The Paleontograph

A newsletter for those interested in all aspects of Paleontology
Volume 1 Issue 9 November, 2012

From Your Editor

Welcome to our November issue. I got a few compliments about the last issue. They are always nice to hear. Bob, the other contributors and I try to make this an interesting item in your mailbox, so it is nice to hear that we are succeeding. My request for articles paid off somewhat. I have an article from George Klein about his favorite fossil creature the Croc. I also have the promise of an article from my good friend Howie Cohn about a collecting trip.

My field season has finished for the most part. This was a so so year for me. I never feel that I get enough time out there and always end the season wishing that I had spent more time on more trips. My fossil business takes much of my time though and there are only so many weekends I can spend on fossils and away from home.

I hope you enjoy this issue. I'm pretty sure it will be the last one out before the year ends.

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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Really, Really Big Crocs

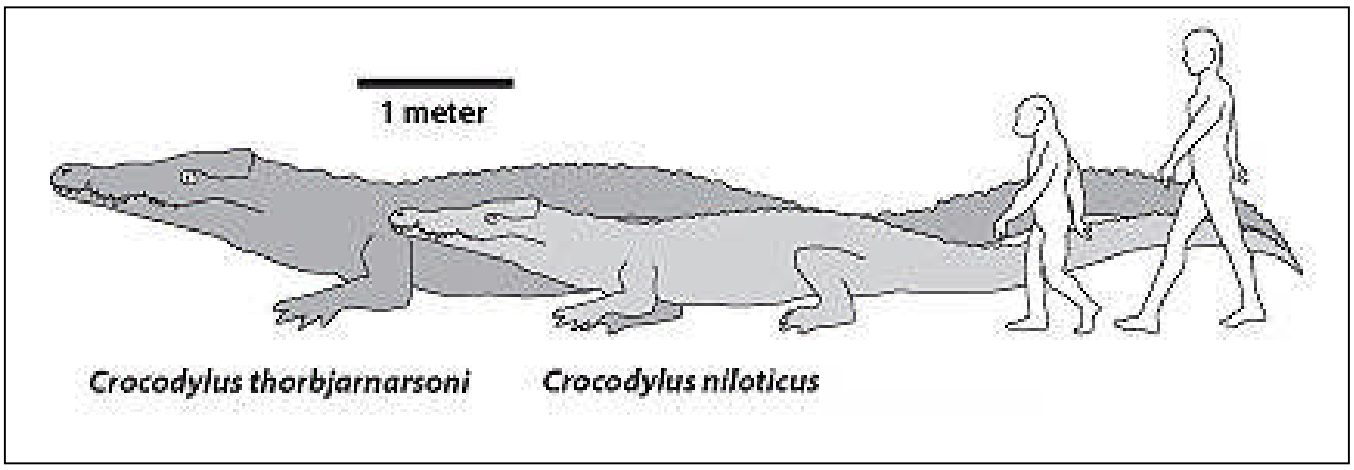
George F. Klein

There have been several recent discoveries in crocodilian paleontology and biology that I thought would interest readers. Some are from the scientific community and one relates to a personal find that I made while collecting in North Carolina in the spring.

Brochu and Glenn Storrs recently named a very large crocodile found in the Turkana basin of Kenya. They classified it as a "true" crocodile, that is, a member of the genus *Crocodylus*. It far exceeds any modern crocodile in size and may have been up to 28 feet in length. Named *Crocodylus thorbjarnarsoni* to honor the recently deceased crocodilian biologist Dr. John Thorbjarnarsoni, it lived between about 5 and 1.5 million years ago.

C. thorbjarnarsoni would have been the largest carnivore in that particular fossil ecosystem and would have definitely been a threat to early human ancestors of the area. *Homo habilis* would have been the most advanced human ancestor of that time period, although australopithecines may have also been present in the fossil ecosystem. However, there is no direct evidence, such as crocodile bite marks on hominid bones, that link *C. thorbjarnarsoni* to attacks on *H. sapiens* ancestors.

Figure 1: ***C. thorbjarnarsoni,*** **a modern Nile Crocodile, a human ancestor and a modern human compared**.



Out of Africa

Chris Brochu of the University of Iowa (Iowa City) has been examining fossil African crocodiles. Much of what he has been examining was originally excavated by Louis Leakey, the famous paleoanthropologist and his team (1).

Another crocodile named by Brochu and colleagues (2), *Crocodylus anthropophagus*, has definitely been linked to attacks on early hominids. Its name means "human eating crocodile". Bite marks have been found on fossil hominid bones, possibly *Homo habilis*, from the famous Olduvai Gorge location in Tanzania. *C. anthropophagus* was probably not as large as *C. thorbjarnarsoni*, however.

