M·A·P·S Digest

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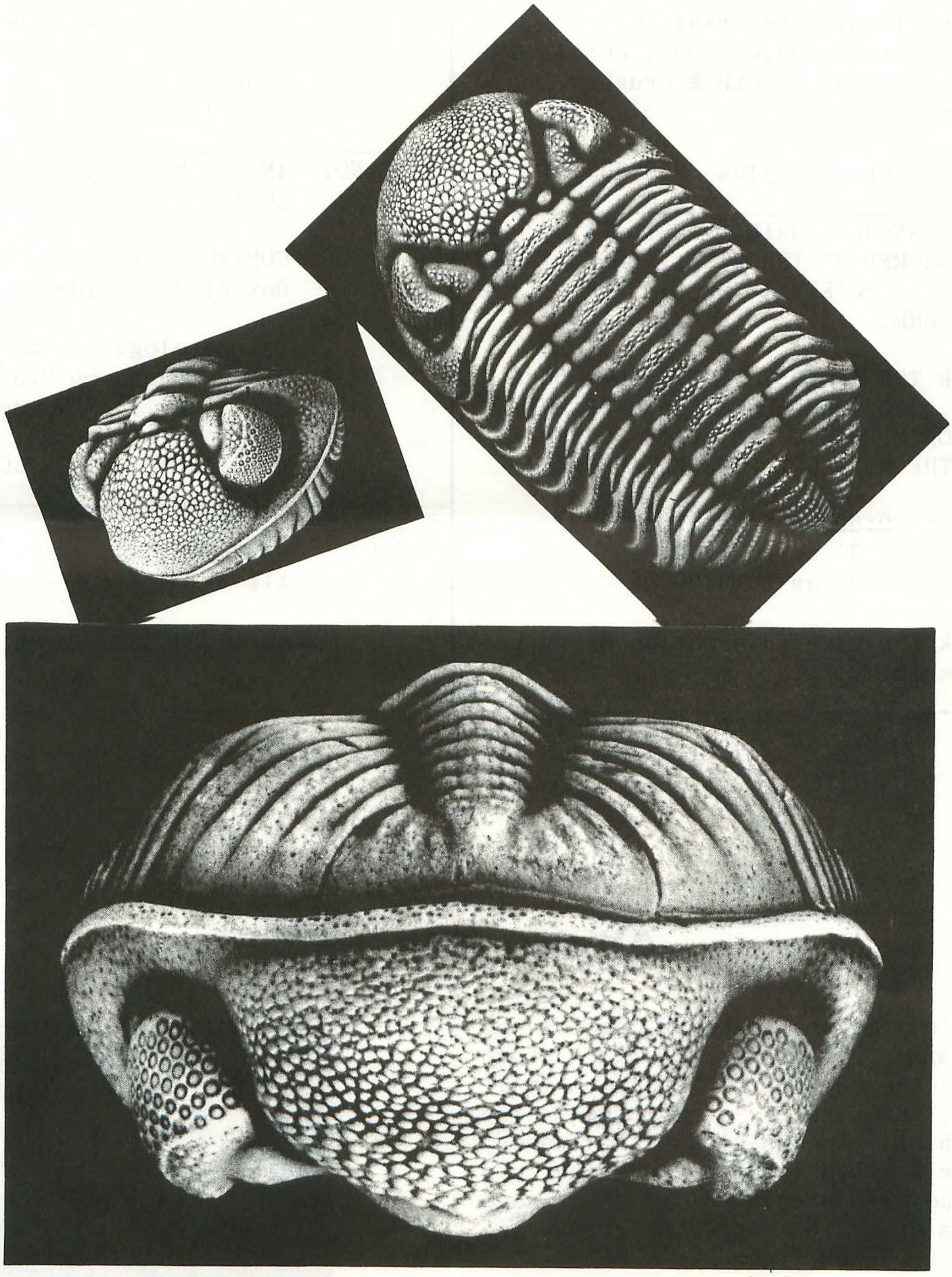


PHACOPS rana crassituberculata©

A LOVE OF FOSSILS BRINGS US TOGETHER

MARK YOUR CALENDARS

8 OCT MAPS FIELD TRIP TO LONE STAR QUARRY, OGLESBY, IL

MEET AT 9:00 AT STARVED ROCK GATE MOTEL OFF I-80 & RT. 178 AT UTICA.

We will be hunting in Pennsylvanian material for brachiopods, pelecypods, coral, & fish remains (teeth & crusher plates).

HOST: Chuck Styles 815-433-9436

20 OCT 21 22 6TH ANNUAL FLORIDA FOSSIL FAIR, SPONSORED BY THE BONE VALLEY FOSSIL SOCIETY & THE CITY OF MULBERRY

NEAR THE INTERSECTION OF HWY 60 & S.R. 37. ONE BLOCK SOUTH OF HWY 60 ON S.R. 37, EAST SIDE CORNER AT THE MULBERRY PHOSPHATE MUSEUM.

Fri.: 9:00 am to 5:00 pm
Sat.: 9:00 am to 5:00 pm
Sun.: 9:00 am to 3:00 pm

Look for more information on page 18.

20 OCT 21 22 FOSSILMANIA VII, SPONSORED BY THE AUSTIN & DALLAS PALEO SOCIETIES.

AT OAKDALE PARK, GLEN ROSE, TX.

Fri.: 1:00 pm to 6:00 pm
Sat.: 9:00 am to 6:00 pm
Sun.: 9:00 am to noon

Look for more information on page 19.

6 NOV 7 8 9 ANNUAL MEETING OF GSA AT ST. LOUIS, MO.

CONTACT: Vanessa George, GSA, Box 9140, Boulder, OH 80301

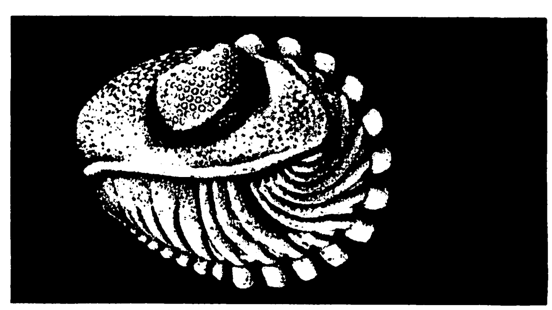
Paleontological Society sponsored Short Course on Dinosaurs on Sun., Nov. 5. No registration fee for the course; book fee usually about $12.50.

1990 MAPS National Fossil Exposition XII

April 20-22, Macomb, IL

ABOUT THE COVER

This month's cover features photos of *Phacops rana crassituberculata* that appeared on the cover of "LSAmagazine," Spring 1988, University of Michigan. The ariticle which accompanied the cover, "Reading the Stories in Michigan Rocks," is copyright and is reprinted in this issue with permission. The upper figures are x $1^{1}/_{4}$, and the lower figure is x $3^{1}/_{2}$.



MAPS MEMORIAL WEEKEND FIELD TRIPS

The Saturday Memorial Weekend field trip to Palo, IA, brought out several MAPS members and yeilded many good specimens of cystoids as well as brachiopods and other types of fossils. It was a perfect day weatherwise, which was more than could be said for Sunday. In fact, Sunday was a washout: many of us who went to Oskaloosa got drenched since the blue skies of the early morning prompted us to leave home without rain gear. But the collecting was good for the relatively short time spent there. Plan to join the group for the October field trip!

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NOTICE OF CHANGE OF ADDRESS
FOR EDITOR/TREASURER

Although I have not moved, the Post Office has changed my address, so please note it in your Directory for future reference. My new address is:

Sharon Sonnleitner
4800 Sunset Dr., **SW**
Cedar Rapids, IA 52404

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SEDIMENTARY NOTES

An article from the October 1988 issue of *Lapidary Journal*, sent by **Jim Konecny**, Prescott, AZ, indicates that **Pete Larson** from the Black Hills Institute, SD, was inducted into the Fossil Division of the National Rockhound and Lapidary Hall of Fame for 1988. Pete was the keynote speaker for EXPO XI and is a new MAPS member. **Jim Konecny** was third on the list of nominees. Congratulations to both!

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Stephen Alexander, Wichita Falls, TX, sent his apologies for being late with his dues, saying he'd recently discovered the back half of a Permian sail-lizard called Dimetredon and was spending time preparing it. He said he didn't realize just how difficult it was going to be but things were going really well with it.

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David Peters, St. Louis, MO, writes that he and fellow MAPS member **Guy Darrough**, Arnold, MO, have founded a new fossil museum in the St. Louis area. The museum, which has not set its location as of yet, has been named the Saint Louis Museum of Prehishtoric Life.

The museum has been set up as a not-for-profit corporation with a mandate to maintain a repository of rare and valuable specimens, to send out expeditions and submit papers on finds of scientific interest, and to educate the public about the earth's (and in particular Missouri's) primeval past and how it relates to the land and lifeforms of today.
The board includes the two founders, their spouses, and Dr. Harold L. Levin, Associate Dean at Washington University and Professor of Geology. They are continuing their search for additional board members. They are also interested in input from MAPS members. Contact David for further information if you are interested.

