DALLAS
PALEONTOLOGICAL
SOCIETY

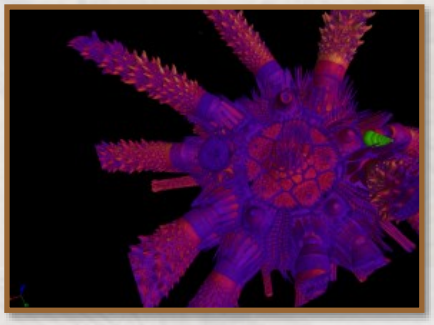
APRIL 2022

THE FOSSIL RECORD

APRIL MEETING: BACK TO BOONESVILLE

By Tom Dill

We will meet on Wednesday, April 13th, at 7 P.M. Central time in the Boonesville Auditorium (Room 125) of the Ellison Miles Building (Bldg H) at the Brookhaven Campus of Dallas College (3939 Valley View Lane, Farmers Branch). That is the same place as before COVID, with just a minor name change for the college. We will have some signs out to help you find it, if you are new or if you have forgotten. This will be a great meeting to see old friends, meet some new ones, share our fossils, and hear about paleontology in person.



A recent cidaroid or pencil urchin, 3-dimensionally rendered from CT scans. The colors represent differences in density. The green snail is a eulimid parasite that is feeding on the urchin.

Dr. Elizabeth Petsios, Assistant Professor in the Department of Geosciences at Baylor University, will drive up from Waco to speak on "The fossil record of parasites and understanding biotic interactions in ancient ecosystems."

Dr. Petsios earned a BS from Cornell University in 2011, advised by Dr. Warren Allmon, well known for research on turritelline gastropods and other mollusks. Her undergrad thesis was on the paleoecology of "Turritella" and its changes across the Plio-Pleistocene boundary. She then earned her PhD from the University of Southern California in 2016, supervised by Dr. David Bottjer, whose early work on burrowing was very influential, and has recently worked on the earliest metazoans, and the Permian - Triassic extinction. Her dissertation was on the recovery of marine benthic ecosystems after the P-T extinction. Dr. Petsios also worked with Dr. Eric Davidson of Cal Tech on the evolution and biology of echinoids. She stayed at USC for one year on a post-doctoral project, and then went to the Florida Museum of Natural History for another post-doctoral project on escalating drilling predation on sea urchins during the Cretaceous and Paleogene. Her exceptionally broad training in invertebrate paleontology is from some of the best. She joined Baylor University in 2018, and has over 12 papers and 24 abstracts published.

In addition, Dr. Petsios will be bringing up Desirae Thorne, one of our new DPS scholarship recipients, to tell us about her research project under Dr. Dan Peppe and to accept her scholarship award.

So, come get to know some our new paleontologists. Bring some fossils to show and some treats to share (sweet or savory, store-bought or homemade, simple or exotic). The DPS will be providing water and soft drinks.

Look for the 'DPS EVENT HERE' signs directing towards Building H of Brookhaven College, where the April meeting will be hosted.

We hope to see many more DPS members and visitors emerge from COVID isolation! Remote attendees are welcome to join us on Zoom at this link https://us06web.zoom.us/j/83765036222 or start the Zoom app and enter the **Meeting ID: 837 6503 6222**. Then enter the Zoom meeting **passcode: 618114**.

THE 2022 FRANK CRANE MEMORIAL SCHOLARSHIP AWARDS

By Roland Gooch, Chairman

The Dallas Paleontological Society awards an annual scholarship to one or more students who is preparing to pursue a career in paleontology. The value of this award is set each year by the Executive Committee, and usually ranges from $500 to $1,000. The scholarship is named in memory of Frank Crane, a Dallas collector and DPS member who donated his Smithsonian-grade collection to the Dallas Museum of Natural History, now a part of the Perot Museum. It is partially funded by the DPS Scholarship Fund in memory of Ken Smith, Derek Main and Barry Leon. Since its inception, DPS has invested over $43,000 in a total of 61 future paleontologists.

Candidates are nominated by professors at UTD, SMU, UTA, TCU, Baylor, and Tarleton State University. As the intent is to build a relationship with local universities, only students from these schools are eligible; and the selection is made by the DPS Executive Committee. Given equal qualifications, students doing research related to Texas paleontology may be given preference at the discretion of the Executive Committee. Selection of an awardee is based primarily upon the candidate's academic performance and potential as an outstanding researcher as judged by their nominator. To maintain the integrity of the process, DPS members or officers can have no influence in the nomination process.

This year we will award 2 scholarships of $1,200 each in upcoming meetings. The 2022 winners and their thesis topics are:

Jessica Lefors, PhD student at UTA. Research topic: "Taxonomic revision, redescription, and pathology using early ontogeny of of Texas Carboniferous and Permian corals".

Desirae Thorne, MS student at Baylor. Research topic: "Effects of light availability on Sycamore leaf morphology and organic molecules".

