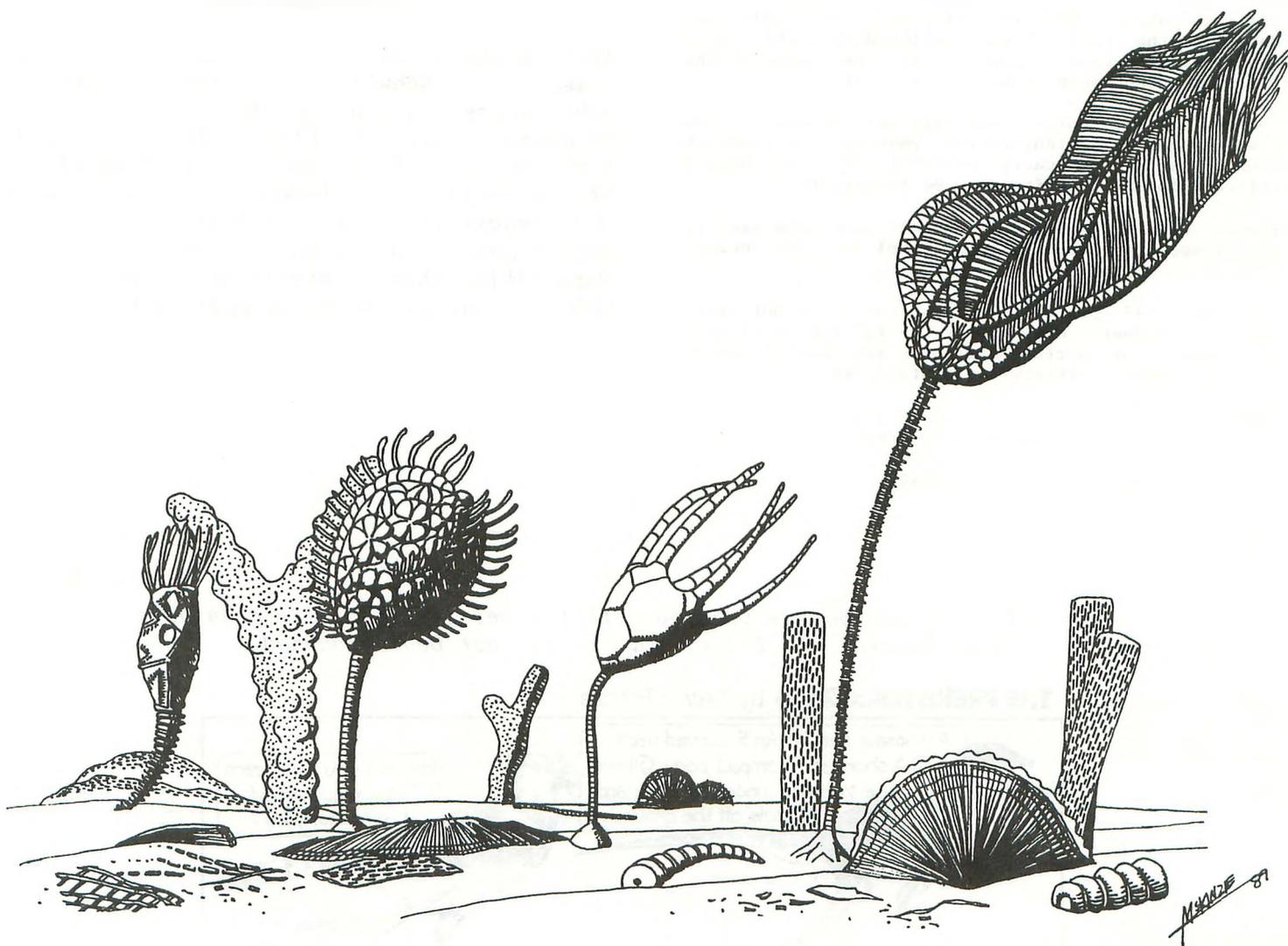


# M.A.P.S. *Digest*

Official Publication of  
Mid-America Paleontology Society

Volume 13 Number 9  
December, 1990

MIDDLE ORDOVICIAN SEASCAPE SHOWING VARIOUS STALKED ECHINODERMS



**MARK YOUR CALENDARS**

<p>1 DEC MAPS MEETING. AUGUSTANA COLLEGE, ROCK ISLAND, IL.</p> <p>1:00 Board &amp; General Meeting combined.</p> <p>2:00 Program: Tracks in Time. Tom Walsh will talk about his experience in helping to dig for trace fossil tracks in Las Cruces, NM, this past summer.</p>	<p>19 APR 1991 MAPS National Fossil Exposition XIII--Lagerstatten</p> <p>20 21</p> <p>The theme for EXPO XIII is Lagerstatten, which means very special locations of fossils world wide. To contribute an article, contact Maggie Kahrs, EXPO Digest editor.</p>
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**\*\*\* 90/12 DUES ARE DUE \*\*\***