Cont'd

Big Crocs Cont'd

Figure 2: Lolong after capture. Yes, this croc is still alive and well in the Philippines.

Ed. Note: Yikes!!!

Lolong

Last year, reports of giant living salt water crocodile (*Crocodylus porosus)* that was captured in a remote village in the Philippines surfaced. Dr. Adam Britton, a crocodile biologist from Australia, travelled to the village and performed accurate measurements on the crocodile. The animal, named Lolong, measured 20 feet 3 inches long and was weighed at 2370 lbs!

The crocodile was named for Ernesto "Lolong" Goloran Cañete, a noted Filipino crocodile hunter, who died while in pursuit of the crocodile. See below for a photograph of Lolong after capture. The people of the village deserve a lot of credit for not killing the crocodile, as it was linked to the death of a girl traveling by canoe to school.

Deinosuchus

This spring, while collecting in the Cretaceous Formations on the Cape Fear River in North Carolina, I found a very large *Deinosuchus* tooth, shown in Figure 3. The tooth is 1.1 inches in diameter and 2.25 inches long.

Deinosuchus was a very large crocodilian that lived during the late Cretaceous. Its prey may have included dinosaurs as well as the large turtles of the day. *Deinosuchus* may have been up to 40 feet in length and 8.5 tons in weight (3).

I thought "how large was the *Deinosuchus* individual that my tooth was from?" I recalled a photograph from Schwimmer's book showing a 2 inch diameter tooth, possibly the largest diameter *Deinosuchus* tooth ever found. Simple pro-ration indicates that the length of a crocodile in feet could be about 20 times the diameter of its tooth in inches.

I tried to find some corroborating data to confirm the above, but initially was unable to locate any. I looked through an old pamphlet I had on Australian salt water crocodiles (4) and found some scaled photographs of a crocodile skull and its largest tooth.

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Figure 3: *Deinosuchus* tooth.

The skull was from a 4.7 meter (15.4 foot) animal. From the photographs, I was able to estimate the size of the largest diameter tooth at 0.8 inches. Dividing:

15.4 feet ÷ 0.8 inches = 19.3 or approximately 20

Close enough for our purposes! Therefore, for rough estimating purposes the length of a crocodilian in feet is approximately equal to the diameter of its tooth in inches multiplied by 20.

This is for rough estimating purposes only, since the diameter of crocodilian teeth vary with their location in the jaw. The measurements from Bredl's pamphlet and for Schwimmer's large *Deinosuchus* tooth were for the largest diameter tooth. For my tooth in Figure 3 above, I am uncertain as to its location in the jaw.

Therefore for the Figure 3 tooth, with a diameter of 1.1 inches, was possibly from an animal that was about 22 feet long.

References

1) Brochu, C. A. and G. W. Storrs "A Giant Crocodile from the Plio-Pleistocene of Kenya, the Phylogenetic Relationships of Neogene African Crocodylines and the Antiquity of *Crocodylus* in Africa" Journal of Vertebrate Paleontology, Vol. 32 (3): p. 587, May 2012

2) Brochu C. A. et al "A New Horned Crocodile from the Plio-Pleistocene Hominid sites at Olduvai Gorge, Tanzania" PLoS One Vol. 5 (2): e9333 February 2010

3) King of the Crocodylians by: D. R. Schwimmer Indiana University Press, Bloomington, IN (2002)

4) "The Real Crocodile" by R. Bredl, Queensland, Australia (1992)

Deinosuchus with modern alligator for comparison. From Wikipedia.

Complete Insect Fossil Fills the "Hexapod Gap"

Bob Sheridan August 12, 2012

The earliest fossils of insect-like arthropods are from the Rhynie chert, a laggerstatten in Scotland that is Early Devonian in age. One particular type of insect called Rhyniella, found only as isolated pieces, is thought to resemble modern springtails, a very primitive type of insect. There is also one pair of jaws from an insect called Rhyniognatha, which might have had wings based on the resemblance of the jaws to those of later winged insects. However, when winged insects appeared is still an open question.

On the other hand, in the Carboniferous we have many complete fossils of very modern-looking insects, some of which are giants. The time period from about 385-325 Myr., when insects presumably diversified, but from which we have very few fossils, is called the "Hexapod Gap."