The 2 awardees will be introduced and give a short presentation of their planned thesis topic at a DPS meeting in the near future. When they are nearing completion of their research, they will return and present a formal talk on their research

If anyone would like to see the formal scholarship nomination request letter and blank nomination form that we send to the schools, please contact the Scholarship Chairman.

FINAL DPS CONSTITUTION & BYLAWS REVISION PROPOSAL

The final revision proposal to the DPS Constitution & Bylaws is an addition to Article IX Activities. Please review the item indicated below under Proposed Changes, New paragraph. This revision will be discussed and voted on at the April meeting.

ARTICLE IX ACTIVITIES

Existing:

SECTION 3 OTHER ACTIVITIES

The Society has the right to promote its purposes in any manner the Executive Committee deems necessary. Such activities include, but are not limited to, awarding scholarships and grants, publishing scientific papers, furnishing representatives and materials to public events, organizing field trips, and sponsoring various paleontological exchanges and investigations. Some activities may be restricted on the basis of age or physical ability at the discretion of the Executive Committee.

Proposed Changes:

SECTION 3 OTHER ACTIVITIES

[No change in this paragraph.] The Society has the right to promote its purposes in any manner the Executive Committee deems necessary. Such activities include, but are not limited to, awarding scholarships and grants, publishing scientific papers, furnishing representatives and materials to public events, organizing field trips, and sponsoring various paleontological exchanges and investigations. Some activities may be restricted on the basis of age or physical ability at the discretion of the Executive Committee.

[New paragraph] Activities of the Society shall not be used for political purposes or attempts to influence legislation except as directly related paleontological interests.

T-SHIRT CONTEST 2022
SUBMISSIONS DUE APRIL 12, VOTING BEGINS APRIL 13

For a variety of reasons, the t-shirt design contest is extended until April 12, 2022. There are some talented people in the DPS. Remember the original artwork can by in any medium, No. pencil, colored pencils, charcoal, sculpture of any material providing it is in a solid state of matter. The only tricky part to the contest is getting the artwork into a digital image format. A digital photograph, a computer design, a scanned image are digital formats that can be emailed.

A DPS shirt design currently available from the DPS Online Store. Visit dallaspaleo.org and select the "Store" icon.

Submit entries to **pangea@dallaspaleo.org**.

Accepted entries will be posted on the website, dallaspaleo.org, in the Members only section for voting. Voting begins on April 13, 2022. Login is required to view and vote.

Some emphasis on the rules:

- The image needs a minimum resolution of 300 PPI or 300 BPI. If you don't know the resolution, look at the files size. A JPG file should be a minimum of 1,000 KB, (1 meg), or a PNG file 500 KB.
- Page layout should be portrait not landscape. This is to make the best use of the shape of the "canvas" of the shirt.
- "DALLAS PALEONTOLOGICAL SOCIETY" OR "Dallas Paleontological Society" somewhere in the image. **New item: No need for a catch phrase or slogan.**

Rules (revised)

- All entries must contain 100% original work or written proof of use by the other creator(s).
- Artwork by members only is limited to paleontology.
- No human crafted artifacts of any age. No dinosaurs with humans.
- Topics may be specific or a broad area of interest.
- All accepted artwork is at the discretion of the T-shirt committee and has the right to reject any entry for any reason.
- Artwork may be created by hand or with the aid of electronic software including photography and editing or "paint" software. Entry may be in black and white or full color.
- Art created by hand such as pencil, charcoal, oil / acrylic paint, sculpture, etc. must be scanned or photographed with the digital image submitted for entry.
- Please submit an image with a minimum of 300 PPI to prevent distortion when printed. Cell camera photographs are acceptable. Print size is estimated at 10" wide by 13" high. 8.5" x 11" is the same ratio and is large enough to fit on a shirt.
- Entries must include / incorporate "DALLAS PALEONTOLOGICAL SOCIETY" OR "Dallas Paleontological Society" somewhere in the image / entry. "Dallas Paleo", "DPS", or any other change or shortening, abbreviation of the name of the Society is unacceptable.
- Topics cannot mention or specify collecting locations like the NSR or Post Oak Creek. Cities like Dallas or Mineral Wells is acceptable. (A photograph from said or other identifiable location is permitted providing the location is not specifically identified. Identification includes signage or other text in the photograph or artwork.
- Entries may contain humor and have a cartoonish art style.
- The T-Shirt Committee has and holds the right to reject all entries and terminate the contest with no winner announced.
- Images of the entries will be posted anonymously. (Please don't post your entry on social media. Non-members cannot vote and it is not cool.)
- Voting will be by the number of the entry.
- Voting will be anonymous.
- A voter may change their vote from one numbered entry to another prior to the deadline. One vote per membership. Yes, one vote per family membership regardless of the number of family members.

Winner will get one free t-shirt and infinite bragging rights.

HOW MANY CRINOID STEMS PIECES DO I REALLY NEED?