Are your dues due? You can tell by checking your mailing label. The top line gives the expiration date in the form of year followed by month--90/12 means 1990/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 on your Digest. We carry overdues for two months before dropping them from our mailing list.

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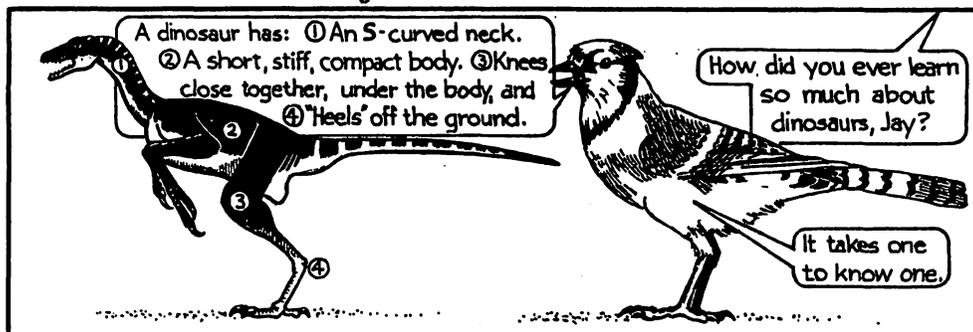
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**ABOUT THE COVER**

This month's cover is a Middle Ordovician Seascape showing various stalked echinoderms, drawn by Mark G. McKinzie, Oklahoma City, OK 73151. The echinoderms pictured are from the left: Rhombiferan *Strabocystis fayeii*, Paracrinoid *Oklahomacystis tribrachiatus*, Crinoid *Hybocrinus nitidius*, and Crinoid *Paradiablocrinus stellatus*. For more information, see story on pages 3-6.

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**THE PREHISTORIC ZOO** by David Peters



**TIME TO START THINKING EXPO**

Although it's just about December, and everyone's thinking about Christmas, it's also time to start planning for EXPO, April 19-21 in Macomb, IL. The January issue will carry all the necessary information for registering for tables and also information about lodging in Macomb.

Maggie Kahrs, who is the EXPO *Digest* editor, sent me a note saying the theme this year has been narrowed to Lagerstätten, Extraordinary Fossil Faunas. So if you would like to contribute an article on that topic for the *Digest*, be sure to contact Maggie. We've had excellent EXPO issues in the past because of the willingness of both members and nonmembers to share their knowledge by writing articles.

**SEDIMENTARY NOTES**

**Robert Wolf**, Fort Dodge, IA, writes that he was sorry he missed the MAPS Rockford field trip, but went on the trip to Delta, IA, instead. (Delta is the site of the tetrapod find.) He says that although he failed to find any amphibian skulls, as did everyone else, he did collect some nice large specimens of *Spirifer grimes*, which he had been trying to get for about the last ten years.

**NJ ASSEMBLY COMMITTEE PASSES BILL  
TO NAME STATE DINOSAUR**

**Stephen Tomchek, Jr.** Neptune, NJ, sent a news clipping from the Asbury (NJ) Park Press stating that a bill that would make the *Hadrosaurus Foulkii* the official state dinosaur has passed an Assembly committee.

According to the article, a hadrosaurus skeleton found in Haddonfield in 1858 by William Parke Foulke included 35 bones of the 25 foot long, eight-ton, duck-billed plant eater that once strode across the swamps of south Jersey about 100 million years ago. The dinosaur find led to a revision of many conventional ideas about the physical structure and habits of prehistoric reptiles and greatly stimulated public interest in dinosaurs.

**OLDEST KNOWN TREE-DWELLING BIRD  
FOUND IN CHINA?**

**source:** The Star Ledger, New Jersey,  
Oct. 12, 1990

**sent by:** Stephen Tomchek, Jr.

A 135 million-year-old fossil found in 1987 in northeastern China may be that of the oldest known tree-dwelling bird. The bird, not yet named, helps provide a picture of the early stages of bird development.