Garrouste et al. (2012) describe a new insect species from the Femanennian Strud locality in Belgium. This locality, Late Devonian in age, appears to be a preserved lake environment. It has produced a number of crustacean and tetrapods as flattened impressions. The particular insect specimen, which has been named *Strudiella devonica* (after the locality and the age), is about 8 millimeters long and two millimeters wide. While not particularly well-preserved, one may see a head with jaws and compound eyes and long antennae, a thorax with three pairs of legs (without gills), and an abdomen with 10 segments. These characteristics make Strudiella almost certainly an insect. There is no trace of wings, but the authors suggest the possibility that Strudiella could be the nymph (young wingless form) of a winged insect.

The jaws of Strudiella suggest it is a herbivore or omnivore but not a carnivore. Its simple legs suggest it is a land-dwelling rather than a swimming insect.

While Strudiella is not the first true insect, it is the oldest more or less complete insect fossil known to date, and it does fill in the Hexapod Gap.

Sources:

Garrouste, R.; Clement, G.; Nel, P.; Engel, M.S.; Grandcolas, P.; D'Haese, C.; Lagebro, L.; Denayer, J.; Gueriau, P.; Lafaite, P.; Olive, S.; Prestianni, C.; Nel, A.
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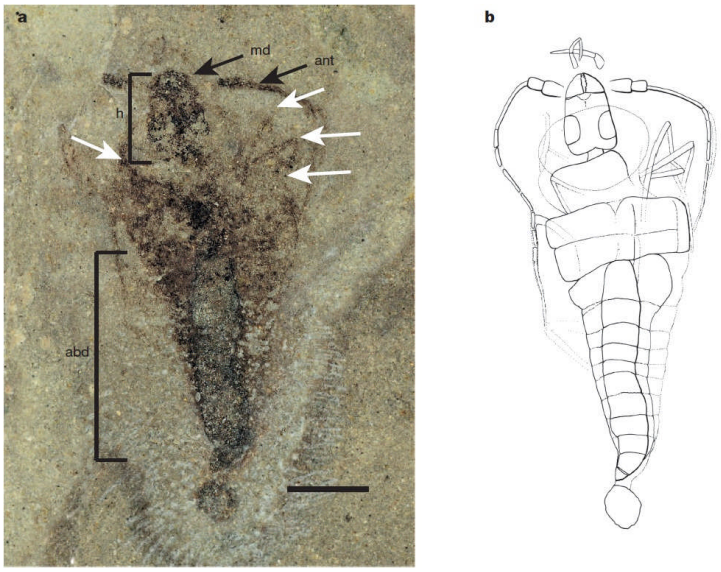
From fieldofscience.com



A Transitional Snake

Bob Sheridan August 19, 2012

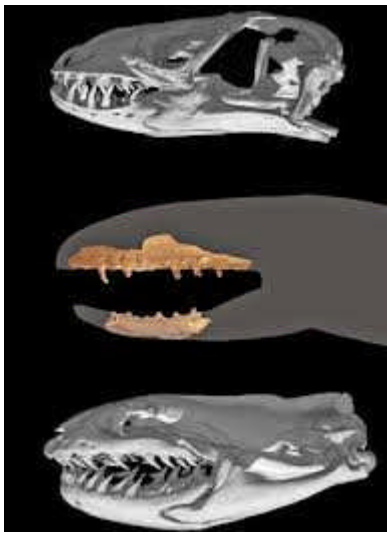
Snakes have a number of unique features relative to most reptiles. They have a very large number of vertebrae, no limbs, no external ears, and a jaw (with hooked teeth) that is essentially unhinged from the rest of the skull. It is a given that the ancestor of modern snakes was a lizard, but which lizard is not clear. Many fossils snakes have been found, the oldest from the Late Cretaceous. Some have vestigial hindlimbs. One classical idea about the origin of snakes (specifically about how they ended up limbless) is that their ancestors were marine reptiles, similar to mosasaurs, if not mosasaurs themselves. They supposedly lost their limbs to become better swimmers. Indeed, some fossil snakes with vestigial limbs have been found in marine deposits. Another idea is that snakes are limbless because their ancestors were borrowing land-dwelling lizards, and it is better not to have limbs when crawling through tunnels. **Cont'd**

Snake Cont'd

It's been several years since I reviewed any literature on the origin of snakes. Looking back in my archives, I found two articles I wrote for the NJPS Paleontograph. These review papers that argue that the land origin of snakes is more likely. I know I wrote at least two more articles on snake origins before 2004, but these articles are in a format that my current word processor can't read. To summarize these two articles: Vidal and Hedges (2004) studied two genes from 19 families of living lizards and 25 families of snakes. Their conclusion is that all modern snakes share a common ancestor. This ancestor is possibly related to iguanas, but not to varanid lizards. This eliminates mosasaurs (modified varanids) as direct ancestors. It is hard, though, to eliminate the possibility that there was some marine lizard in the Cretaceous related to the iguana. Apeteguia and Zaher (2006) describe a fossil snake Najash from the Late Cretaceous of Argentina. Najash has a sacrum fused to a pelvis, something missing in other fossil snakes with hindlimbs. Thus Najash is usually considered the most primitive snake, and since Najash was found in land-based deposits, this implies a land origin.

