M·A·P·S Digest

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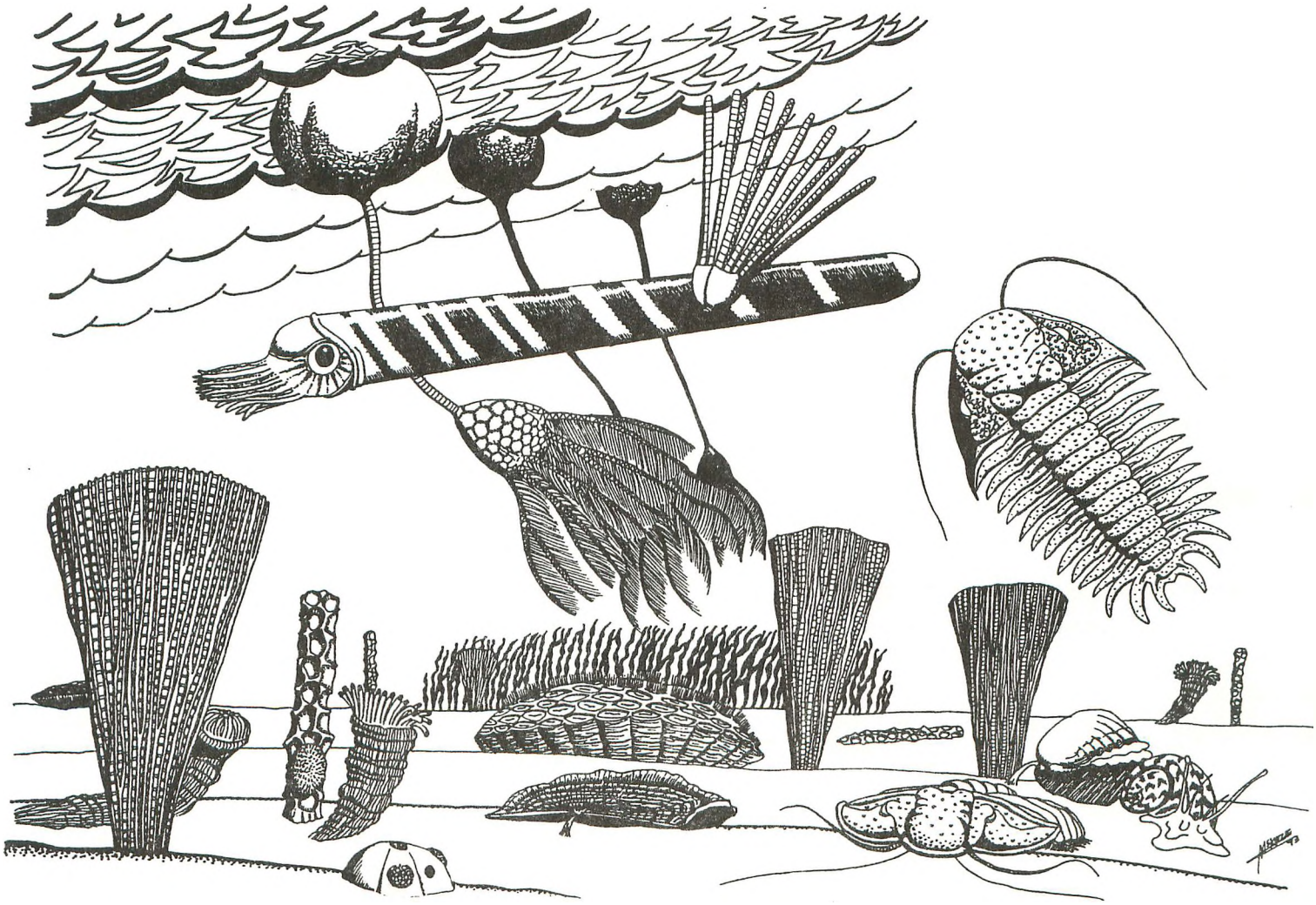

A LOVE OF FOSSILS BRINGS US TOGETHER

MARK YOUR CALENDARS

11 DEC MAPS MEETING. Augustana College, Rock Island, IL.

1:00 Board & General Meeting combined.
2:00 Program

15 APR 1994 MAPS NATIONAL FOSSIL
16 EXPOSITION XVI
17

Fri., Apr. 15: 8am - 6pm
Sat., Apr. 16: 8am - 5pm
(Business meeting and auction following)
Sun., Apr. 17: 8am - 3pm

PLEASE NOTE: THE DATES ARE INCORRECT IN THE 1993 DIRECTORY

***** 93/12 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--93/12 means 1993/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.