The sparrow-sized creature lived about 10 million years after the primitive bird, *Archeopteryx*. *Archeopteryx* retained many dinosaur characteristics and was basically a ground-dwelling bird with teeth. According to researcher Paul Sereno, it probably could climb trees, jump and flap its wings to propel itself, but its flight was probably very short-ranged. The newly-found bird, however, had claws which suggest it probably lived in trees. The shape of its wing bones and breastbone and its short clump of tail bones, in contrast to the longer tail of *Archeopteryx*, suggest that it probably was capable of long-range, agile flight.

Scientists had thought that birds basically lived on the ground for 50 to 100 million years after *Archeopteryx*. But that idea was questioned in 1988 when a report was given on the fossil of a 125-million-year-old tree-dwelling bird found in Spain. The Chinese find pushes the history of tree-dwelling birds back to 10 million years following *Archeopteryx*.

John Ostrom, curator of vertebrate paleontology at the Yale Peabody Museum of Natural History, said Sereno's interpretation appears reasonable, but he is not convinced the specimen was a tree-dweller. Ostrom said the specimen "was very definitely an advanced-level bird" for that period, and Sereno's belief that the bird was tree-dwelling is not outrageous.

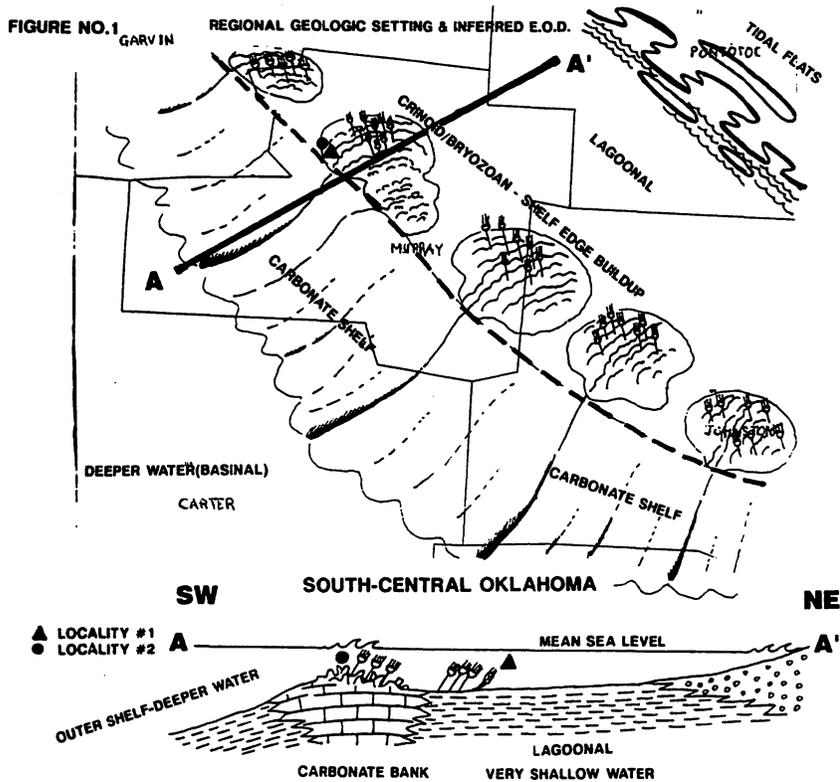
According to Sereno, the specimen is a transitional bird, having retained some dinosaur characteristics: moveable fingers in the front edge of its wings, a lack of fusion of many of its bones, and a club-shaped end of the pubic bone that may have rested on the ground when the bird sat.

COMPARISON OF TWO STALKED ECHINODERM FAUNAS FROM THE MIDDLE ORDOVICIAN OF SOUTH-CENTRAL OKLAHOMA

by Mark G. McKinzie, 8702 Acre View Rd., Oklahoma City, OK 73151

The Upper Echinoderm Zone of the Mountain Lake member of the Bromide Formation has produced an exceptionally rich and varied suite of stalked echinoderm fossils. In the Arbuckle Mountains of south-central

Oklahoma, the unit is exposed in numerous accessible locations, and literally thousands of stalked echinoderms have been collected. (See *Echinoderm Fossils from the Bromide Fm. (Middle Ordovician) of Oklahoma*; University of Kansas press, James Sprinkle ed., 1982.) In this paper I would like to describe and compare two previously unknown Upper Echinoderm Zone locations that lie within 1/4 mile of each other in Murray County, Oklahoma. The differences in faunal elements represent different environments at the time of burial and ultimate preservation.