A reexamination of a previously named fossil snake casts some light on the jaws of early snakes. Coniophis is one of the first fossil snakes of North America, described by O.C. Marsh in 1892 from a single vertebra. Skull elements were eventually collected but not described. Longrich et al. (2012) redescribe Coniophis based on two dozen vertebrae, a partial lower jaw a partial maxilla, all from the Lance Formation of Wyoming (latest Cretaceous in age), where the original specimen was found by Marsh.

The teeth of Coniophis are cylindrical, tall, and curved backward, i.e. very snake-like. The mandible is curved as in snakes, and deeply notched in the back to receive the surangular, also a very snake-like feature. The maxilla has many labial foramina, and has a substantial surface for contacting other skull bones. This makes it more lizard-like than snake-like, i.e. the maxilla is rigidly attached to the skull and not mobile as in snakes. The vertebrae are clearly those of a snake, but they look fairly primitive, with low neural arches.



Coniophis compared with a modern lizard (top) and a modern snake at the bottom.

Phylogenetic analysis suggests that Coniophis is a slightly more basal snake than Najash. It has snake-like teeth and snake-like body, but the jaws are not fully mobile. Coniophis is small enough for a borrowing lifestyle to be plausible, and its specimens are found in sediments characteristic of flood-plains. Therefore a terrestrial origin for snakes is further supported.

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Apesteguia, S.; Zaher, H.
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Nature 2006, 440, 1037-1040.

Longrich, N.R.; Bhullar, B.-A., S.; Gauthier, J.A.
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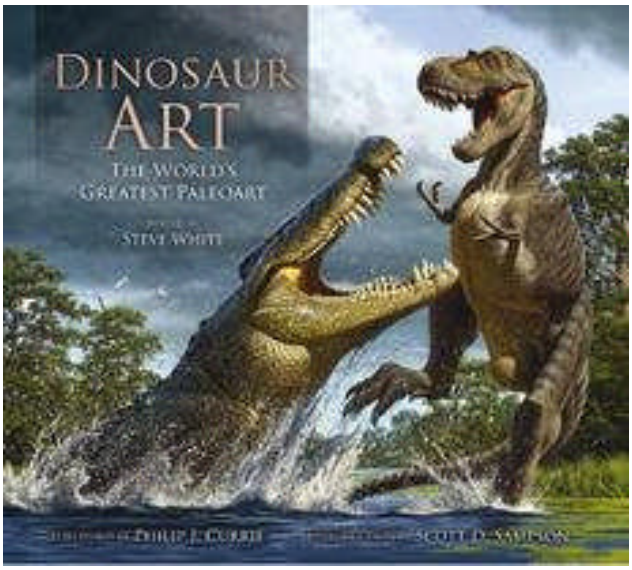
Nature 2012, 488, 205-208.

Vidal, N.; Hedges, S.B.
"Molecular evidence for a terrestrial origin of snakes."
Proc. Roy. Soc. London, 2004, 271, S226-S229.

Dinosaur Art--A Review

Bob Sheridan October 1, 2012

There are many books out there that feature the work of a particular paleoartist. There are also many books that include the work of many artists, but are primarily "encyclopedias" or have significant scientific content. More rare are anthologies of paleoart that exist solely for the purpose of showing the art itself. The last example I remember was "Dinosaur Imagery" from 2000. This year we have a new one "Dinosaur Art. The World's Greatest Paleoart," edited by Steve White. (I am not sure if the title is implying the art is great because it depicts dinosaurs, or that the book contains the greatest dinosaur art.) Steve White is a British comic book writer and editor, but also an illustrator of dinosaurs.



TWGP deals with ten currently practicing artists (in alphabetical order): Mauricio Anton, John Conway, Julius Csotonyi, Doug Henderson, Todd Marshall, Raul Martin, Robert Nicholls, Gregory S. Paul, Luis Rey, and John Sibbick. The Foreword and Introduction are provided by Dr. Philip Currie and Dr. Scott Sampson, respectively. I am not sure why these artists are included and not some of my other favorites like, say, William Stout or James Gurney. About 15 pages are devoted to each artist. The text of the book is in the form of a short bio followed by an informal interview of each artist, much as we have seen in the paleoart magazine "Prehistoric Times." The text comprises only 15-20% of the space of the book, with the rest being whitespace and the art itself. There are also separate sections or "boxes" that tell about a particular animal (some of which I have not heard of before). Another reviewer has noted that the boxes are in the same font as the main text and the boxes are not otherwise set off with borders or different background color, so sometimes you lose the thread of the text. I have to agree.