By Dennis Gertenbach

At February's DPS meeting, there was a discussion about crinoid stems (called pluricolumnals) after James Thomka's presentation. Certainly, the different shaped pluricolumnals must have come from different crinoid species. However, the genus and species of a crinoid are identified from the cup (calyx), not the stalk. (For those who need a refresher on the parts of a crinoid, see Figure 1.)

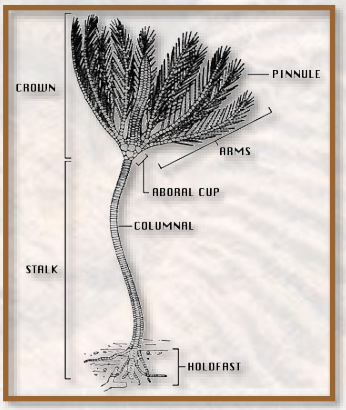


Figure 1. General morphology of a stalked crinoid. Credit: William I. Ausich

As Tom Dill mentioned during the meeting, different crinoid stem shapes were studied by two famous invertebrate paleontologists in the 1960s, Raymond Moore and Russell Jeffords. Their publication, "Classification and Nomenclature of Fossil Crinoids Based on Studies of Dissociated Parts of Their Columns" (https://kuscholarworks.ku.edu/handle/1808/3820), provides names for the various different types of crinoid stem pieces throughout the fossil record. These names are columnal taxa, based on the stem fragment shapes. Generally, columnal taxon names are not associated with known crinoid species, as these are based on their calyx.

This seminal publication is quite jargon-laden, but Google was my friend in deciphering some of these descriptions. Here is a little nomenclature that is helpful in identifying different columnal taxa:

- Columnals are the individual pieces of the stem. When multiple columnals are found together, this is called a pluricolumnal.
- Nodals are the columnals where the cirri are attached. The cirri are short arms that extended from the stalk.
- Internodals are the columnals between the nodals. As the crinoid grows, a first-order internodal forms between two nodals. Second-order internodals form between first-order internodals and nodals, giving three internodals between nodals. Likewise, third-order internodals form between second-order internodals, first-order internodals, and nodals, giving seven internodals between nodals.
- The columnal face or articula is the surface where one columnal attaches to the next.
- Most of the columnal faces have ribs, also called culmina.

Figure 2. Pentaridica pentagonalis. a) The five-sided stem, b) columnal face showing five-sided pattern and ribs extending or a short distance from the outer surface.

Difficulties in determining the different columnal taxa arise from stem shape differences between young and mature crinoids, and between stem segments near the calyx and those further down the stem. Stem segments that are closer to the calyx and those from younger crinoids may only have first-order or first- and second-order internodals, giving a different number of columnals between nodals. Weathering can also affect the appearance of stem segments. Not to mention, there are most likely differences from one crinoid and other of the same species.

Using this paper, four different crinoid stem fragments from the Desmoinesian Minturn Formation in the McCoy, Colorado area can be identified.

Pentaridica pentagonalis

As you could guess from its name, this one has five-sided stems (Figure 2a). The columnals are all about the same thickness and the division between each columnal is only slightly indented, giving each columnal a slightly rounded appearance. When looking at a columnal face (Figure 2b), the star-shaped pattern of the inside of the stem is apparent. The ribs only extend from the edge to the star pattern inside the columnal.

Figure 3. Floricyclus angustimargo. a) columnal face showing pedal-shape interior, b) rounded columnals with zig-zag pattern between columnals.

Floricyclus angustimargo

The most notable feature of this taxon is the five-sided petal inside the stem when looking at the columnal face (Figure 3a). The ribs only extend a short way from the edge of the columnal. The exterior of the columnals are rounded. A slight zig-zag pattern is formed between the columnals where the ribs of each columnal join together (Figure 3b).

Blothronagma cinctutum

This is another easy one to identify, as the nodals are wider and stick out further than the first-order internodals, which are wider and stick out further than the second-order internodals, which are wider and stick out further than the third-order internodals (Figures 4a). Webster and Houck (1998) list this as the second most common columnal taxa found at McCoy. Another distinguishing characteristic of this taxa is the five-sided shape of the face of the nodals, with the cirri coming out of the five points. The internal opening down the center of the stem is round and the ribs extend about 1/4 the diameter from the outside edge (Figure 4b).

Figure 4. Blothronagma cinctutum. a) the staggered diameter of the columnals, b) a nodal face showing the five-sided shape, circular interior, and ribs extending part way from the outer surface.

Continued on Page 5

HOW MANY CRINOID STEMS PIECES DO I REALLY NEED? CONT'D

***Cyclocaudex* sp.**

Listed by Webster and Houck (1998) as the most common columnal taxon at McCoy, these columnals can reach large diameters of an inch or more. The ribs take up much of the area of the columnal face and the ribs can branch in larger columnals (Figure 5a). The segments tend to show large cirri scars. The outside surface of the pluricolumnal can be smooth (Figure 5b) or show slightly rounded columnal edges (Figure 5c). The rounded edges may be due to preferential weathering between the columnals, a different age or location of the stem, or may be from different *Cyclocaudex* species. Webster and Houck chose not to differentiate *Cyclocaudex* species from McCoy.