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Carlton S. Nash, Granby, MA, sent several clippings about his life and work. Carlton is the proprietor of Nash-ional Dinoland and an adjacent quarry which has so far produced some 5000 dinosaur tracks from 50 layers. The quarry is said to be the largest in the world, and Dinosaurland in South Hadley, MA, is a museum, a park and a souvenir shop. Dinoland is currently celebrating its 50th year.

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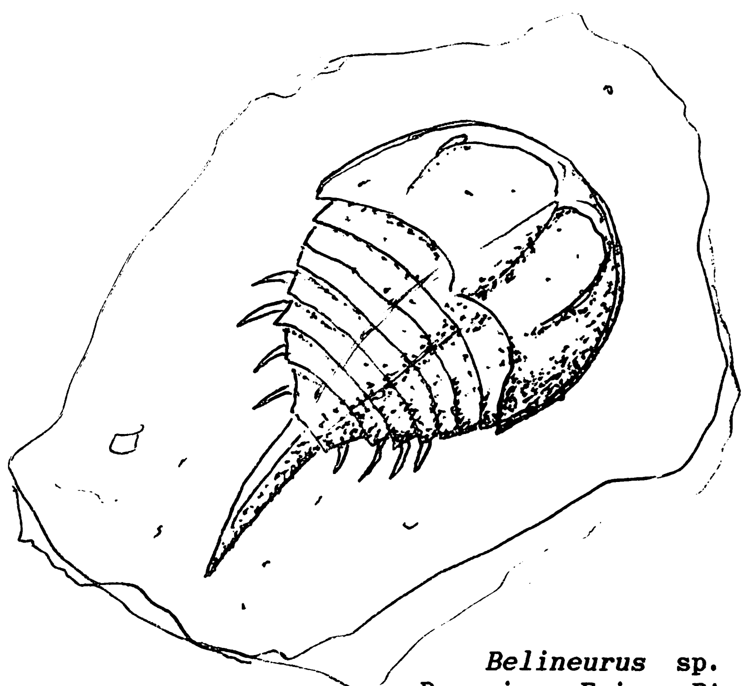
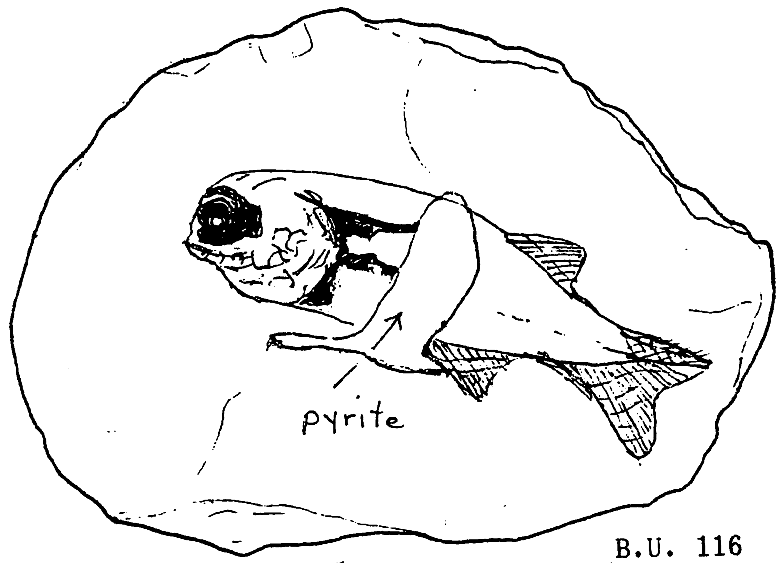


Belineurus sp.
Devonian--Erie, PA
Drawing by **Scott McKenzie**, Erie, PA

RARE FOSSIL FISH STOLEN FROM BRADLEY UNIVERSITY

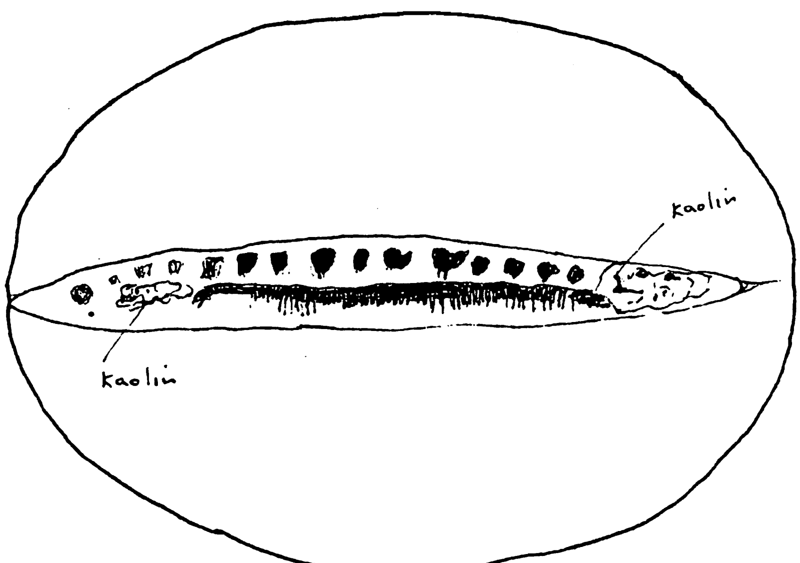
MAPS member Dr. Merrill Foster, Chairman of the Department of Geological Sciences at Bradley University, Peoria, IL, asked that we announce the loss of two rare fossil fish from Bradley. The two Pennsylvanian Mazon Creek fish were stolen in April *(see crude figures below)*. One was a paleoniscoid from Astoria, Illinois. It has a distinctive bleb of pyrite across its middle. On the back of the concretion it says Astoria, a date in the 1970's, and B.U. 116. The other is the lamprey *Mayomyzon pieckoensis*. On the back of this concretion, it probably says Pit 11 and some date in the 1970's. This specimen was illustrated in the July/August 1988 (vol. 63, no. 4) issue of *Rocks and Minerals*, p. 197, fig. 18. Dr. Foster personally collected both of the specimens. Please contact Dr. Foster if you have seen or have any information on the specimens.



B.U. 116

ca. x 2

Paleoniscoid fish
Astoria, Illinois



ca. x 1.25

Mayamyzon pieckoensis
pit 11

Some MAPS members who saw Dr. Foster's incomplete remarks in newspaper announcments of the theft thought that he was attacking the amateur collector and MAPS in particular. Dr. Foster assures us that nothing could have been further from his mind and sent the following article which he had sent to the *Peoria Journal Star*, the newspaper that originally reported the theft, in an attempt to clarify his thoughts on the matter.

CLARIFICATION OF THE OPINION OF DR. M. W. FOSTER REGARDING A THEFT AT BRADLEY UNIVERSITY

There has recently been a variety of articles in newspapers; and announcements on the radio and television concerning the theft of two rare fossil fish from the collections of the Department of Geological Sciences, Bradley University. Some non-professional students of fossils have interpreted these news items, particularly my quotes, as being a moral indictment of these paleontologists. This was not my intent and couldn't be further from my opinion of amateur paleontologists.

Due to these misunderstandings, I would like to herewith clarify and amplify my thoughts regarding this theft. I do not know who stole the fossils! The media asked me to speculate as to the possible culprit(s). My best guess, and it is only a guess, is that it was a highly knowledgeable person with a specialty in Paleozoic fish. This person(s) was most likely a non-professional because this kind of action by a professional could destroy his or her career. The thief probably learned of the presence of *Mayomyzon pieckoensis*, the rarest fish taken at Bradley University, from a picture I published of it giving the repository in the July/August, 1988, issue of *Rocks and Minerals*. The evidence from the Bradley Custodial staff suggests that the theft occurred between about April 10 and April 25. This dating led me to suggest that either the Mid-America Paleontology Society's National Fossil Exposition April 14-16 in Macomb, Illinois, or the Geology Section - Peoria Academy of Sciences' Gem and Mineral Show April 22-23 in Peoria, Illinois, might have attracted the felon(s) to Illinois. I do not think it likely that members of these two groups were involved. I belong to both groups myself! In fact, as a group, fossil students are probably much more honest than devotees of things such as guns, cars, stamps, and coins.

In conclusion, I should point out that I would never have been able to have found the two rare fish that were stolen or many other fossils in our collection without the help of amateur paleontologists. They took me personally to the two different localities where I found the fish. Non-professional paleontologists have been a godsend to me in teaching and research through their introducing me to new collecting localities and their donations of many sepcimens to our collections. I was an amateur paleontologist before I became a professional and hope to be one again after I retire.

BOOK REVIEW

by N. Gary Lane
Indiana University, Bloomington

DINOSAUR PLOTS. AND OTHER INTRIGUES IN NATURAL HISTORY. 1989. Leonard Krishtalka. William Morrow and Co., New York. 316p. $17.95.