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

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ABOUT THE COVER

by Mark G. McKinzie, Euless, Texas

This month's cover represents an upper Silurian seascape at the time of deposition of the Henryhouse formation in south-central Oklahoma. The Henryhouse, along with the overlying Haragan formation of lower Devonian age, is well-known to fossil collectors worldwide because of its exceptional trilobite specimens. An abundant and diverse invertebrate fauna is found associated with the Henryhouse arthropods. They indicate that these animals were a well-adapted and thriving benthic community inhabiting a warm, shallow-water sea.

The three crinoids hanging upside down from their bulbous floats are *Scypho-crinites cinctus*. Two very different modes of life have been proposed for this genus based on the function of the highly specialized root system. In one case the bulbous root would have been buried in the soft muck like a sweet potato or beet or turnip. In the other case it would have acted as a true float with the partitioned chambers acting as air pockets and giving it a negative buoyancy with the crown end down. There are good arguments for both cases, and the debate is far from over. I have them illustrated in the flotation life mode where they drifted along in the currents much like modern-day jellyfish swarms.

The other crinoid shown drifting by is the very small and very common pisocrinoid *Ollulocrinus quinuebolous*. This crinoid is also unique in that its most proximal columnals have actually fused to the basals and been incorporated back into part of the calyx. Strimple (1963) termed these "captive" columnals **basilarids**. He suggested that the extra weight of these columnals acted to keep the calyx cup-heavy so that it floated cup-downward when the crown detached from the stem. Another *Ollulocrinus* cup is lying oral face downward in the limy muck where it has already become an attachment site for juvenile coral and bryozoan colonies. Both these two crinoid genera have an adult stage that is nektonic and mimics their free-swimming larval stages.

The two trilobites pictured here are the calymenid *Diacalymene clavicula* and *Cheirurus infensus*. *Diacalymene clavicula* is by far the most common trilobite in the Henryhouse formation, while *Cheirurus infensus* is very rare. *Diacalymene* is shown feeding on the sea floor while *Cheirurus*, having been startled by some movement nearby, is swimming to safety.

The sea bottom is dotted with the fronds of fennestrate bryozoan colonies and solitary

FROM THE EDITOR

Happy Holidays to all of you! Cold and snow has arrived in the Midwest, so active fossil collecting is over until the spring thaw. But plans for EXPO are well underway. The January issue will carry all the details. Dr. Donald Wolberg from New Mexico will present the keynote address on this year's theme of dinosaurs on Friday night and will conduct a seminar Sunday morning. (Incidentally, we picked our theme before we knew about "Jurassic Park.")

The January MAPS meeting will probably be the second Saturday, but plans have not been finalized yet.

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ABOUT THE COVER *(CONT.)*

rugose corals. The long, slender horn corals are *Amsdenoides acutiannulatus*, and the shorter ones are *Capmophyllum bedlundi*. Both these are very common fossils in the Henryhouse formation. Other corals include the tabulate colony *Favosites conicus* and the stick-like *Striatapora sp.* None of the corals ever approached "reef-like" density in the Lawrence Uplift area south of Ada, Oklahoma. In the background is a thicket of seaweed waving in the currents. Lacking hard parts to calcify, these organisms, or their imprints, are rarely preserved as fossils.

The brachiopods are represented by the strophomenid *Strophonella loeblichi* and the atrypid *Meristina roemeri*. A platycerid gastropod is seen grazing along the sea floor while a orthoconic nautiloid cephalopod swims by in search of a meal.

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BOOK REVIEW
by John D. McLeod, Allen, Texas

The Collector's Guide to Fossil Sharks and Rays From the Cretaceous of Texas, by Bruce J. Welton, Ph.D. and Roger F. Farish, 204 pp., Published 1993 by Before Time, 5 Remington Drive, Lewisville, Texas 75067.

The last self-published book I bought was a fossil atlas, a work replete with editorial oversights in a binding so flimsy it self-destructed in a matter of weeks. It was therefore with some trepidation I investigated the latest offering from the paleontological vanity press.

Delightfully, **Fossil Sharks and Rays** sets new standards for quality in writing, photography and production for this genre. The authors, a vertebrate paleontologist and geophysicist by education, respectively, have produced a sophisticated compendium of shark and ray fossils. The work targets both amateur and professional paleontologists and should prove to be a reference work of value far beyond the Texas borders.