Figure 5. Cyclocaudex sp. a) columnal face showing ribs covering most of the surface, b) smooth surface showing large cirri scars, c) more rounded columnals with cirri scars.

So, don't overlook those crinoid stem segments when you are out collecting. Look at them carefully and you may find that you have a variety of different kinds. And to answer the question: How many crinoid stem pieces do I really need? Enough to have a variety of columnal taxa, but leave enough for others to find.

ACROFEST 2022

by Estée Easley

It was a pleasure getting back to Idabel, Oklahoma, to share the love of fossils with the visitors of the Museum of the Red River's annual Acrofest.

Beau McDaniel, aka Dino Bo, presenting at Acrofest 2022.

The Museum's website gives great details about why they host this event: "The first remains of an Acrocanthosaurus were discovered in 1940 by J. Willis Stovall and Wann Langston, Jr. near Atoka, Oklahoma. Other fossils have been found in Texas, Utah, and perhaps Maryland. However, the most complete skeleton was unearthed by amateur paleontologists Cephis Hall and Sid Love in 1983, less than twenty miles from the Museum. Over fifty percent of the fossil was recovered—including the entire skull. Their find would change everything paleontologists knew about Acro. Unfortunately, the fossil was extremely fragile. Organic matter in prehistoric remains is usually replaced by stable quartz compounds. However, this specimen was composed of iron and sulfur compounds, including marcasite and pyrite. The former crumbles in open air when in a non-crystalline state. The latter can emit sulfuric acid fumes when removed. The high humidity levels only worsened the situation. The two men needed more help.They contacted Allen and Fran Graffham of Geological Enterprises in Ardmore, OK. With their help, the remains were moved to the Black Hills Institute for Geological Research in South Dakota. The Institute built a dedicated lab space for the remains and the fossil was saved a few years later. It was eventually sold to the North Carolina Museum of Natural History. The cast at the Museum of the Red River is a faithful copy of the original bones, with scientifically-determined replacements for the rest. It is almost indistinguishable from the original. Its acquisition was made possible by a group of third and fourth graders who led a two-year, countywide donation drive."

Acrocanthosaurus display. Image courtesy: www.museumoftheredriver.org

This year's event had over 400 visitors, and the DPS table had over 150 of them stop and chat. We showed them several examples and asked them to find which of the items was not an ammonite (tricky, because it was a fossilized nautilus). We had a carnivore or herbivore game. Each kiddo got an echinoid from the fossil box. Other activities included the always popular face painting and balloon animals - the line was out the door all day for those ladies! Dino Bo (DPS member Beau McDaniel) had a table and a fun presentation for the kids. DPS Education Chair, Joe O'Neil, hosted a Dino Dance Party again this year, and the kids loved it!

I would like to encourage everyone to visit this free museum at any time of the year. The Acrocanthosaurus display area is amazing, and the museum has much more to offer.

CISCO FIELD TRIP RECAP

By Kim Pervis

Kathy Casper in the foreground. Kim Pervis, Gigi Spells, Estee Easley in orange, Brian Witte in plaid, his female friend is behind him. JoAn Cross in red, Lee Higginbotham, Frank and Peter Holterhoff. Photo by Jill Perez.

In March of 2021 I made a trip out to the Cisco, Texas area for a Dallas Paleontological Society Fossil Bureau of Investigation case. While out there I hit a few sites for personal hunting that were recommended to me by Peter Holterhoff. I found a lot of cool things that I was happy with, and I wanted to share the sites with members of the Dallas Paleontological Society. So on December 5, 2021 the Dallas Paleontological Society hosted a trip to Cisco, Texas.

The focus of the trip was two marine members of the Moran formation which is the Wolfcampian stage of the Permian. The members of the Moran that we visited were the Camp Colorado and Watts Creek shale. I invited Peter Holterhoff to join us on the trip and take the lead. Peter is former professor of geology at Texas Tech and he did graduate work on crinoids from the Watts Creek. I was so happy he accepted the invitation.

I drove out the night before the field trip with my daughter and we spent the night in a motel in Cisco. As I was unloading my car I somehow managed to pocket dial Peter and Frank Holterhoff, with a group video call. No clue how I managed to do that. There is a first time for everything. When I took my phone out of my pocket they were both there on video looking at me. I was bewildered and it took a few seconds to process what was going on. I sheepishly said hello, apologized for the pocket dial and had a good laugh at myself.

Ron DiPronio with the hat, Tom Dill and Lee Higginbotham in the Camp Colorado fossil hunting.