Leonard Krishtalka is curator of fossil mammals at the Carnegie Museum of Natural History in Pittsburgh. The museum publishes a bimonthly magazine appropriately titled "Carnegie Magazine." Krishtalka writes a column on paleontological subjects for the magazine headed "Missing Links." The recently published book called *Dinosaur Plots* is a collection of these essays. I found the columns to be exceptionally interesting, well-written, and in some cases very humorous. He discusses topics of current research, debate and controversy, and has strong judgements on most controversial issues. He discusses such topics as hot-blooded dinosaurs, asteroid impacts and extinction, and human evolution. Most of the articles concern vertebrate paleontology, Krishtalka's special field of interest, but other aspects of paleontology are covered, but more briefly.

Even if you don't buy this book , I would strongly recommend that your public library should have a copy and that some of the chapters should be called to the attention of any elementary public school teachers who include a unit on dinosaurs in their teaching. Dinosaurs are a very popular science topic in elementary school, despite the fact that many of the teachers do not have any specific training in this area of paleontology. There is a wealth of teaching materials available, from books, models and posters to dinosaur songs for 3rd graders. Any teacher can benefit from reading the chapters in this book about dinosaurs. The two most useful chapters are Chap. 1, "Dinosaur Plots," which discusses recent developments in ideas concerning the activity and life styles of dinosaurs and Chap. 4, which discusses a free-for-all of questions concerning dinosaurs that were solicited by and answered by the Carnegie staff. This chapter should help any teacher cope with the multitudinous questions that school kids can ask.

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PRESIDENTIAL ADDRESS

PALEONTOLOGY: THE ACADEMY AND THE MARKETPLACE

N. GARY LANE
Department of Geology, Indiana University, Bloomington 47405

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The presidential address for The Paleontological Society traditionally has been given on a topic in the president's own special area of research. This year I am breaking that tradition because there are serious matters concerning this Society that deserve widespread discussion.

There are several important problems that face us as scientists. I do not have solutions to all of these problems, but I will make some modest recommendations at the end of this talk. Putting these problems forward in a public forum such as this meeting today will, I hope, benefit us as well as future paleontologists.

The problems that I want to mention briefly today deal mainly with our relationships with others and fall into three categories. One is our relationship, as paleontologists, with physical geologists. Another is our relationship to amateur fossil collectors. The third deals with fossil sites and fossil collecting.

OUR RELATIONSHIP WITH PHYSICAL GEOLOGISTS

I have seen statements by some of our most eminent colleagues that paleontology is a dying science. They see a continuing, serious, worldwide decline in paleontology. This pessimism stems from the fact that teaching positions in paleontology in our universities and colleges are gradually being eliminated. As positions occupied by paleontologists become vacant, they are being filled by geophysicists or hydrogeologists because of demand by students for training in those areas where there are abundant job opportunities. It is estimated that 60 percent of the practicing professional paleontologists in this country are employed as academics; thus, the attrition of job opportunities in this area really does affect a majority of us. I don't have any hard statistical data to support the contention that our employment opportunities are steadily declining, but I do know that this feeling is widely held.

In addition, there are fewer paleontologists employed in the oil and gas industry today, which used to depend much more heavily on biostratigraphic studies than it does now. The use of seismic stratigraphy and magnetostratigraphy is viewed by many geologists, incorrectly in my view, as eliminating the need for biostratigraphic studies.

The great majority of us in academics are employed in geology departments. Thus, we typically constitute a biological minority within a group of physical scientists who may not appreciate the interdisciplinary nature of paleontology. We need to make special efforts to educate our more physically oriented colleagues about the exciting and challenging problems that are being addressed in paleontology today. Understanding evolution and extinction should be part of the scientific culture of all educated persons. The deciphering of the history of life continues to be one of the profound monuments to the intellectual achievements of man. In order to reach a general audience of college-age young adults who will not become scientists but who will become the leaders of tomorrow, we cannot continue teaching courses exclusively dealing with invertebrate fossils, which the average college student finds boring. Rather, we must excite young folks with the entire range of fossil life, from Precambrian cyanobacteria to dinosaurs.

In addition to these contributions to a liberal education, it is clear that paleontology is still essential to the solution of many geologic problems. An increasingly refined biostratigraphy for all Phanerozoic rocks is essential to the prevention of diachronous correlations. No other tool offers the detailed correlations that are possible with fossils. The possibilities for increasingly accurate biostratigraphy are closely tied to an increasing emphasis on evolutionary taxonomy. Without new data, our science will surely stagnate. New data are obtained first through fieldwork and then by careful systematic studies of newly discovered fossils. We pay lip service to the need for good taxonomy, but how many advertisements do you see in *Geotimes* for faculty positions in paleontology with a taxonomic emphasis? Good taxonomy must be closely tied to evolutionary studies. These primary aspects of fieldwork, evolutionary taxonomy, and biostratigraphy will continue to be the foundation of paleontological studies for many years to come. We need to continuously emphasize the importance of these fundamental areas of research to our colleagues in the earth sciences.

OUR RELATIONSHIP WITH AMATEUR COLLECTORS

The interplay between scientific paleontology and amateur fossil collecting is complex and can be frustrating for both sides. We all know splendid examples of fruitful cooperation between amateurs and professionals. The efforts of the late Gene Richardson in saving the enormous wealth of the Francis Creek Shale nodules, or Lloyd Gunther's important discoveries in western states, are well documented. We also know some of the horror stories of this relationship. The exhaustion of the Indian Creek crinoid beds of Indiana by commercial collectors, an area that has never been studied scientifically, is an example with which I am intimately familiar. Despite my efforts to document and salvage even a small part of the unusually complete fossil record at these sites, I have been frustrated at every attempt. I have learned recently about a mosasaur skeleton from the Niobrara Chalk of Kansas that now resides embedded in the side of a Japanese swimming pool.

Confusion exists even in the names that people use to classify paleontological efforts. For example, most amateur collectors, like it or not, use the term "professional" to mean any person who earns his or her principal income through fossils, whether that income is derived from teaching and research or from the sale of fossils. Thus, scientists and commercial agents are lumped together. We need to insist that a clear distinction be made between a scientific paleontologist and a commercial dealer in fossils. We have an educational task here that all of us need to emphasize.

The cooperation of amateur paleontologists is important to the advancement of the science of paleontology. Let's just look at some numbers. We are greatly outnumbered by amateur collectors. There are 56 societies in the United States devoted largely to the amateur collection of fossils, compared to about 11 professional societies in North America. In addition, there are many rock and mineral clubs that include some amateur fossil collectors in their membership. There are over 100 rock and fossil shows in the United States each year at which fossils are exhibited, traded, and sold. We scientists have almost no input into this enormous expenditure of time and money on fossils. Amateur collectors are a potential source of tremendous goodwill and aid if we would ask for their help in a reasonable way. The motto of M.A.P.S., the Mid-American Paleontological Society of amateur collectors, is "A Love of Fossils Brings Us Together." Many of these people have influence in government or education. They are able to provide financial support and to volunteer time and effort if properly motivated. Amateur collectors can be trained to do scientific work of many kinds. Some can do artwork, fossil preparation, prepare catalog entries, or perform an integral part of various scientific studies. There are many examples of this kind of cooperation between amateurs and professionals and we need to do more to foster this relationship.

Many amateur fossil collectors trade stories, horror stories to them, of broken promises by professional paleontologists. Promises to write up a donated specimen of a new species, promises to display a rare or unusual fossil—promises that were not kept even by many of us here today at one time or another. We must ask ourselves how we can expect cheerful cooperation from amateur collectors if we persist in treating them with disdain. We must deal with amateur collectors as honestly and realistically as possible if we are ever to obtain their trust and collaboration. The establishment of the Strimple Award by this Society is an important and significant step in this direction. This award has excited the keen interest of amateur collectors and has had a significant impact on their activities.

I believe that we neglect this valuable source of help to our own detriment and that we clearly need to make a greater effort to bring serious amateur collectors and professional scientists together in pursuit of our common goal, which is very simply to learn more about fossils. Over and over again, when new members of M.A.P.S. are asked to state briefly their interests, they say that they are joining M.A.P.S. because they want to "learn more about fossils." Thus, there is a tremendous educational opportunity here that we are largely not fulfilling. Many of us are teachers and we have here a captive audience of enthusiastic and intensely interested folks, yet we continue to neglect this audience. Our institutional duties may require us to spend time educating 20-year-olds in required geology courses. We should not use this as an excuse to neglect those dedicated amateurs who really do want to learn.

FOSSIL SITES AND FOSSIL COLLECTING

Few areas of the interaction of scientists and the public engender as much disagreement and controversy as those of fossil collecting on public and private lands, the rights of people to collect, the destruction of fossil sites by overcollecting, and the issuance of rules, regulations, laws, and permits with regard to collecting.

I believe that the ultimate solution to these problems is primarily one of education, not one of permits. Professional paleontologists and amateur collectors in Great Britain have developed an excellent working relationship based on mutual respect and trust. In some instances a comparable situation has developed here between specific persons or small groups, but we still have a long way to go. Fossils are a part of our national heritage. Thus, in a sense they belong to all of us. Fossils are an important national scientific resource and thus their wise use is, and should be, a matter of conservation policy, at whatever level.