Twelve chapters address geology, anatomy, ichnology, systematics, collecting methods, preparation, curation, display and collecting localities of shark and ray fossils. A glossary of terms, a list of cited references, a blank checklist for collectors, and a stratigraphic range chart are also included.

Copious photographs are used to display multiple views and growth series in the systematics section. They are also journal-quality and include extensive scanning electron microscope photographs of smaller specimens. Excellent line drawings of anatomical details and other subjects are also used.

The text follows a well-organized succession of topics and appears to have been professionally edited. Some minor misspellings and omissions, however, such as the missing references cited under some text figures, do not detract from the overall value of this work. The authors entice a wide audience, providing technical detail for professionals, as well as educating non-specialists.

Fossil Sharks and Rays has had something of a subliminal effect. Admittedly not a fossil chrondrichthyian aficionado, the depth, quality of writing and organization of this topic has inspired me, as it may others, to look a little harder for teeth, denticles and vertebrae in the Cretaceous rocks I search for ammonites. It also may elevate self-publishing fossil books to a potentially honorable enterprise, at least when entrusted to hands as capable as those of the authors.

Future Trilobite Collecting Potential of the Bromide Formation (Middle Ordovician) in the Arbuckle Mountains of Oklahoma

by Mark G. McKinzie, Euless, Texas

A very interesting series of papers was published by the Geological Survey of Canada in 1991 under the title "Advances in Ordovician Geology." One article in particular, by R.E. Sloan of the University of Minnesota, caught my interest. It is a comprehensive listing of trilobite genera for the North American continent, compiled from published reports. it has also incorporated the latest absolute time ranges for the series and stages of the Ordovician. A paper like this will always be an "in-progress" report as new trilobites are discovered and tabulated and the absolute time ranges are further refined. Ignoring that, I thought it would be interesting to compare the known reported trilobites from the Bromide formation of Oklahoma (proven trils) with the listing of Sloan's for the equivalent time interval in North America (potential trils).

The Bromide formation in Oklahoma is composed of two members: the older Mountain Lake member and the overlying Pooleville member. The Pooleville member is further subdivided into a Corbin Ranch submember. All the beds were deposited within the Blackriverian, and the basal Rocklandian? stages of the Mohawkian series of the uppermost Middle Ordovician. According to Sloan, the current best-guess absolute age for this time interval is 458.5-453.7 million years ago. This is a relatively short time interval of 5.8 million years.

The Mohawkian series in North America is a small enough time slice that any collections of trilobites should equate to an "apples to apples" versus an "apples to oranges" comparison. Similarities in trilobites from various localities of the same equivalent age can indicate many things. Among them, close approximation in terms of paleogeography at that time, similar environmental conditions (shallow shelf versus deep-water basin versus brackish tidal-flats, etc.), or trilobite genera that were cosmopolitan and had a wide distribution. By the same token, different trilobite assemblages from the same time horizons can indicate remote geographical positions at the time of deposition, different environments, a bias in preservation, insufficient sampling of the outcrops, or trilobites that were truly endemic to that area. All these factors must be taken into account when comparing faunal lists from one locality versus another.

Table 1. is a listing of known trilobite genera for the Blackriverian and Rocklandian stages in North America. I simplified it from Sloan's original listing, which covered the whole Ordovician time interval. There are a total of 86 genera reported. I reviewed the bibliography at the back of his article, and the trilobite occurrences are from the following localities:

1) upper Mississippi Valley (MN, IL, IA, WI), U.S.A.
2) MacKenzie Mtns, MacKenzie District, western Canada
3) western Newfoundland, Atlantic coast of Canada
4) Appalachian Mtns of eastern Tennessee & western Virginia, U.S.A.
5) northeast Greenland, Arctic Circle
6) Arbuckle Mtns, Oklahoma, U.S.A.
7) Nevada/Utah, western U.S.A.
8) Ontario, eastern Canada

I have plotted these locations on a paleogeographic reconstruction of the Middle Ordovician, modified from Scotese & McKerrow (1991) to show their relative positions at the time of deposition (Figure 1). I will go into more detail about the paleogeography of North America during the Ordovician in just a minute.