Early the next morning all the attendees met at a gas station along I-20 in Cisco. We huddled around as Peter introduced himself, told us what we could find at the site, and gave a brief safety talk. From the gas station we caravanned to the first site along a narrow country highway where we parked our vehicles along the shoulder. Everyone spread out on both shoulders of the road and climbed the banks of the road cut to find fossils. This was the Camp Colorado member of the Moran Formation. There were bryozoa, crinoid pieces and brachiopods in limestone, and some scattered that had weathered out of the limestone. The crinoid pieces were fairly common to find loose, but it was more than just stem pieces. Frank Holterhoff, Pete's older brother and long-time DPS member, called the material "Crinoid kits."

Below the limestone layer was a carbonate pale green clay to mudstone layer that had more brachiopods, crinoid pieces and horn corals. We hunted this site for a few hours and then moved on up the road to the Watts Creek Member.

The Watts Creek shale was completely different. Everything was weathering out of the shale. The ground was so covered with tiny fragments of bryozoa and crinoid pieces, and other marine fossils to the degree that no soil was visible. Most of us who have hunted for fossils in the Carboniferous have found crinoid stem segments, but this site was full of other pieces of crinoids that you don't commonly find.

We hunted at the Watts Creek for a couple of hours. Peter was such a huge help with identification and educating us about the geology and the fauna. The weather was great and I think everyone went away with some fossils they were happy to have found.

I would like to thank Peter Holterhoff for driving all the way up from Houston to guide us on this trip and help us with identification of so many of our finds.

The ground in the Watts Creek with numerous types of bryozoa present.

A little slab of bryozoa from the Watts Creek.

FOSSIL PEARLS

By Virginia Friedman

The land where we all live today, what is now the DFW Metroplex, was a long time ago in geological terms a vast ocean. This body of water was called the Western Interior Seaway (WIS). It was an epicontinental seaway that stretched all the way from what is now the Gulf of Mexico to the Arctic Ocean, splitting North America into two landmasses, called Laramidia to the west and Appalachia to the east. *(Fig. 1 from Wikipedia Commons)*

Figure 1, Western Interior Seaway

An enormous area of the United States (including Texas) was submerged under a huge ocean for about 45 million years. This sea experienced several regressions and transgressions. This means that at different points of time, some areas that were previously submerged became temporarily firm land and vice versa. The interior seaway was not very deep (at the most about 200 meters) but it was teaming with life of all sorts. Today we find both marine invertebrate and vertebrate fossilized remains. Among them are clams, snails, ammonites, plesiosaurs, countless fishes, sharks, turtles, as well as enigmatic small marine lizard-like reptiles called *Coniasaurus.* There are rare reports of dinosaurs that lived on nearby land and likely fell into the water of this seaway and drowned. Even scantier reports exist of pterosaur remains in the DFW area. Dinosaur and pterosaur remains are rarely found articulated, and it is more common to find them scattered including pieces like teeth and vertebrae. The reason for this is that the skeletons of those organisms are composed of hard, durable minerals that are able to survive the geologic ages. There are also other fossils that are quite rare in the fossil record and those include fossilized pearls.

In the WIS, a number of organisms swam or simply floated around. Some lived near the surface, others deeper and others were bottom dwellers. Sedimentological evidence shows that in some areas the waters, this sea was not well aerated. This means the bottom was oxygen-deficient due to poor circulation.

Marine bivalves called *Inoceramus* were one of the rare organisms capable of inhabiting the bottom of this sea. Taxonomically these organisms were mollusks that belonged to the class Pelecypoda, family Inoceramidae. They are very important in paleontology because they evolved rather rapidly. They can be found as fossils in many parts of the world and are easily identifiable (i.e., they are very useful in biostratigraphy). Most of the time they are found broken and scattered around. Their shells are composed of calcitic prisms and are very common in Cretaceous sediments. It is worth mentioning that they produced pearls.

Pearls alongside with corals, amber and jet are considered natural gems (i.e. produced by living organisms). Pearls have excited the imagination of mankind since ancient times. Many cultures throughout the world have treasured them and today they remain a sign of sheer elegance and unsurpassed beauty.

Fossil pearls are rare in the fossil record. Their oldest record goes back to the Triassic Period (216 Ma). In the DFW area, we (Friedman and Hunt 2004) reported for the first time the occurrence of fossil pearls in North Central Texas from the Upper Cretaceous (about 90 Ma).

Fossil pearls are calcareous bioconcretions that are found occasionally adherent on the inner surface of pelecypod bivalves or sometimes in free condition. It is believed that the mollusk produces a pearl as a defense mechanism to some kind of irritant (i.e. a piece of sand grain or a parasite) that accidentally had gotten into the mollusk. The mollusk secretes a fluid to coat the irritant. And so, layer by layer the coating is deposited on the irritant until a lustrous pearl is formed.