We find that the paleontological community is sharply divided with respect to the need for any policy decisions. Some believe that collecting restrictions are necessary, on all or on some part of the paleontological population. Others believe that no restrictions of any kind should be imposed on anyone. This controversy is far from being resolved. Those interested in fossils do not agree on whether or not collecting causes significant damage to fossil sites. No consensus exists. The recent report on Paleontological Collecting by the National Research Council has been condemned by some and supported by others. The report deals only with Federal land, and the whole issue of the conservation of fossil sites on private property has not even been addressed. This report is an important first step in promoting open debate of these problems. Clearly there must be a much more intensive and prolonged dialogue on these issues before any consensus can be reached.

No professional paleontologist can possibly know about or collect all fossil sites that may be of interest in his or her research. We are continuously indebted to amateur collectors for calling our attention to sites and for the use of collections that they have made. An extremely valuable exercise that amateur collectors can and do perform, but which they could do much more often, is to return time after time to a favorite site, carefully recording each collection and providing an extensive census of fossils from a single site that can be used for a variety of studies. Most professional paleontologists do not have the time or opportunity to make such collections.

Another area of conservation that affects me directly is the wise use of fossil localities for teaching purposes. I have had favorite field trip localities so stripped of fossils by collectors—students, amateurs, or others—that they have become useless for teaching purposes. There are research localities that would be useful for teaching purposes that I dare not take students to, as the sites would soon be exhausted. We all know that most fossil localities age and ultimately fade away, simply from weathering and erosion, or more recently by being overgrown by crown vetch planted by highway departments. If we all give some consideration to others and try to limit collecting to that necessary to provide instruction to students, many localities might last longer.

SUMMARY

In summary, we need to exert as much influence as possible on our geological colleagues to convince them that paleontology is an absolutely necessary part of the education of all earth scientists. It is pedagogically unsound to think that knowledge of the history of this planet can possibly be complete without an understanding of the evolution of life.

We need to undertake the enlistment of amateur collectors in our quest to elucidate this history of life. There are many ways that we can set about doing this. I will mention only a few examples here today. Each of us could serve as a scientific adviser to amateur rock and mineral, and fossil, clubs. We could propose and aid in projects that have social and scientific merit. Such amateur groups could provide study sets of specimens for school science classes. They could prepare study guides for field trips and outcrops in their local area that could be used for educational purposes. They could assemble as complete faunal and floral sets of specimens from local formations as possible. Such well-identified sets could form the basis for a State Fossil Room at a local, regional, or state museum. There are many such worthwhile activities in which amateurs could take an active and proud role. Obviously, there are many ways that such groups could help us in our own individual research as well. Finally, we should take very seriously the keen awareness and interest of the general public in the fossil materials that we study. We must appeal to this interest and use it to develop paleontology into a strong asset of the scientific community.

Reading the Stories in Michigan's Rocks

by Robert V. Kesling

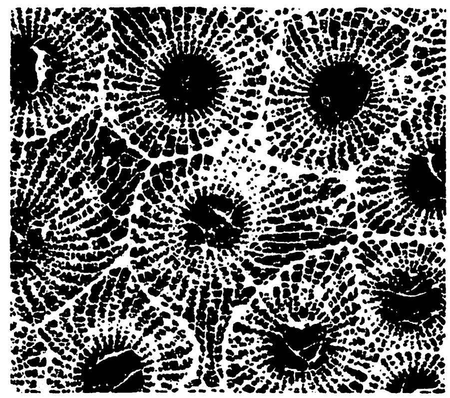
ED NOTE: This article is copyright and is reprinted by permission from "LSAmagazine," Spring 1988, University of Michigan.

It is clear in the first place that the world in its present state is the outcome of movement. Whether we consider the rocky layers enveloping the Earth [or] the arrangement of the forms of life that inhabit it, . . . we are forced to the same conclusion: that everything is the sum of the past and that nothing is comprehensible except through its history.
— Pierre Teilhard de Chardin, *The Future of Man*, 1959

ossils, the basic data of paleontology, tell the story of our past; yet, most people know little about them or about why their study is important. For John Q. Public, the word "fossil" conjures up giant reptiles sloshing about in a steamy swamp, devouring either exotic plants or one another, and John Q. Jr. can excitedly discuss several genera of dinosaurs with his kindergarten classmates. However, although the dinosaur exhibit is probably the most popular section of the University's Museum of Paleontology, dinosaurs are relatively rare fossils, and none have been found in Michigan.

The common fossils of our state are the marine invertebrates that inhabited the area now called Michigan during the Paleozoic Era (some 600 to 200 million years ago), when it was covered by tropical seas. Tropical seas? Yes, indeed, both before and after evaporation precipitated the thick beds of salt that underlie the Lower Peninsula. Furthermore, recent paleomagnetic studies indicate that for a while during the Paleozoic Era, this part of our wandering continent was situated just across the equator, in the Southern Hemisphere!

Why is it important to collect fossils, study them, and learn what we can about their environment? The most immediate response to that question is that paleontology gives us access to information that concerns our own species. If "everything is the sum of the past," as Pierre Teilhard de Chardin says, paleontology can provide clues that help us understand our place in the environment.



A thin section through the compound coral Hexagonaria anna, *commonly called the "Petoskey Stone" and officially named the State Fossil of Michigan. It and all other tetracorals are extinct. (x 2)*

One thing paleontological research tells us is that just when certain creatures achieved what seems to have been near-perfect adaptation to their environment, they became extinct. By the end of the Paleozoic Era, tetracorals, tabulate corals, trilobites, cystoids, blastoids, edriosteroids, cyclocystoids, armored fish, and many other major groups of animals died out completely; others dwindled to a few insignificant survivors. The usual explanation for this is that the environment changed too quickly for them to evolve to fit it. Is it possible that our environment could change so rapidly that we could no longer live in it? Could we also become too well-adjusted to the status quo?

Although extinction was the end of the line for certain species in the past, the appearance of new ones to replace them and maintain the faunal balance was just as significant. Scientists continue to debate whether new species developed their characteristics suddenly or assumed them gradually, through long spans of time. Will mankind give rise one day to a new and superior species, or will our species be slowly modified until it can no longer be recognized as *Homo sapiens?* We do not have answers to such tantalizing questions. Nevertheless, Michigan fossils provide much interesting and useful information and many clues about how organisms respond to environmental changes.

The "Petoskey stone" and other extinct creatures

Paleontologists applaud the selection of the "Petoskey stone" as Michigan's state fossil. Although it is not a "stone," but rather a Devonian fossil coral of the genus *Hexagonaria*, and although this same coral is found in various parts of the state (and even outside it, for that matter), the Petoskey stone focuses attention on the question of extinction. Despite the fact that they once thrived in such numbers that their calcareous skeletons helped build reefs, some reaching a thickness of more than 800 feet but now buried under younger strata in Michigan, *Hexagonaria* and all its relatives among the tetracorals are no more.

Other extinct groups adjusted in unusual ways to survive. For example, the cystoids and blastoids (stemmed and anchored relatives of the starfish) developed elaborate highly specialized structures for extracting oxygen from the sea water around them. The trilobites (armored relatives of the living crayfish) evolved the curious ability to completely "enrol," protecting their legs and soft undersides with thick dorsal hinged plates; this was evidently a protection against smaller species of armored fish and other predators that appeared at that time (cover).

▲
Oral view of Strataster, *showing the cups in the arms to accommodate the tube-feet used in procuring food. The central disk, housing the vital organs, was exceptionally small, compared to the long, tapering arms.* *(x 10)*

The tabulate corals (differing from the living corals in both symmetry and manner of growth) resemble a honeycomb, utilizing the minimum secretion of carbonate to make chambers for individuals of the colony. One individual could build itself into a colony by successive asexual budding, and in some species, the "parent," after budding off its "offspring," doomed itself to be overgrown and suffocated by them.

Fortunately, most of these extinct organisms have living cousins, from which we can infer certain parameters of the physiology and ecology of the extinct species. For example, the cystoids and blastoids are definitely members of the phylum Echinodermata, as revealed by their growth pattern (ontogeny), in which the size increases by successive additions around the rims of the individual plates that constitute the external armor. The common living echinoderm is the starfish, which cannot survive in low salinities. Hence, in the absence of any contrary data, paleontologists believe that cystoids and blastoids lived only in normal concentrations of sea water. Modern corals (with rare exceptions) need some sunlight for their well-being, and the assumption is that the extinct tetracorals and tabulates likewise lived in the shallow sunlit parts of the Paleozoic oceans. The present-day brittlestars have weakly developed mouth-frames and feed exclusively on organic debris; we think the Paleozoic brittlestars, their direct ancestors, were, similarly, scavenging and detritus feeders.

Aboral (top) view of Strataster, *with part of the central disk missing. The relatively weak mouth-frame indicates that the biting power was negligible, and the animal probably fed on small particles of detritus borne along by the currents. Around the mouth frame are grooves for water circulation and for nerves, exactly as in living brittle-stars. In fact, these creatures have changed remarkably little over the last 300 million years.*

Other kinds of Paleozoic marine animals left a lineage of living descendants. Brachiopods, which secreted two unequal but bilaterally symmetrical valves to protect the soft parts, were one of the major groups in the Paleozoic seas, both in numbers and diversity; they have now declined to a pathetically few species and are becoming rarer with each passing decade. Their place as filter-feeding organisms has been taken over by the pelecypods (clams), which have with time increased in both numbers and kinds. One would naturally assume that in the competition for small organic detritus, the pelecypods were more efficient than the brachiopods; nevertheless, paleontologists are still investigating other possibilities. With the sources of their information long since deceased, paleontologists need to keep an open mind.