The art itself is spectacular, of course, and that alone is enough to buy the book. There are a number of styles. Doug Henderson, for instance, is mostly a landscape artist (who happens to include prehistoric animals); he works in a soft almost impressionistic style. Raul Martin's dinosaurs, on the other hand, are pin sharp with lots of detail. Luis Rey's work is noted for being especially colorful, with the dinosaurs garbed in almost neon hues. Not all the art is of dinosaurs. Mauricio Anton, for instance, specializes in mammals. There are many crocodilians, pterosaurs, and marine reptiles. The worst thing you can say is that you probably have seen a lot of these paintings before, especially for the artists that have been around a long time.

All the artists are pretty obsessed with getting the science right and are pretty disparaging of artists that don't try. Most were inspired by Bob Baaker and the Dinosaur Renaissance in the 1980's. It is interesting that within the scientific uncertainty some have the philosophy of "don't show feathers on theropods unless there is direct evidence", and some work by "feathers make everything look cool."

You can see that modern paleoart has gone at least partly digital. A few of the artists, for instance Julius Csontonyi, show digitally painted animals photoshopped over a photographed landscape. A few still work in physical media (pencils and paint). Some of those still use the classical technique of making small dinosaur sculptures to use as models before beginning the painting.

I give this book a high recommendation. The nominal price of $35 is pretty high, but some of the on-line bookstores have it for at $20.

Sources:

White, S. Editor
"Dinosaur Art. The World's Greatest Paleoart"
Titan Books, 2012, 188 pages. $35 (hardcover)

Oldest Arthropod Inclusions in Amber

Bob Sheridan September 7, 2012

Arthropod inclusions in amber are very common fossils. The oldest specimens are from the Late Cretaceous. Amber itself is not found in abundance before that time, although trees capable of producing resins should have existed much earlier.

A recent paper by Schmidt et al. (2012) describes amber from the Late Triassic Heiligkruz Formation in northern Italy (in the Dolomite Mountains). In this formation amber occurs as droplets a few millimeters long. By the chemistry of the amber and pollen found in the matrix surrounding the amber, it is clear that the amber is from a conifer, specifically a member of the Cheiroleopidiaceae. Among the 70,000 drops that were examined, these investigators found only three arthropod inclusions, a midge and two mites.

The midge is incomplete; all that is preserved is the head, antennae, a partial thorax and four legs. In life it would probably less than two millimeters long. The two specimens of mite are complete enough for the authors to name: Triasacarus fedelei (Triassic mite of Paolo Fedele, the person who discovered the amber deposits). and Ampezzoa triassica (named for the Valle d'Ampezzo where the amber outcrops are found). Triasacarus is 0.2 millimeters long and Ampezzoa is 0.1 millimeters long.

Here we need an aside about the particular type of mites represented by these specimens. Mites are small arachnids; in most cases they have a rounded body consisting of two segments (cephalothorax and abdomen) and four pairs of legs (although larvae might have three pairs). There is a type of modern mite, the Eriophyoidea, that is very unusual in that members have only two pairs of legs as adults and have a longish segmented abdomen. To my eyes ey resemble fat bristle-bearing leeches, with tiny gs near the mouth. Eriophyoidea are parasitic on ants (97% on angiosperms) and cause the rmation of galls, hence the designation of some of e members as "gall mites."

iasacarus is more cylindrical in form ("vermiform") nd Ampezzoa is flattened. Ampezzoa may exhibit gns of waxy filaments on its ventral side. This is sual for some modern Eriophyoidea, which use the ax as a protective mechanism. It is unexpected at a very specialized mite like the Eriophyoidea existed as long ago as the Triassic, and it is also unexpected that the Triassic specimens would look so modern. However, it is presumed that these specimens were feeding on the conifer that produced the amber, while only 3% of modern Eriophyoidea feed on confers.

One must also point out that these are the oldest known arthropod specimens in amber. Now that it is known that such exist, it makes sense to look for inclusions in Triassic amber.

Schmidt, A.R.; Jancke, S.; Lindquist, E.E.; Ragazzi, E.; Roghi, G.; Nascimbene, P.C.; Schmidt, K.; Wappler, T.; Grimaldi, D.A.
"Arthropods in amber from the Triassic Period."
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