Pearls are of similar structure to the shell in which they are found. The structure of the mollusk shell is complex. The typical molluscan shell is made of three layers secreted by specialized regions of the mantle. The outermost thin layer, named cuticle or periostracum, is often uncalcified. The prism's layer is laid down under the periostracum and is characterized by a columnar arrangement of crystals; the innermost layer has a lamellar structure and is named "nacre" or "mother of pearl."

Inoceramid bivalves were fairly abundant in some areas of the DFW area. Among their remains, about 72 pearls (age Cenomanian and some Turonian) have been collected by the author. The pearl size ranges from micropearls of about 1 mm in diameter (Fig. 2 and 3).
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FOSSIL PEARLS CONT'D

Inoceramid bivalves were fairly abundant in some areas of the DFW area. Among their remains, about 72 pearls (age Cenomanian and some Turonian) have been collected by the author. The pearl size ranges from micropearls of about 1 mm in diameter (Fig. 2 and 3). Micropearls, as the name indicates, are generally found with the aid of a binocular microscope. The micropearls shown in Fig. 3 were found by my daughter Joanna when she was 7 years old in Mansfield. On the same field trip was our friend and DPS charter member Jimmy Green who identified them as fossil pearls. Joanna and I were so excited about the find. We had never seen fossil pearls nor did we know they existed. Normal sized pearls have also been found here (Fig. 4 and 5). The large pearls (megapearls) are about 3 cm in diameter. Of these, only one has ever been found in the DFW area and probably in all Texas (Fig. 6). The shape of fossil pearls range from a perfect sphere to rather irregular and sometimes bizarre shapes. Their color is tan grayish or black. Most of the time they have lost their nacre through the ages.

Figure 2: Micropearl (Dallas, TX)

Figure 3: Four Micropearls (Mansfield, TX)

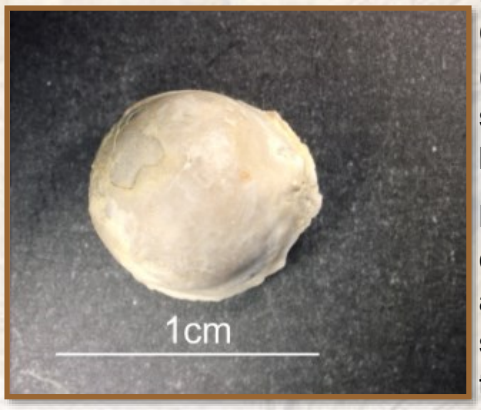


Figure 4: Pearl (Mansfield, TX)

Mineralogical studies show a calcitic composition secondary to an aragonitic/prismatic calcitic original composition. Some fossil pearls show still a visible onion ring layer arrangement characteristic also of natural modern pearls. The Cretaceous pearls studied are attributed to inoceramid clams due to the fact that most pearls were found in association with them and others were found still attached to inoceramid shells (Friedman and Hunt, 2004).

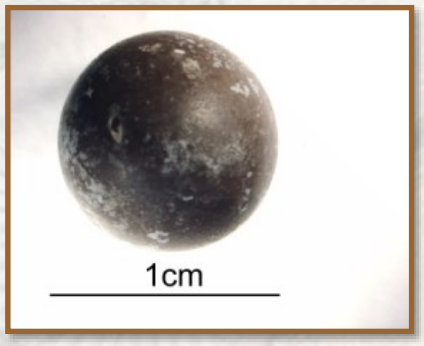


Figure 5: Pearl (Dallas, TX)

Inoceramid were a long-ranging widespread group of bottom-dwelling clams. There were many species i.e. Inoceramus pictus, I. howelli, I. proximus, I. fragilis, I. globosus to name just a few. The sizes of these bivalves were from about 8 cm to almost 1.2 meters in diameter.

It is believed that they managed to survive in oxygen deficient environments due to their association with photosynthetic algae called Zooxanthellae. These algae helped them survive by providing them with nutrients resulting from photosynthesis. The clams provided them in return with shelter in their shells. Inoceramids were abundant inhabitants of the Cretaceous seas worldwide. They declined in diversity towards the end of the Cretaceous and went extinct at about 69 Ma. Their extinction was a global event that was likely related to a profound change in deep ocean circulation. By 66 Ma a bolide from outer space impacted the earth in what is now the Mexican Yucatan Peninsula causing a tremendous ecological catastrophe, as a consequence the dinosaurs alongside many other organisms became extinct.

Figure 6: Megapearl (DFW)

Literature cited.

Friedman, V. and Hunt A., 2004. Fossil Pearls from the Cretaceous of Texas. Geological Society of America. Denver, CO.

WOMEN IN PALEONTOLOGY: JOHANNA GABRIELLE OTTILIE "TILLY" EDINGER: FOUNDER OF NEUROPALEONTOLOGY

by Tom Vance

Female paleontologists were a rarity during the early 20th Century; Tilly Edinger was an exceptional one born in Germany and emigrated to the United States. Her life and career can best be described as one of interruptions and great personal losses. Yet, she pioneered a new branch of paleontology.

