceratops* eggs. Recent finds in the Gobi have shown that the eggs actually belonged to *Oviraptor* and that occasionally an *Oviraptor* parent is fossilized near the nest protecting, not stealing, the eggs.

Dovetailing with this is evidence that was accumulated slowly over many years (much of which actually paralleled today's forensic techniques such as bone thin sections) concerning the possibility that many dinosaurs may have been endothermic (or at least homeothermic). John Ostrom and Bob Bakker, among others, were proponents of this theory, which is still debated today. John's discovery of *Deinonychus*, a larger relative of *Velociraptor*, provided evidence, based on a careful analysis of the structure of the skeleton (another CSI technique), for an animal that must have had a very active lifestyle and, therefore, a high metabolism to maintain said lifestyle. *Deinonychus* was powerful evidence for a quick, agile dinosaur that contradicted the old, traditional view of dinosaurs as overgrown, sluggish and swamp-bound reptiles.

Another related theory, one that can be traced back at least to Thomas Henry Huxley and O. C. Marsh, involves dinosaurs as the ancestors of birds. The skeletal anatomy of many small dinosaurs is very similar to today's birds and to *Archaeopteryx*--a fact evident even to scientists working years ago without the benefit of present day forensic and cladistic techniques. If a specific group of dinosaurs was the ancestor to birds then they were probably endothermic and if this was true they should be equipped with some type of insulation--all small endotherms today sport insulation be it feathers or fur. Enter the Chinese dinosaur/proto-bird/bird fossils with preserved feathers. Although some of these feather imprints are asymmetrical indicating that the animal could have used them for powered flight, most feathers associated with the non-avian dinosaurs were most likely used for insulation and/or display. I love it when evidence collected to prove one theory can also be used to support or introduce others.

In my opinion, it would seem to be a bit easier to accumulate evidence for invertebrate lifestyles and behavior since one often finds not only the entire body fossil of the animal but also, occasionally, mono-specific deposits that contain enormous numbers if individuals often representing a coherent population (there are, of course, several dinosaur sites that also contain numerous individuals). As I wrote previously (Catalani, 1998), analysis of such populations for ammonoids has led to several conclusions concerning their reproductive activities. When dealing with populations of organisms it is beneficial to determine if the two sexes can be identified. Sexual dimorphism has always fascinated scientists particularly when dealing with birds. The plumage of males is often much more extensive and colorful than that of females thus facilitating sexual selection as a process of microevolution. However, such clear evidence is often lacking in the fossil record for obvious reasons although specimens of *Confuciusornis*, one of the Chinese feathered fossil species, exhibit two forms with differing plumage undoubtedly male (much longer tail feathers) and female.

When dealing with invertebrates, any sexual dimorphism is usually reflected in the size and/or shape of the shell. For ammonoids, sexual dimorphism is much easier to identify for Jurassic and Cretaceous true ammonites than for Paleozoic and Triassic ammonoids. Evidence, such as preserved shell structures as well as presumed fossilized eggs, strongly suggests that specimens identified as macroconchs were female which, as the mane implies, were many time larger in size that the males represented by shells termed microconchs.

As stated above, determining dimorphism in pre-Jurassic ammonoids is much more difficult. However, using large populations, two distinct forms are often identified differing not so much in size as in shell shape--frequently one shell type is compressed while the other is depressed. Unlike true ammonites, however, it is unclear which form is female and which is male. Such slight

differences are similar to dimorphism in *Nautilus* in which the males have somewhat larger shells with wider apertures (to accommodate the spadix, a male reproductive organ) than females. Further analysis of several ammonoid assemblages has led to the speculation that these deposits represent post-spawning mass mortalities similar to the reproductive behavior of many coleoids today.