Table 2. is a listing of known Bromide trilobites from the Arbuckle Mountains of south-central Oklahoma by species, and broken down for the Mountain Lake (MLM) and the Pooleville (PM) members. It is a compilation by Fay & Graffham (1982), and updated with my personal collecting experiences. There are 23 currently

identified trilobite genera from the Bromide formation. That is only 26.7% of the potential trilobite genera from Table 1. (23/86) known to have occurred during this time interval. On top of that, Sloan's list does not include any undescribed trilobites in private collections or those yet to be found. That means the total number of potential trilobites from Bromide time-equivalent age beds in North America is even greater than the 86 reported genera in Sloan's listing in Table 1. What does it mean as far as future collecting possibilities for trilobites of the Bromide formation?

First, let's take a look at the paleogeography of the continent called Laurentia (North America craton during the Ordovician). I will not go into too much detail about how Figure 1 was developed because it goes way beyond the scope of this paper. Please read the articles cited in the references if you are interested in how scientists determined the position of Laurentia during the Middle Ordovician. However, the present is the key to the past, and physical processes active today between the oceanic and continental plates are assumed to have occurred in a like manner throughout geologic time. The lower 48 of the United States was situated SOUTH of the equator between latitudes 0 - 30 degrees. This places the bulk of the Bromide time-equivalent localities in a tropic to subtropic climate at the time of deposition.

The largest exposed landmass of the ancestral North American continent was what is today called the Canadian Shield. Large portions of it have been above sea level since the PreCambrian, and have been exposed to erosional forces since that time (over 600 million years)! In the Middle Ordovician, terrestrial plants had not evolved yet, and the landmass must have been a very barren and rocky desert indeed.

In Figure 1, the narrow SW-NE trending landmass called the taconic highlands was actually a series of volcanic-island archipelagos with ocean water in between. This whole island-arc trend is considered a subduction zone in plate tectonic theory and was being actively uplifted at the time by the impending collision of the continent called Baltica with Laurentia (see Figure 1). The same applies to the landmass over present-day California, which was also a volcanic island-arc system along a subduction zone. The Ozark Dome of Southeast Missouri was a large island rising above the carbonate shelf of the Ordovician sea. To the south this sea was bordered by by a landmass composed of the eastern edge of present-day South America.

Between these landmasses extended a broad, shallow, continental margin sea of generally uniform climatic conditions across it. The warm shallow waters were ideal for carbonate precipitation and supported an abundant and varied benthic community. The major current direction was from east to west, paralleling the dominant wind direction south of the equator. Periodically, the Appalachian region was covered with fine layers of ash from erupting volcanoes of the taconic highlands to the east. These ashfalls, preserved today as bentonites in the marine rocks enclosing them, provide some of the more accurate radiometric age dates for the Ordovician in the eastern United States. The bentonites thin out and disappear before reaching Oklahoma.

This large seaway, with its relatively uniform and tropical climatic conditions, should have offered few migration barriers to the benthic communities inhabiting the shallow-water shelf at the time. Most of the limestones were deposited in water depths of less than 100 meters (or 300 feet). The probability of finding common **genera** from Newfoundland to Oklahoma (and points in between) should be high even though a give **species** might be endemic to a given locality. To test this hypothesis I tabulated the number of genera in common for the localities in Tables 3 - 6 and compared them with Table 2 trilobites form Oklahoma.

Table 3. is a listing of trilobites from the Lourdes formation of the Long Point group from western Newfoundland along the Atlantic coast of Canada. Nine of the 14 reported trilobite genera from here are also found in the Bromide formation in Table 2. That means 64% of the trilobites from this location are also found in Oklahoma. Table 4. is a listing of

trilobites recorded from Bromide time-equivalent beds of eastern Tennessee and western Virginia. Six of the 12 reported trilobite genera from this region also occur in the Bromide (50%). Discounting the deeper-water forms *Ampyx*, *Ampyxina*, and *Robergia* from the lower Athens shale then it is a 9/12 ratio or 75% correlation.

Table 5. is a listing from Bromide time-equivalent beds of central Tennessee. Six of the 15 reported genera also have been found in the Bromide deposits for a 40% correlation. Table 6. is a listing of trilobites from the upper Mississippi Valley region of Iowa, Illinois and Wisconsin. Six of the 8 reported genera from here, 75%, also occur in the Bromide beds. The similarities are interesting, and at the class level of Trilobita, indicates a probable common environment at the time these creatures were living.