Tilly Edinger (born 1897-died 1967) was born in Frankfurt, Germany to a well-known neurologist Ludwig Edinger (born 1855-died 1918). She was one of three siblings. In the beginning of her life, she grew up in a wealthy family, but she faced some very important issues and risks regarding her heritage and health. To begin with, Tilly had developed a hearing impairment during her early life and became completely deaf as an adult. Secondly, she happened to be Jewish and grew up during the time when people were being arrested by the German Gestapo and transported to concentration camps. She emigrated to the United States in 1940. So, let's begin a short story of her life.

Tilly attended Shiller-Schule, a secondary school for girls. In 1916, Tilly attended the University of Heidelberg and the University of Munich with a major in zoology but changed to geology/paleontology. In 1921, She attended Frankfurt University where she completed her Ph. D. work dealing with Nothosaurus, which she determined was not a dinosaur but long-necked aquatic reptile.

She grew up in a wealthy and progressive Jewish environment surrounded by scientists of an old German family to which she loved and became deeply attached. As a young girl, Tilly often visited the Senckenberg Museum in Frankfurt where she became interested in its fossil collections. The visits later influenced her life as a scientist. It was also at the Senckenberg Museum that Tilly was presented with her first job. She worked as an unpaid "volunteer-assistentin" from 1921-1927 and as an unpaid curator from 1927-1938. From 1933-1938 she worked in secret under the protection of the museum director, Rudolf Richter.

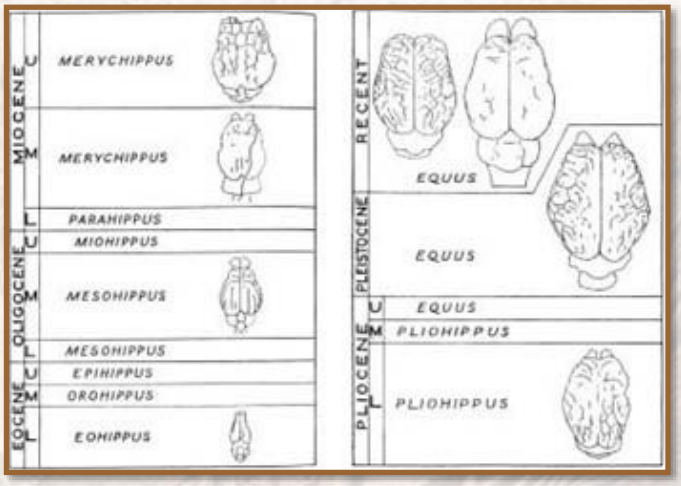
Increasing reprisals by the Nazi laws turned her life into a humiliating and fearful existence at the very margins of academia and society. Tilly worked at the Senckenberg Museum in secret until the night of the Reichskristallnacht ("Night of Broken Glass" named for the shattered glass from store windows of Jewish businesses that littered the streets) on November 10-11, 1938. She was discovered on November 11 and forced to consider emigrating elsewhere. She was leaving through the back door of her residence as the Gestapo entered the front. Remarkably, she had narrowly escaped arrest, imprisonment, and death at the last moment. But it was in 1939 that she was able to escape to London where she worked as a translator for one year. She had lost many of her family members to the Holocaust. She also lost any wealth that her family had prior to World War II. Therefore, Tilly lived in very modest and reduced circumstances until relatively late in life.

In 1940, Tilly moved from London to the United States by sailing on the SS Britannic. She arrived in New York but moved down to Boston where she continued her work as a paleontologist. She was hired by Harvard University's Museum of Comparative Zoology where she spent the remainder of her career. This position gave her the opportunity to publish her seminal work The Evolution of the Horse Brain, 1948, Geol. Soc. Amer. Mem., 25: 1-178. She also arrived at a perfect time to become a founding member and only female member of The Society of Vertebrate Paleontology which she served as president from 1963-1964.

Tilly never married nor had any children. Her deafness, caused by a hereditary condition known as otosclerosis, caused Tilly to have difficulty communicating with others, and prevented her from following academic conferences and activities.

Tilly's interest in paleontology involved neurology. She was especially concerned about the brain of prehistoric vertebrates. Her father identified ancient and modern areas of the vertebrate brain and she built on his ideas. Because brains did not fossilize, she developed a way to make endocasts of the cranial cavities. She found herself in an unknown new branch of vertebrate paleontology. Tilly also became interested in the brain endocasts from prehistoric horses. Her research on horse brains supported the idea that evolution is a branching process, as structures could evolve independently.

Continued on Page 10



Edinger's series of horse brains from 'Letters from Gondwana: Tilly Edinger and the study of "Fossil Brains."

WOMEN IN PALEONTOLOGY CONT'D

Tilly theorized the notion that ancient anatomy was not present in living vertebrates. She essentially founded the concept of neurology and paleontology by integrating comparative anatomy and sequence stratigraphy. This also introduced the concept of time to neurology and changed what the scientific understanding of the vertebrate brain was then.