Crinoids (usually referred to as "sea lilies") are favorites of fossil collectors. One reason is their well-developed pentameral symmetry in the calyx (or "head") to which the long, graceful arms are attached. Those from the Middle Devonian strata of Michigan are particularly well preserved. In contrast to the few small unattached crinoids still extant in tropical seas, these 350-million-year-old stemmed echinoderms formed a significant element in communities of their time. From the survivors, however, we can deduce much about the life habits of their Devonian predecessors. The fossil forms have weak, branched arms provided with a multitude of tiny pinnules for intercepting and extracting little food particles carried by passing currents, exactly like those of the living crinoids. The flexible stem permitted the calyx to swivel into the most advantageous position for feeding, and musculature enabled the arms to fold up, like ribs of an inverted umbrella, for protection.

The sea-lily, or crinoid Arthroacantha carpenteri, *from the Middle Devonian strata of Michigan, developed stout spines on its branched arms, evidently as a protection against predators. This may have discouraged the smaller fishes that lived at the same time. (x 4)*

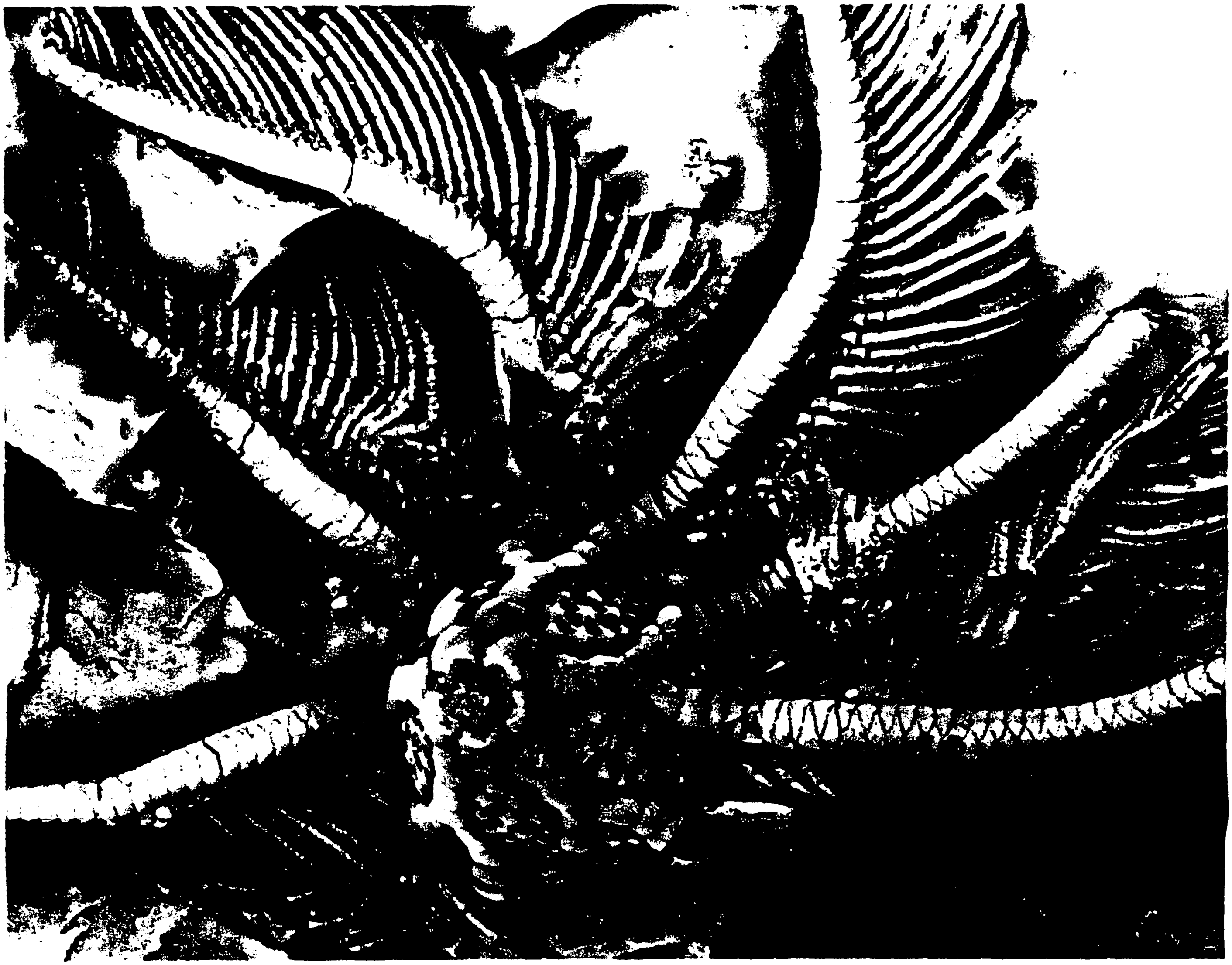
Of course, in the Paleozoic Era, as now, the sea water teemed with microscopic life. One of the more intensively researched groups of these tiny creatures is the Ostracoda. Ostracods (as they are known to ostracodologists) are miniature versions of a crayfish, enclosed between two hard valves, like those of a clam. The appendages (legs) and internal organs are only rarely preserved in the fossils, but the calcareous carapace, consisting of two valves hinged together along the dorsal (top) side, is enclosed in chitin and is quite durable. Ostracod carapaces are found in nearly all Paleozoic strata. Because many ostracods are less than one millimeter long as adults, "collecting" them requires special techniques for washing away the rock matrix and sorting through the residue with the help of a binocular microscope. The results can be rewarding. The two valves of the carapace are nearly mirror images of each other. In most species they are variously ornamented with knobs, spines, lobes, furrows, and specialized structures, making classification on the basis of form not very difficult.

Microfossils and petroleum

Because certain species of these microfossils appear to have been intimately linked with particular environments, the petroleum industry is interested in them. Ostracods are small, numerous, and ubiquitous; therefore, a good sample of them can be obtained from a short section of well core. These minute crustaceans exhibit so many structural features in their shells that they can be readily assigned to sub-class, order, family, genus, and (ultimately) species; and they evolved so rapidly, each species being relatively short-lived, that they yield excellent dates for the deposition of the rock in which they are buried.

One fascinating group of ostracods is the superfamily Beyrichiacea, exclusively Paleozoic, which had a long straight hinge between the valves. These little animals were dimorphic; that is, the adults were divided into two groups, each differing only in particular details. One dimorph resembled the juveniles in form, but was larger; in the other, however, a lower portion of each valve ballooned outward, like the cheeks of a gopher in a peanut patch. For many years it was uncertain whether the dimorph with the added protuberances in its valves was the male, utilizing the inside pockets for storage of sperm (living ostracods possess the largest sperm in the animal kingdom!) or the female, using the spaces for carrying eggs. To finally solve the question, an investigator ground down a specimen into thin sections and discovered that the structures actually contained young carapaces of the same species; he promptly named them *cruminae*, or "brood pouches."

In other Paleozoic dimorphic ostracods, the dimorphism is not so pronounced, and paleontologists are still arguing about which is the male and which the female. In the genus *Ctenoloculina*, one adult form has a series of small pockets in each valve, open to the outside. Could the female have manipulated an egg into each of these pockets and cemented it fast? We do not know.



The crinoid Opsiocrinus mariae *from the Middle Devonian. This specimen has the stem missing, but the scar remains. It shows the five-fold symmetry characteristic of echinoderms. The arms are provided with multiple pinnules, and we presume that the animal spread them out into an effective net for intercepting food — just as do the few crinoids still living. (x 6)*

The occurrence of Ostracoda, combined with geological observations, may yield important information on past environments. One of the unusual formations in the northern part of the lower peninsula is the Devonian Gravel Point Formation, in particular a bed known as the *Welleria* zone, exposed near the village of Afton. It derives its name from the very numerous specimens of the ostracod *Welleria aftonensis* that it contains. In the Campbell Quarries, just north of the village, this layer contains so much oil and other hydrocarbons that on warm days crude oil actually seeps out along bedding planes. A close examination of thin sections of the rock reveals that the matrix is composed of slightly reworked chips of fine-grained, sun-curled chips of clay. The layer contains *only* the one species of fossil, but this species is particularly abundant.

The exclusion of other invertebrates suggests an unusual condition. We know that ostracods today can survive in bodies of water with exceptionally high salinity; indeed, some species thrive in them. The story becomes clear; in a restricted lagoon with heavy evaporation and strong saline concentration, the ostracod was the only form of life (other than possibly the unpreserved microscopic plants upon which it fed) that could survive; without competition, *Welleria* flourished. High salinity prevented the growth of bacteria that would normally consume or alter the hydrocarbons as they formed. Gentle wave action bore mud onto the shore, which when dried and cracked by the sun, was carried back by later waves as small chips, to form the major constituent of the rock formation. Ostracod oil!