The Upper Echinoderm Zone of the Mountain Lake member of the Bromide Formation is Blackriverain age (Middle Ordovician). It overlies the Lower Ordovician Arbuckle Fm. and is in turn overlain by the Viola Ls. of Trentonian age. The Upper Echinoderm zone is part of a NW-SE trending belt of carbonate facies representing the carbonate shelf of a shallow-water carbonate sea. The ancient shoreline was to the E-NE, and the deeper-water basin lay to the W-SW. This area is the NE flank of a structure called the Southern Oklahoma Aulacogen. See Figure 1 for the environment of deposition and the approximate location of the two collecting localities. Please note that the slope of the carbonate shelf is greatly exaggerated.

TABLE 1. LOCALITY #1. LOCALITY #2.

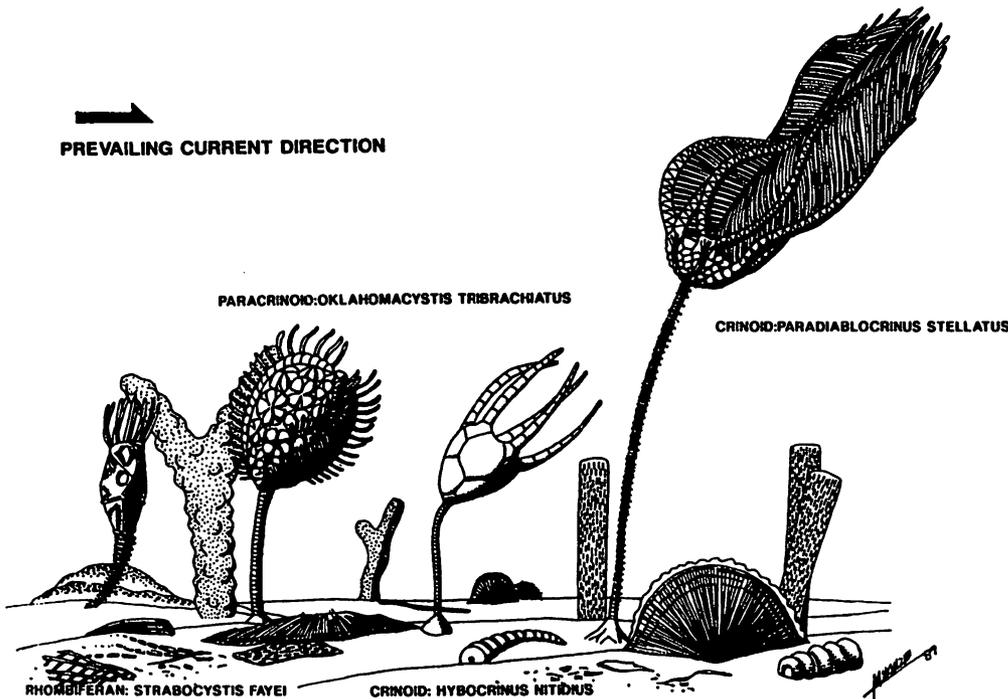
GENUS	NO. OF SPECIMENS	PERCENTAGE	NO. OF SPECIMENS	PERCENTAGE
Oklahomacystis	117	55	40	95
Sinclairiocystis	32	15	0	
Hybocrinus	34	16	1	2
Bistomicystis	3	1	0	
Archeocrinus	5	2	0	
Diablocrinus	11	5	0	
Paradiablocrinus	6	2	0	
Strabocystis	2	1	0	
Penicilliorinus	1	1	0	
Apodasmocrinus	2	1	0	
Pirocystella	0		1	2
<b>TOTALS</b>	<b>213</b>	<b>99</b>	<b>42</b>	<b>99</b>

A total of 255 identifiable stalked echinoderms were collected from the two localities. See Table 1 for a list of the genera collected, the number of specimens of each genus, and the percentage of the total stalked echinoderm fauna represented by each genus.

The three classes of stalked echinoderms present are the CRINOIDEA (M. Camb.-Recent), PARACRINOIDEA (M. Ord.-U. Sil.) and the RHOMBIFERA (L. Ord.-U. Dev.).