She was the first person to apply deep time perspective to brain evolution. Her studies of neonatological comparisons were challenged by George Gaylord Simpson. She also worked in conjunction with Alfred S. Romer at the Museum of Comparative Zoology on the brain cases of alligators. She carried on a long-time friendly dispute about brain cases with her Princeton colleague Glen Jepsen.

Tilly was honored by various organizations for her pioneering work. She received a Guggenheim Foundation fellowship for 1943-1944, American Association of University Women for 1850-1951, elected Fellow of the American Academy of Arts and Sciences in 1953, honorary doctorates from Wellesley (1950), University of Giessen (1957), and the University of Frankfurt (1964). She served as president of the Society of Vertebrate Paleontology, belonged to Society for the Study of Evolution, the Paleontologische Gesellschaft, and Senckenberg naturf Gesellschaft.

Tilly Edinger retired at the age of 67. She continued to serve as an advisor and continued with her research. Her life came to a sudden end when she died from severe head injuries in an auto accident. She is buried in the Mount Auburn Cemetery, Cambridge, Massachusetts.

PALEONTOLOGY IN THE NEWS

Compiled by Andrew "Dino Dad" Stück

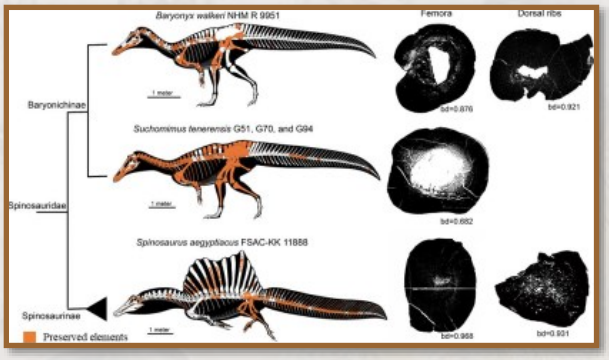
Tyrannosaur rex Split Into Three Species

A team of paleontologists led by prominent paleoartist and researcher Gregory S. Paul has split Tyrannosaurus into three species: a bulkier, ancestral T. imperator (Emperor), and two slightly more gracile descendant species, T. regina (Queen) and the familiar T. rex (King). There has long been an informal idea floating around the paleo community that T. rex seemed to come in "robust" and "gracile" morphs. This paper affirms that suspicion, though further splitting the gracile morphs into two species came as a surprise. As one might expect for such a radical proposal about such a popular dinosaur, the paper has been met with intense scrutiny, with several paleontologists pointing out some possible errors. Fellow paleoartist/paleontologist Mark Witton notes that the descriptions of the three species seems overly brief, and that they lack strong statistical support. Furthermore, several species within the genus Tyrannosaurus have already been proposed by previous authors which include the holotypes that Paul et al erected for their named species. By the law of nomenclatural priority, this means that even if the species remain accepted as valid, they would likely have to be renamed to the preexisting names, with T. regina becoming T. megagracilis and T. imperator becoming T. lancensis.

Paper: https://link.springer.com/article/10.1007/s11692-022-09561-5

Mark Witton's summary of the various critiques: http://markwitton-com.blogspot.com/2022/03/tyrannouroboros-how-everything-old-is.html

Spinosaur Bones Demonstrate Swimming Ability



Matteo Fabbri, Nizar Ibrahim, and a team of other researchers have published a paper looking at the bone density of a wide variety of organisms (especially diving birds) to see if they could creative a predictive method for determining the foraging strategies of animals suspected to have relied on aquatic food, in this case the spinosaur family. Based on their methodology, they discovered that both Baryonyx and Spinosaurus appear to have pursued prey underwater, while Suchomimus appears to have been a wader that would not have been as proficient at swimming.

https://www.nature.com/articles/s41586-022-04528-0

DALLAS PALEONTOLOGICAL SOCIETY OFFICERS, COMMITTEE CHAIRS, AND ADVISORS

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Dr. Ron Tykoski, Perot Museum of Nature and Science

The Dallas Paleontological Society was founded in 1984 for the purpose of promoting interest in and knowledge of the science of paleontology. It was intended by the founding members that the Society would be a network for the exchange of data between professionals and serious amateurs in this field.

dallaspaleo.org

The Dallas Paleontological Society meets the second Wednesday of every month at 7:00pm at Brookhaven College, unless we have something special happening that month. Please check our calendar for exact dates. Original versions of minutes and treasury reports will be available upon requests. Come meet with us, hear a speaker, learn about paleontology, and bring your unidentified fossils and unique finds to share with the group. You will be welcome, and we will enjoy meeting you. For a map of our meeting location visit dallaspaleo.org/contact.

Estee Easley, Kim Pervis, Gigi Spells and Peter Holterhoff looking at fossils at Watts Creek during the Cisco Field Trip (Page 6).

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