Was this a rare event? We think not, because in drilling in strata of the same age in western Saskatchewan, well cores were obtained in which specimens of *Welleria* were found embedded in clear salt. Undoubtedly they lived in a lagoon that was remarkably similar to that in Michigan, but evaporation so concentrated the brine of the lagoon that salt was precipitated.

410 days per year

Occasionally, the actual substance of the fossil leads to unexpected revelations; the growth of corals is a case in point. Because light encourages more active movement of the coral's food supply, we have known that corals grow in direct relation to the amount of light in their environments; in short, the more light, the more available food swimming by; the more food available, the more consumed; more food consumed, more shell growth per day. Microscopic examination of living corals has now shown that this peculiarity of growth-light relationship can be detected in the coral's skeleton with great precision: in thin sections, growth rings representing daily additions vary according to the phase of the moon (the coral having grown faster on moonlit nights); over the day-night and moon-phase cycles are imposed the annual cycles dictated by temperature and currents. Since it has proved possible to discern the days in the year from living corals, someone got the brilliant idea of examining fossil corals by the same method. From thin sections of a Paleozoic fossil coral, we have learned that the earth had some 410 days per year when that coral was alive. This not only confirmed that the rotation of the earth is slowing down, but gave a definite quantitative answer on the rate.

Reading history in rocks

What, then, is this science called paleontology? Basically, it has three "dimensions": taxa (the kinds of animals and plants living in the past); space (geography of the past); and, very importantly, time (when the creatures lived). In the complex relations between these three "dimensions," global tectonics (mountain-building, uplifts, and faulting) influenced the local tectonic setting, which in turn determined the paleogeography to which the animals had to adjust (their physical environment). Within the biota, each species had to reach a balance with its contemporaries — with regard to predation, competition for food, availability of the oxygen supply, and reproductive opportunity. After death, every animal was subject to scavengers, transportation by currents, solution of its hard parts, and chemical replacement of its shell material. Furthermore, a fossil was at the mercy of physical forces affecting the rock in which it was entombed — compaction, folding, and chemical alteration (diagensis). Little wonder that the paleontologist regards each fossil as a marvel of survival through the ages.

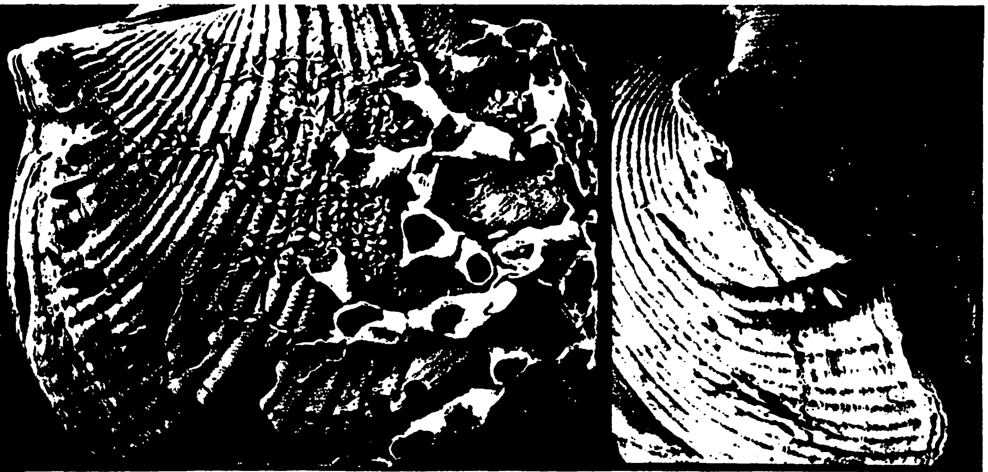
Paleontology might better have been called "paleobiology," for it is the study of biology applied to creatures of the past. Paleontology deals with one dimension that biology does not: TIME. This accounts for many difficulties. The pages of ancient history (the rock strata) are incomplete, both in time and space. Whole chapters are missing; yet the paleontologist seeks to piece together the plot of the entire book. Many years ago, the noted earth scientist Alfred Wegener wrote: "We are like a judge confronted by a defendant who declines to answer, and we must determine the truth from circumstantial evidence. All the proof we can muster has the deceptive character of this type of evidence. How would we assess a judge who based his decision on only part of the evidence?"

Nevertheless, the necessity for detective work is a large part of the fascination. Each new technology must be applied to old riddles. In neither the organic nor the inorganic world is there such a thing as a fresh start; time continues inexorably, uninterrupted. Every animal is the product of its ancestry, inheriting some characteristics that are essential and some that are not. Similarly, each sedimentary unit is the product of previously formed rock units that are being recycled by physical processes. Fortunately, certain chains of control and feedback can be detected. In the animal world we call it "evolution." The end result is obvious: the diversification of life forms that we have around us today. The steps that led to this are not so obvious.

Fossils are the record of their times. Each sedimentary stratum containing them is a page recounting a brief interval of earth history. From paleontologic investigations, we catch glimpses of the excitement of long-ago times: struggles for survival, competition within the community, migrations into and out of the area, colonization and exploitation of preferred habitats, the successes and the tragedies, life and death. We strive for a dynamic interpretation with only the static evidence of incompletely preserved bodies to guide us. From what Providence has held in storage for us, we see something of ancient history — often as through a glass darkly — but always with the hope of more and better knowledge.

By these researches into the state of the earth and its inhabitants at former periods, we acquire a more perfect understanding of its present condition, and more comprehensive views concerning the laws now governing its animate and inanimate productions.

— Charles Lyell, *Principles of Geology*, 1830



The brachiopod Paraspirifer bownockeri *and some of the epizoans that lived upon it. One specimen (left), seen in top and front views, bears a prominent colony of the tabulate coral* Aulopora microbuccinata *on its brachial valve. The notch at the left corner marks the onset of predation by the parasitic worm* Cornulites, *and borings near the margin can be ascribed to sponges, probably* Clionides. *An enlargement (center) shows colonies of the* Aulopora *and the ctenostome bryozoan* Ascodictyon fusiforme *and two infestations of sponge borings; growth lines immediately beyond the rows of borings are closely spaced, indicating a slow recovery by the host. Another specimen of* Paraspirifer *(right) has two tubes of the parasitic worm* Cornulites, *which grew forward at the same rate as their host, to continue eating at its shell-secreting tissue at the edge, producing notches in both valves of the unfortunate brachiopod.* (left figures: slightly less than natural size; right figures: nearly twice natural size)

The Paraspirifer Saga

Some fossils divulge dramatic events of their lifetimes. From the Middle Devonian Silica Formation, exposed in the ill-fated and now abandoned Martin-Marietta quarry near Milan, Michigan, come specimens of the brachiopod *Paraspirifer bownockeri*, which tell tales of conflict in those times. These large, rotund brachiopods were ideally suited to survive atop the soft muddy bottom of the Silica sea. They grew like other brachiopods, adding tiny increments of shell along the margins of their valves; the closely spaced growth lines indicate poor conditions (slow growth) for their owner, and widely spaced lines indicate very good times. A few lucky larvae settled on the shells of the Paraspirifer and made their life-long home there, taking advantage of the hard brachiopod shell for anchorage and a firm foundation. Some of these unwelcomed guests were not truly parasitic, although by their sheer weight they must have placed an added burden on the brachiopod to open its valves for feeding. These include the tabulate coral *Aulopora microbuccinata* and numerous genera of bryozoans, as well as a few other brachiopods, polychaete worms, and young crinoids.

It has even been suggested that the association of the brachiopod *Paraspirifer* and the coral *Aulopora* may have been mutually beneficial (commensal); the coral may have taken advantage of feeding currents generated by its host, and the brachiopod gained a degree of protection from the stinging cells of its guest. This has not been proved.

Two parasites were a more serious matter for *Paraspirifer*. On occasion, the currents swept a host of sponge larvae into the area. As they matured, these boring sponges perforated the edges of the brachiopod's shell. The unfortunate host was subjected to a major infestation of these parasites at one time. In no case observed, however, were the sponges fatal, for the brachiopod recovered and continued to slowly secrete its shell *beyond* the borings, leaving them as a "dotted line" along one of the growth lines in each valve.

More serious was the attack of the worm *Cornulites*, which apparently fed upon the tissue of the brachiopod at the leading edge of the shell and continued to build its conical tube-like shell forward at the same rate as its brachiopod host grew, always maintaining a position at the edge, from which it could chew upon the shell-secreting tissue of the *Paraspirifer*. That *Cornulites* was damaging to the host brachiopod is convincingly attested by the fact that wherever a worm tube is situated, the shell growth of the brachiopod was impeded — leaving a notch in the shell edge as a record.

As if *Paraspirifer bownockeri* did not have enough troubles, a few specimens show opposing perforations through the entire thick valves. Insofar as is known, the only inhabitant of the Silica sea powerful enough to have inflicted such punctures was the giant armored fish *Dinichthys*, with its great crushing jaws measuring some three feet across. Probably the bitings were accidental or experimental, for if *Paraspirifer* had been on the fish's regular menu, it would have been wiped out in short order.