The Paracrinoidea are Blastozoans with the viscera enclosed in a multi-plated theca. Feeding structures are exothecal and include ambulacra supporting brachioles. Some species sat on the bottom attached to a short, nonfunctional stem. Ambulacra uniserial with uniserial brachioles. The most abundant paracrinoidea by far in the Upper Echinoderm Zone is *Oklahomacystis* which is characterized by three short ambulacra lying recumbent on the theca (see Figure 2). All in all it resembles a miniature pineapple.

FIGURE NO.2 MIDDLE ORDOVICIAN SEASCAPE SHOWING VARIOUS STALKED ECHINODERMS



The Rhombiferans are Blastozoans characterized by the presence of internal or external pore rhombs. Pore rhombs are sets of thecal canals shared equally between two adjacent thecal plates, and they aid in gas diffusion and respiration (see Figure 2).

Crinoids are Crinozoans with arms, rather than ambulacra, and pinnules, rather than the brachioles of the two classes above. The multi-plated theca is of a more uniform

arrangement. Crinoids developed a longer stem (columnal) than the cystoids, blastoids, or the paracrinoidea (see Figure 2).

All living crinoids are rheophilic (current-seeking), and are leeward, passive suspension feeders. They feed by means of aerosol filtration which involves catching plankton-sized organic matter in their arms and pinnules. This same mode of feeding is thought to apply to the other extinct stalked echinoderm classes since the feeding structures are so much alike.

Out of the total 255 stalked echinoderms collected, 213 were from locality #1, and 42 were from locality #2. At locality #1 initial surface collecting of a nearly vertical shale outcrop netted numerous *Oklahomacystis* and *Sinclairocystis*. A trench was dug one foot wide, three feet deep, and three feet long. Approximately 1/3 cubic meters of shale were removed. The shale was sieved through a 1/4 inch screen, and all identifiable fossils were removed. At locality #2, only surface collecting was done as the exposure is much more well-cemented shaly limestone, and the rock cannot be removed without the use of heavy-duty power tools.

A comparison of the two stalked echinoderm faunas from the two localities indicates that two different stalked echinoderm communities are present. At locality #1 there are 10 different species present including three paracrinoidea, six crinoids, and one rhombiferan cystoid (see Figures 3 & 4). At locality #2 only three identifiable species are present; one paracrinoidea, one crinoid, and one rhombiferan cystoid. Paracrinoidea are by far the most common stalked echinoderm group present; the crinoids follow, and the rhombiferans come in a distant third.