I will now present some evidence for nautiloid lifestyles (admit it, you were holding your breath waiting for this, weren't you?) that I have tentatively inferred from my personal collection. The lower Upper Ordovician rocks of the Platteville Group (northern Illinois and southern Wisconsin) that I study preserve a diverse and abundant nautiloid fauna. Small, curved, usually compressed forms (oncoceroids to true believers) are the most common types present. After collecting hundreds of such forms, identifying the published "species", and pouring over the Treatise, I realized that two species of *Richardsonoceras* might in fact be sexual dimorphs. These two species occur in about equal numbers and are the only common species of this genus (some others previously assigned to this genus may not be valid) preserved in Platteville rocks. One form, *R. simplex*, is a very compressed ("thin") form while the other, *R. beloitense*, is more inflated--a situation similar to some ammonoid dimorphs and to *Nautilus*. A similar genus, *Beloitoceras*, contains many species and some related forms that I have yet to identify (new forms?) which makes me wonder about not only sexual dimorphism but also the possibility of hybridization similar to the hybridization that occurs between related finches on the Galápagos Islands.

Another, more unique, Platteville nautiloid that has, almost from the beginning, sparked my imagination is *Gonioceras*. *Gonioceras* is an extremely depressed form that may be as much as 10 (occasionally more) times wider than thick (or high in nautiloid jargon). It is so depressed that the sides of the shell were even called "wings" by early workers. Most of the fairly complete specimens I have collected show a remarkable similarity of preservation--both the dorsum and venter of the posterior end are preserved more-or-less intact but as one approaches the living chamber the dorsum is poorly preserved to absent. Clearly, the closely spaced septa and high surface area-to-volume ratio of the conch would have confined *Gonioceras* to the substrate. I, in my possibly naïve way, take this as powerful evidence for a semi-burrowing lifestyle in which *Gonioceras* would back into the substrate with only the anterior dorsum and aperture exposed waiting for hapless trilobites or mollusks to venture by then grabbing them with its tentacles for an easy meal. Since *Gonioceras* was already partially buried, should death occur in this position preservation would be as I have described the specimens above.

As I have written several times previously in these essays, using the fossilized forensic evidence preserved with our specimens permits us to deduce or speculate about the lifestyles and behavior of fossil, sometimes extinct, organisms. This allows us to compare ancient organisms to present-day ones thus facilitating and expanding our knowledge about the evolution of life on Earth. This, I believe, is one of the most significant contributions that paleontology can make to science.

REFERENCES

Catalani, J. 1998. Nautilus and the Ammonoids. *American Paleontologist* 6(4):8-10.

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Moriya, K., H. Nishi, H. Kawahata, K. Tanabe, and Y. Takayanagi. 2003. Demersal habitat of Late Cretaceous ammonoids: Evidence from oxygen isotopes for the Campanian (Late Cretaceous) northwest Pacific thermal structure. *Geology* 31:167-170.

The **M**id-**A**merica **P**aleontology **S**ociety (MAPS) was formed to promote popular interest in the subject of paleontology; to encourage the proper collecting, study, preparation, and display of fossil material; and to assist other individuals, groups, and institutions interested in the various aspects of paleontology. It is a non-profit society incorporated under the laws of the State of Iowa.

Membership in MAPS is open to anyone, anywhere who is sincerely interested in fossils and the aims of the Society.

Membership fee: $20.00 per household covers one year's issues of DIGESTS. All Canadian and Overseas members receive the DIGEST by air letter post. For new members and those who renew more than 3 issues past their due date, the year begins with the first available issue. Institution or Library fee is $25.00. (Payments other than those stated will be pro-rated over the 6 yearly issues.)

MAPS meetings are held on the 2nd Saturday of October, November, January, and February and at EXPO in March or April. A picnic is held during the summer. October through February meetings are scheduled for 1 p.m. in Trowbridge Hall, University of Iowa, Iowa City, Iowa. One annual International Fossil Exposition is held in April or late March.

The MAPS official publication, MAPS DIGEST, is published 6 times per year – January, Feb/March, April, May/June/July, August/Sept, Oct/Nov/Dec.

CYATHOCHRINITES