There is more to the *Paraspirifer* saga. Over 500 specimens have been examined to determine which areas of each were inhabited by each of the alien species, and the information was plotted on a grid. The results show a preferential side of the host for initial attachment of most settlers. Because most of the brachiopods lay in nearly the same orientation, we have a clue to the direction of the prevailing currents bearing the larvae of the settlers. But questions remain. Certain of the epizoan species seldom inhabited the same host brachiopod with certain others. Could it be a case of "first come, first accommodated," in which the earliest arrivals somehow repelled settlement by the latecomers or devoured them as fast as they came? In a few brachiopods, the attached corals extended their colonies across the junction of the host's two valves, so that they could no longer open for respiration or feeding. Did the larva originating each of these coral colonies settle while the brachiopod was alive or after its death? We suspect the former, but we have no conclusive proof — yet.

Robert V. Kesling is professor emeritus of geological sciences.

THE USE OF DATABASES IN PALEONTOLOGY

by Wayne S. Barnett

The use of databases in paleontology has been a practice that has existed since the first scientific collections have been made. Those early databases were maintained on index cards or in ledgers. Each lot (a number of specimens of the same species from the same location) had their own entry and/or card. If the collector or curator wanted to know the details of a particular specimen they would need to look it up in the ledger or a file card. While this method of record keeping allowed the collector to keep tract of the specimens, it did not allow him the ability to sort on different locations or families in a convenient manner. In the traditional database each entry was made in the ledger and when additions or corrections to the data was required each entry needed to be found and changed individually. If the file card method was used the cards were added, in order, as they were filled out. While this made it convenient to find the information in the order that it was filed it made it difficult to find information that the database was not sorted to find.

In recent years the use of databases on computers has come into use. The use of desktop computers has given the collector a convenient way of keeping tract of collections and sorting on any number of parameters that may be saved in the data. What follows is a guide on how to set up and manage a fossil database. It is based on experience and may not be all inclusive but will, hopefully, help avoid some of the pitfalls of trying to set up such a database.

The first thing that must be considered is the database program that is to be used to enter the data. There are many different brands of programs on the market. Each has their advantages and shortcomings. If you are only going to collect a few specimens and are not keeping long records on each specimen a flat filing system may be the type of program needed. If a larger collection is anticipated and the details on each specimen is extensive, then a more complex program may be required.

A rather complete analysis of databases was given as a three part series in PC magazine in 1988. It gave more detail than the scope of this article dictates. If an analysis of databases is desired it is suggested that you refer to that series of articles. For the purposes of this article there are two types of database programs, flat and relational. Flat filing systems do not offer any sort of cross-referencing between files. Relational systems allow more than one file to be accessed to generate a report or to find a series of entries.

While it is not a recommendation, it should be noted that the defacto standard for databases is dBASE by Ashton Tate. Many of the programs that are on the market were originally placed there to compete with dBASE because of a short coming that it had. One of the factors that all of these programs have in common is the relative high cost, usually several hundred dollars. One of the alternatives is to use a product that is put on the market as shareware. These are programs that are usually much cheaper than shrink wrapped programs and will serve the needs of most users. There is a popular shareware product that, in fact, will generate a file that is compatible with dBASE. Many shareware companies advertisements can be found in most of the popular computer magazines.

Once the program that will be used to enter the data has been chosen, the information that will be kept in the record for each specimen must be determined. Most programs will allow the addition or deletion of fields to the form so that it may not be required to enter all the fields when first setting up the database format. The basic fields that should be in any fossil database are genus, species and location. These three fields are the most important pieces of information for most collectors.

The first two fields are usually filled with only one word each. The field for location may have a great amount and variety of information in it. It is better, however, to break the information into several fields. Normally the location notes where in the state or county the specimen is found as well as the placement along the roadcut, quarry, or stream fromwhich it was recovered. The location field may be broken into several fields such as state, county, etc. In addition several other types of information should be added to a database that is used to manage fossils. The following list of fields are those that are probably most important. Not all may be required for your needs and there may be others not on this list. The list is in alphabetical order and not the order that would normally be entered in a database.

AGE The AGE field is used to enter the age of the specimen. This age is usually obtained from the literature on the area that you are working.

AGE CODE This field may be added so the specimens may be sorted in chronological order. The names of the periods are not in alphabetical order from oldest to youngest, so another sort parameter must be chosen if the material is to sorted in age order.

AUTHOR When a specimen is named the individual that names it is given credit. The date (year) the specimen was named is also part of this information.

CLASS is the third biological division by which animals and plants are divided.

COLLECTOR Who collected the specimen may be important if specimens are acquired through trading.

COMMENTS Odd information about the specimen may be entered in this field.

COUNTRY The COUNTRY where the specimen was collected.

COUNTY This may be the county or other political entity. In some countries this may be the Parish.

DATE This may be when the specimen was collected or when the information was entered into the database. If both are desired it will be necessary to have two types of DATE field names.

FAMILY The biological family that the plant or animal belongs. In most modern works the species are divided into at least the families in the text.

FORMATION Formations are the rock units that the fossils are found.

GENUS The first name of specimens in the Linnean system of naming plants and animals.

KINGDOM Which major biological group do the specimens belong, plant or animal.

LOCATION The place where the specimen was found. Information on the location should be as detailed as possible. This is one field that a great amount of information can be entered. Break the information out into as many fields as possible to make access and sorting easier. Many other-wise valuable specimens have been deemed worthless because of poor or no location data.

NUMBER The NUMBER that is assigned to the lot. This may be a code with letters and numbers or a serial numbering system like 1, 2, 3, ..., n.

PHYLUM One of the major divisions of the biological classification system.

SPECIES The lowest major subdivision if the biological classification system that is used.

STATE The state or province the specimen was collected.

STORAGE Where the specimen is kept.

SUBGENUS A division of the generic designation that groups a number of the species into sub-generic units. Many times the SUBGENUS name is elevated to generic level.

SUBSPECIES A division of the species level into smaller biological units. The subspecies designation is used when the differences between populations are not great enough to warrant the erection of a new species.

In order to establish a database that will serve your needs some thought should be given to setting it up. The first step is to determine what fields are required. Of the above fields all may not be required for your needs. There also may be fieldsthat are not included in the above list that will be required. The next step is setting up an entry form for the database with the required fields. It is usually best to set the database up with the required fields from the start. Most database programs will allow the addition or deletion of fields but may not allow the data entry order to be changed.

The number of spaces that are required for each field is the next step in setting up the database. The addition of a few spaces may increase the size of the file significantly. If the space that is designated is not enough additional room can usually be added at a later time. The order that the data will be entered will need to be determined so the amount of time that it takes to enter the data will be minimized. With any database project the greatest amount of time will be spent entering the data into the system. Any way this time can be reduced will make the job easier. If a large collection is being entered the saving if just a few seconds per entry will mean hours saved on the entire project.

Once the entry form has been generated the data entry may begin. Depending on how the collection being entered was assembled and/or organized there are several ways to enter the data. If the specimens are a series of random lots that were acquired from diverse sources the entry of the data will need to be done a lot at a time. If the collection was and is being made in large blocks of specimens with much common data the data entry may be made more efficient. Some database programs allow the generation of a single form with all the fields filled except those that need to be different. Also sequential fields such as number may be generated in order so that all that is needed is to fill in the blanks for the specimens names. This is a particularly powerful function if the specimen information being entered have many fields with common information.

Other considerations are the applications the data will be applied. If the user wants to cross-reference the fields to compare, for example, the species verses the locations collected, it may be advantageous to generate a coding system that can also be used when entering the data. In this manner the species may be entered on one axis and the locations codes may be entered on the other axis.

Once the information is entered into the database it may be sorted in several different ways. This is one of the major reasons that such data is kept in digital form. If a listing of the material that was collected from a particular state or location is desired the use of a digital database will made it possible to extract the information quickly. Additional types of sorts could include family, genus, or age. Many times a sort will be done with several variables. In such a case the collection may be first sorted on class, family, genus and then species. In this type of sort the collection is placed in a biological hierarchy. After any sort is done a hard copy is usually possible. If a paper copy is not required the file may be resorted or deactivated until needed again.

A side benefit of the sorting process will be that many errors or omissions will be found in the data. These errors will be from typographical, spelling and other errors. By keeping the records for your collection on a digital file the records may be corrected as the errors are found. Another type of change that may be required with a fossil collection is names that are changed in the literature. If it is easy to sort and change the data efficiently the collection may be kept current with the present naming conventions. Periodically a new hard copy may be printed, if desired.

There are several advantages to using a digital database with a fossil collection. As above to keep track of the specimens in the collection, but also to generate any number of types of reports, trade lists and to keep a record of the material sent fellow collectors.