FIGURE NO.3 SPECIES DIVERSITY

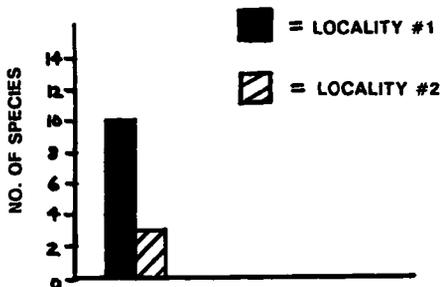
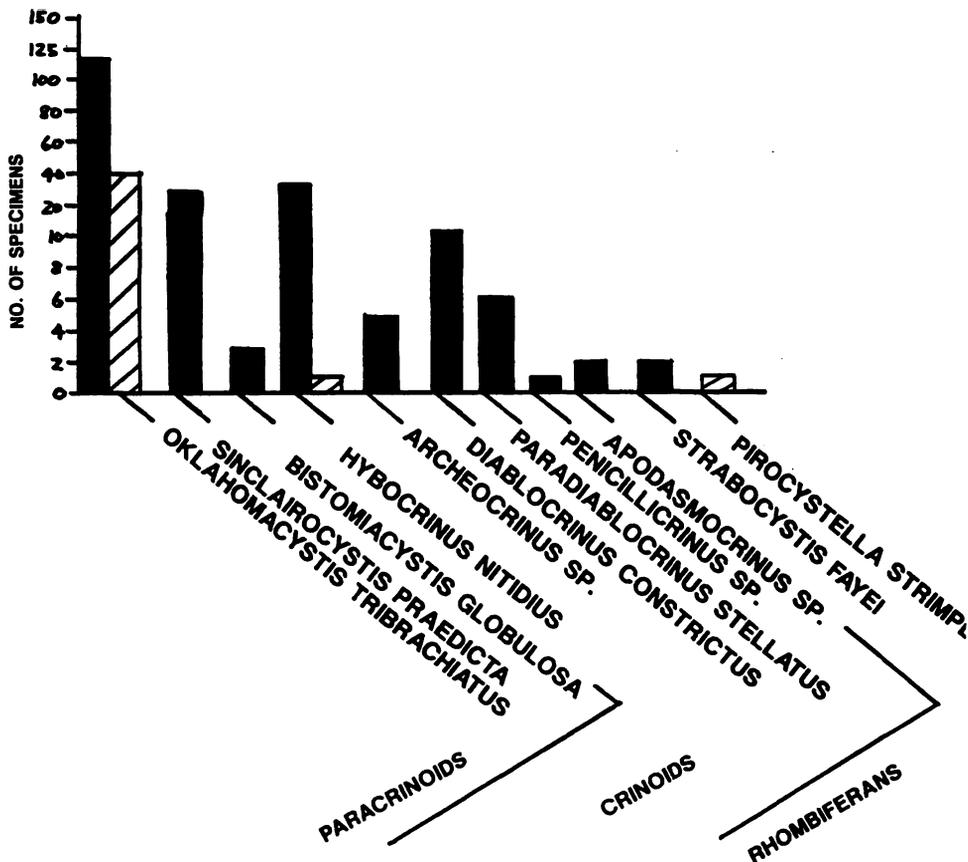
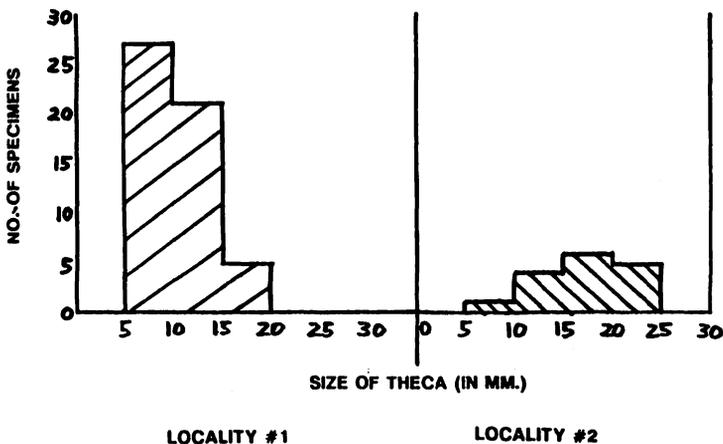


FIGURE NO.4 SPECIES FREQUENCY



Of the paracrinooids, the genus *Okalomacystis* is the dominant faunal element. This genus represents 55% of all stalked echinoderms at locality #1 and 95% of all stalked echinoderms at locality #2 (see Table 1). Figure 4 shows the size variation in *Okalomacystis* between the two locations. Please note the overall smaller size of this genus at locality #1 versus locality #2. Note also that the bar diagram is highly skewed towards the smaller size at locality #1 while it is a more normal bell-shaped curve at locality #2.

FIGURE 5 SIZE VARIATION IN PARACRINOID; OKLAHOMACYSTIS TRIBRACHIATUS



The Middle Ordovician was the time of greatest echinoderm expansion in the fossil record. All 20 echinoderm classes were present at this time. By the end of the Middle Ordovician the crinoids had risen to become the dominant class of stalked echinoderms in the Paleozoic. The stalked echinoderm communities of the upper Echinoderm in Oklahoma present an enigma in that the paracrinooids were the dominant element of the stalked echinoderm fauna. Number-wise, they represent the most successful stalked echinoderm. However, in terms of species diversification the crinoids seem to have evolved the most rapidly. This is probably the window in time (relatively speaking) when the crinoids were emerging as the dominant force. Or is the apparent dominance of the paracrinooids at these locations a result of a preservation and/or collection bias?

At locality #1 I am confident that the results are accurate because a fine enough mesh screen was used to capture all but the smallest complete cups or crowns. There may be a collecting bias at locality #2 due to the fact that only surface collecting was done. Is locality #1 a more "mature" stalked echinoderm community than locality #2? Did more intense competition for the same food sources at locality #1 cause no single echinoderm genus to reach maximum potential size (overgrazing as it were)? Is locality #2 a snapshot of a pioneering stalked-echinoderm community with the paracrinoid *Oklahomacystis* being the initial niche colonizer?

Other fossils collected at locality #1 besides the stalked echinoderms include bryozoans (ramose, branching, and encrusting forms), articulate brachiopods, and the very rare asteroid or two. Echinoderm plates, rhombiferan plates, and occasional holdfasts are all common fossils at this site. Locality #2 is dominated by bryozoans of all growth forms and much larger colonies than at locality #1. Articulated brachiopods are also common. Disarticulated remains of the trilobite *Illeanus americanus* are also present. In general, the fossil remains at locality #2 are much more fragmented than those at locality #1. They show evidence of being deposited in a higher-energy environment (see the cross-section in Figure 1). The abundance of various fossil groups at both localities indicates a "normal" marine environment (aerobic, normal salinity, etc.) even though locality #1 is a quieter, more restricted water depositional site than locality #2.

I would like to briefly discuss the Paleocology of these two Upper Echinoderm Zone localities. The echinoderm/bryozoan shelf-edge buildups occurred at the top of a very gentle carbonate slope separating the open-sea arm of the Southern Oklahoma Aulacogen from the shallow, restricted lagoonal waters to the E-NE. At that time Oklahoma was much closer to the equator than it is today, and the climate was tropical to sub-tropical. The stalked echinoderm/bryozoan biohermes were not true reefs (which did not develop until the corals of Silurian) but did represent a positive high along the local sea floor.

They probably produced an effective wave break during low tide (and high?) between the open sea and the lagoon behind it. Locality #2 occurred within this high energy setting along the apex of the carbonate bank. The larger size *Oklahomacystis* probably grew to just below normal wave base. Locality #1 was in the quieter-water conditions on the landward side of the carbonate shelf. Here conditions were favorable for a greater range of stalked-echinoderm forms.

Periodically, major storms or squalls would sweep in from the open sea. These would agitate the surface waters and lower the wave base. The higher energy conditions would decapitate the stalked echinoderms and topple the taller bryozoan colonies. If the turbidity reached high enough levels, many of the suspension feeders would "suffocate" and die in place. Burial of the organisms must have been rapid enough to prevent or retard decomposition and to prevent attack by epifaunal or infaunal scavengers.

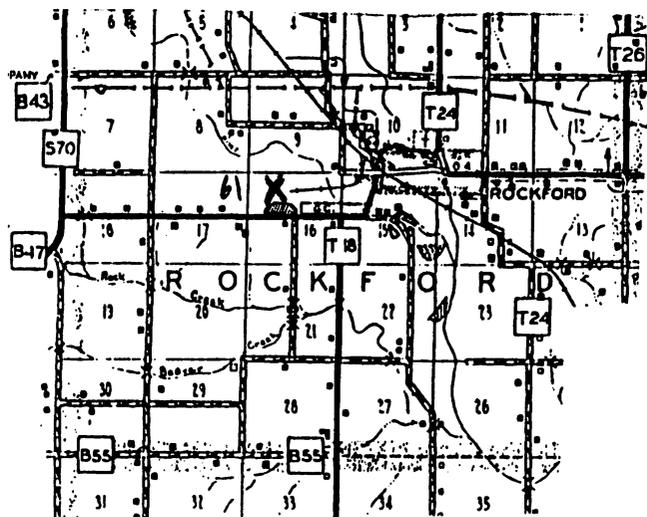
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- 3) Robinson, R.A.; Rowell, A.J. (ed.). 1976. Paleontology and Depositional Environments: Cambrian of Western North America, Brigham Young Univ. Geol. Studies, pp: 61-73.
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## THE ROCKFORD PIT

By Robert Wolf, Midwest Rockhound Services, 3521 10th Ave North, Fort Dodge, IA 50501

Along the north side of County Road B-47 (paved), just west of the Rockford Country Club, west of the town of Rockford, is one of Iowa's most famous fossil localities. Known as the Rockford Brick and Tile Company Pit, the pit is now abandoned, but the Floyd County Conservation Board is in the process of purchasing the property to turn it into a county park open to fossil collecting. This is in the NW<sup>1</sup>/<sub>4</sub> section 16, T95N, R18W, Floyd County.