As with any storage method the risk of loss is to be guarded against. The habit of backing up your data files will help prevent the loss of data. There are several ways to insure that the data is saved. Using the copy command and copying the file to a floppy disk at regular intervals will help save most of the data. If the file is lost the only data thatneeds to be re-entered is the data since the last backup. If the backup interval is one week a weeks worth of entry will be lost. Using a batch file to activate the copy and save routine will make it quicker to save the data. After a time the data file may get larger than will fit on a single floppy disk. At this time the file will need to be split or use the backup command to save the file. It is usually better to use the backup command. This function will save the data on as may disks as is necessary to hold the data. If the data is lost and has been saved with the backup command the restore command must be used to put a file back on the hard disk.

Hopefully these few lines have given some help on how to set up a fossil database. If any questions arise on database management or other computer type questions please let me know. If there is a number of repeat or related questions I shall try to answer them with a follow-up article as well as try to answer them individually. I may be contacted at my Houston address in the directory.

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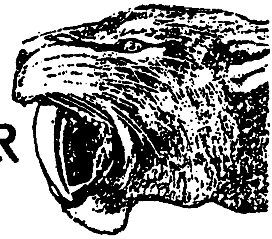

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TABLES: 8 FT, tables available - $10.00 for event [MUST REGISTER]

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FLORIDA FOSSIL FAIR (REGISTRATION FORM)

NAME ______________________________ PHONE ( ) ______________

ADDRESS ______________________ CITY __________ STATE ______ ZIP ______

DEALERS: __________ DAYS @ $10.00 a day. FRI _____ SAT _____ SUN _____

CAN YOU CONTRIBUTE TO THE AUCTION? ________ EXHIBITS ____________

WILL YOU ATTEND THE FIELD TRIP ON FRIDAY ____________

The Austin and Dallas Paleontological Societies Present

FOSSILMANIA VII

FOSSILMANIA VII will be held at Oakdale Park, Glen Rose, Texas on October 20-22, 1989. Displays, trade, or sale items are to contain only fossil or fossil-related items.

HOURS:

Friday	October 20	1:00 p.m. to 6:00 p.m.
Saturday	October 21	9:00 a.m. to 6:00 p.m.
Sunday	October 22	9:00 a.m. to noon

LODGING:

Trailer Sites	$10.80/night (full hook-up)
Tent Sites	7.65/night + $2.00 each additional adult.
Cabins*	36.00/night - 2 double beds, linens furnished. (3 double beds with kitchen facilities, without linens - rent directly from Oakdale Park, PO Box 546, Glen Rose, TX 76043, 817/897-2321)

*All cabins are air-conditioned and heated. There is a 2-day minimum requirement on all cabins. A local motel and state park are listed below for your info.

MEALS: There are several cafes in town. FOSSILMANIA will sponsor a Potato Bust on Friday night at 6:30 p.m. and a Texas BBQ on Saturday night at 6:30 p.m.

EXHIBITS: Let us know if you intend to bring an exhibit. Tables will be provided free. Let us know dimensions of case and any electrical requirements.

TABLES: Tables will be assigned on a first-come, first-served basis. The cost is $10 for a 6-foot table for the entire weekend. If tables are not already reserved, reduced cost basis for partial days will be available.

FIELD TRIPS: No field trips will be sponsored during the show. However, we will have information available for trips in the surrounding area.

AUCTION: We would like a donation of one nice fossil specimen for the live auction to be held Saturday night after the BBQ. Please be prepared to provide full data on the item and the name of the donor.

RESERVATIONS: Everyone should make advance reservations as soon as possible, but no later than September 30, 1989. Cabins not reserved by then must be released back to Oakdale Park. Please separate the reservation form below and send it to Frank Crane, 1603 Twilight Ridge, Austin, TX 78746. Make checks payable to the *Austin Paleontological Society*. For additional information you may also call (after 5:00 p.m.) Frank or Joan Crane at 512/327-4005.

MOTELS/RV SITES:

Glen Rose Motor Inn - US 67 - 817/897-2941 Double - $44.52/night (incl tax)

Dinosaur Valley State Park - From US 67, FM 201 east 4 miles; Park Road 59 east 1 mile. Entrance $2/day. Water/electricity/sewer hook-up $10/day, water/electricity hook-up $9/day, primitive camping $4/day. The state park is popular - you can make reservations up to 90 days in advance (requires an advance equal to the first night's cost). PO Box 396, Glen Rose, TX 76043, 817/897-4588.

SECURITY WILL BE PROVIDED BUT WE CANNOT BE RESPONSIBLE FOR LOST OR STOLEN ITEMS.

Name________________________ Phone (   ) ________________________

Address______________________ City_________________ State____ ZIP__________

Cottages: 2 dbl beds $36.00/night, linens furnished $__________
PLEASE CHECK: Thurs__, Fri__, Sat__, Sun__

Campsites: Trailer Sites @ $10.80/night __________

Tent Sites @ $7.65/night + $2.00 ea add'l adult __________

Meals: Potato Bust @ $4.00/person __________

Texas BBQ @ $8.00/person __________

Combo PB/BBQ @ $11.00/person (save $1) __________

Tables: 6' table for weekend @ $10.00 each __________

TOTAL ENCLOSED __________

Exhibits: Yes______ No______ Size of Case____________
Electricity Required Yes______ No_______

Please ADD the Following NEW MEMBERS to Your Directory:

J. Herbert Hall Rt. 1, Box 380 Carbondale, IL 62901 618-457-8464	Chemistry professor. Will trade. Wants to pursue interest in fossils.
Rita O. McDaniel 519 - 7th Ave. So. Surfside Beach, SC 29575 803-238-1083	Interested in fossils since 1985.
Doug O'Brien 6688 N. Avon Rd. Honeoye Falls, NY 14472	Interested in all fossils; vertebrates. Will trade.
Brad & Linda Ross 107 Westminster Drive St. Clairsville, OH 42950	
Matthew Swilp 205 Caveson Dr. Summerville, SC 29483 803-873-5715	Fossil collector/musician. Will trade. Major interest sharks' teeth, fossil imprints (shells, amonites, etcs), mammal teeth, edentates. Has for trade Eocene, Oligocene sharks' teeth, whale, turtle, bird, fish remains, Miocene teeth, some rarities. Wants to broaden his contact & collection and to see what is found elsewhere.
Joe Taylor Mt. Blance Fossil Casts 208 So. Farmer Crosbyton, TX 79322 806-675-2604	Artist, sculptor, muralist, mold-maker. Will trade. Major interestBlancan, all West Texas & Plains fauna --exact molds & exact reproduction & restoration. Has for trade possible horse, bison--fossils; also over 30 casts of skulls & bones of bison, extinct mammal & dinosaurs. Wants to network with others for papers, information, and a marketplace to sell or trade his casts.
Jan Van Donk 121 S. Coolidge Enid, OK 73703 405-242-4188	Teacher. Will trade. Major interest invertebrate fossils (esp. trilobites & crinoid cups) and plant fossils. Has for trade crinoid bulbs, conostichus, horn corals, sigillaria wood, etc. Wants to connect with other collectors of midcontinent fossils & to learn more about new finds and interpretations of old finds.
Brisac Patrick La Bridoire II 26130 St. Paul 3 Chateaux FRANCE	Wants to have contact with other collectors for exchange of vertebrate and invertebrate fossils of any kind. Gets lots of species from European deposits.

Please Note the Following CHANGES OF ADDRESS and CORRECTIONS.

Stephen Alexander
2212 Talunar Lane
Wichita Falls, TX 76301

Edward Books
109 Rose Lane
New Oxford, PA 17350

Donald J. Kenney
625 Kings Way
Canton, MI 48188

Andrew L. Price
P.O. Box 8642
Lancaster, PA 17604
717-872-9201

Keith W. Wheeler
100 Wilson Point Road
Hot Springs, AR 71913

The Mid-America Paleontology Society (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: One year from month of payment is $10.00 per household. Institution or Library fee is $25.00. Overseas fee is $10.00 with Surface Mailing of DIGESTS OR $25.00 with Air Mailing of DIGESTS.

MAPS meetings are held on the 1st Saturday of each month (2nd Saturday if inclement weather). October & May meetings are scheduled field trips. The June meeting is in conjunction with the Bedford, Indiana, Swap. A picnic is held in August. November through April meetings are scheduled for 2 p.m. in the Science Building, Augustana College, Rock Island, Illinois. One annual International Fossil Exposition is held in the Spring.

MAPS official publication, MAPS DIGEST, is published 9 months of the year--October through June.

President: Peggy Wallace, 290 South Grandview, Dubuque, IA 52001
1st Vice President: Blane D. (Pappe) Phillips, 2758 J St. S.W. , Cedar Rapids, IA 52404
2nd Vice President: Doug DeRosear, Box 125, Donnellson, IA 52625
Secretary: Jo Ann Good, 404 So. West 11th St., Aledo, IL 61231
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Membership: Tom Walsh, 501 East 19th Avenue, Coal Valley, IL 61240
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FIRST CLASS MAIL

EXPIRATION DATE........... 89/12
Allyn & Dorris Adams
612 W. 51st Street
Davenport, IA 52806

MID-AMERICA PALEONTOLOGY SOCIETY

Mrs. Sharon Sonnleitner
MAPS DIGEST Editor
4800 Sunset Dr. SW
Cedar Rapids, IA 52404

Dated Material - Field Trip Notice