The pit exposes strata of the Upper Devonian Lime Creek Formation. The upper part of the pit exposes approximately fifteen feet of yellowish brown shales and thin limestones of the Cerro Gordo Member. These are highly fossiliferous. Below that is approximately fifteen feet of shales, yellowish brown in the upper part and bluish gray in the lower part. The lower part is similar in appearance to the Juniper Hill Member. The entire unit is fossiliferous, especially in the upper part. The upper five feet or so is exposed at the base of the upper level of the pit. The lower ten feet or so is exposed along the top of the lower level of the pit. Below that is a massive bedded, bluish gray, silty limestone (one to two

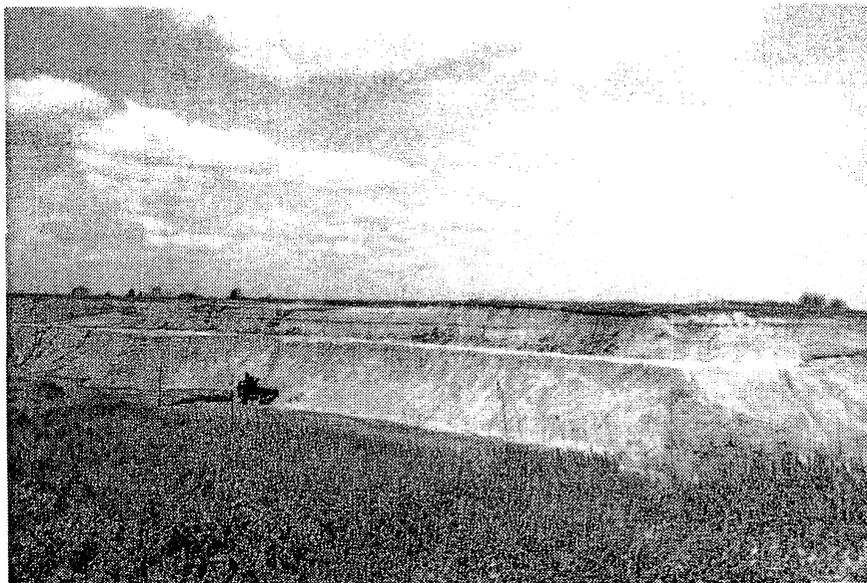
feet thick) that is highly fossiliferous. The brachiopod *Douvillina* is especially numerous. This bed marks the base of the Cerro Gordo Member here.

The Juniper Hill Member here is represented by an estimated ten feet of bluish gray shales in the base of the pit. Fossils have been reported (i.e. brachiopods *Lingula* and *Gypidula*, and fish teeth), but I have been unable to find any.

In the Cerro Gordo I have collected at least thirteen species of brachiopods, encrusting bryozoans, branching bryozoans, lacey bryozoans, horn corals, colonial corals, crinoid columns, several species of gastropods, annelid worm tubes, pelecypods, and a nautiloid, in addition to one of the worse sunburns I have ever experienced.

Collecting is easy here since most specimens occur in the loose shales of highly eroded limestone lenses. I have had my best luck along the road ditches, although fossils at this level tend to be somewhat smaller than those found a bit deeper in the pit.

*The pit at Rockford exposing the Cerro Gordo Member (upper level and about half of the lower level), and Juniper Hill Member (base of the lower level) of the Upper Devonian Lime Creek Fm.*



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Health Care Management. Will trade--only high quality specimens. Interested in all Paleozoic fossil material. Wants to be affiliated with an all fossil association and to meet those with similar interests and talk fossils!

Own ambulance service. Will trade. Major interest vertebrates. Has some local invertebrates--ostrea congesta, etc. Was advised by a person in Beloit, KS about the MAPS Digest.

Beautician & teacher (retired). Will trade. Major interest Pennsylvanian of Texas crinoids, sponges, brachiopods, pelecypods, echinoids & ferns. Nothing for trade yet. Want to meet other fossil collectors and learn more about fossils.

Physician. Will trade. Major interest cretaceous period. Has for trade ammonites; general interest. Member of Paleontology Group of Austin & San Antonio, TX.

Metallurgical Engineer. Will trade. Interested in all fossils. Has for trade Miocene sharks teeth, Plio/Pleistocene invertebrates. Member of Tampa Bay Fossil Club, Florida Paleo. Soc. Wants to receive newsletter and meet other collectors and learn of new sites.

Financial Controller. Will not trade at present. Major interest fish and insect fossils. Wants to meet and correspond with collectors in the Northwest area with similar interest.

Grocery Store. Collects and has for trade Jurassic ammonites, sea urchins, brachiopods and bivalves. Looks for Cretaceous ammonites, trilobites, fishes, sea urchins, teeth. Wants to make contact with other collectors.

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

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*Happy Holidays!*



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