The rocks themselves indicate similar bottom environments at the time of deposition at these localities. They are all dominantly limestones with varying amounts of shales. The rocks contain an abundant and varied associated community of bryozoans, brachiopods, and to a lesser extent, gastropods, corals and echinoderms. If anything, this common distribution of trilobites indicates the cosmopolitan nature of some of them, which in turn reflects how well adapted they were to their surroundings at the time. The ocean floor of this Middle Ordovician sea was a stable shelf of uniform environmental conditions. The waters were warm, well-oxygenated, shallow (less than 300 ft?), below tidal base and usually sediment-free. conditions were ideal for the procreation and migration of trilobite genera along the length of the shelf.

In conclusion, diligent and systematic collecting of the Bromide formation in Oklahoma, and in these other localities of Blackriverian series age, should continue to yield new or previously undocumented trilobites. It will also help to increase our knowledge base of trilobites in general from North America, from which future trilobite studies can be launched. With less than 27% of the potential known trilobite genera discovered to date from the Bromide, I am confident that new (or unreported) genera will be discovered by further hunting by amateur collectors.

REFERENCES

1) Barnes, Chris R.; Stait, Bryan A.; (1991), "Stratigraphy of the Middle Ordovician Long Point Group, Western Newfoundland," in Advances in Ordovician Geology, Geol. Surv. of Canada, paper 90-9, p. 235-243.
2) Butts, Charles; (1941), Geology of the Appalachian Valley in Virginia, Virginia Geol. Surv., bul. 52, part 2, p. 60-97.
3) Derby, J.R.; et al; (1991), "Biostratigraphy of the Timbered Hills, Arbuckle, and Simpson Groups, Cambrian and Ordovician, Oklahoma: A Review of Correlation Tools & Techniques Available to the Explorationist," in Late Cambrian-Ordovician Geology of the Southern Mid-Continent, 1989 Symposium, Okla. Geol. Surv., circ. 92, p. 15-39.
4) Fay, Robert O.; Graffham, Allen; (1982), "Biostratigraphic & Paleontological Studies," in Echinoderm Faunas of the Bromide Formation (Middle Ordovician) of Oklahoma, Univ. of Kansas Paleo. Contributions, Monograph 1, p. 31-33.
5) Kolata, Dennis R.; Willman, H.B.; (1978), The Platteville and Galena Groups in Northern Illinois, Il. State Geol. Surv., circ 502, p. 15-33.
6) McKerrow, W.S.; Scotose, Chris R.; (1991), "Ordovician Plate Tectonic Reconstructions," in Advances in Ordovician Geology, Geol. Surv. of Canada, paper 90-9, p. 271-280.
7) Sloan, Robert E.: (1991), "A Chronology of North American Trilobite Genera,"in Advances in Ordovician Geology, Geol. Surv. of Canada, paper 90-9, p. 165-174.
8) Walter, Otto T.; (1924), Trilobites of Iowa and some related Paleozoic Forms, Iowa Geol. Surv., part 2, p. 198-261.
9) Wilson, Charles W. Jr.; (1948), The Geology of Nashville Tennessee, Geol. Surv. of Tenn., bul. 53, p. 49-57.

TABLE 1. REPORTED TRILOBITES FROM BROMIDE-EQUIVALENT BEDS OF N. AMERICA (86 genera total):
* modified froom Sloan (1991)

SUBORDER	GENUS
AGNOSTIDA	Geragnostus
	Arthorhachis
PTYCHOPARIIDA	Triathrus
ASAPHINA	Isotelus, Basiliella, Vogdesia, Nahanina
	Anataphrus
REMOPLEURIDACEA	Remopleurides, Hypodicranotus, Tetrarhynchus
TRINUCLEACEA	Ampyx, Salteria, Lonchodamus, Ampyxina, Raymondella, Cryptolithus,Cryptolithoides, Tetraspis, Reedolithus, Dionide
HARPIDA	Hibbertia, Dolicoharpes, Paraharpes,
LICHIDA	Amphilichas, Probolichas, Hemiarges, Platylichas
ODONTOPLEURIDA	Ceratocephala, Apianurus, Diacanthaspis, Primaspis, Miraspis
CHEURURINA	Sphaerexochus, Nieskowskia, Ceraurinella, Psuedosphaerexochus, Acanthoparypha, Holia, Sphaerocoryphe, Xylabion, Hadromeros, Ceraurus Ceraurinus, Gabriceraurus, Pandaspinapyga, Pliomerops, Pliomerella, Anapliomerella, Encrinuroides, Erratencrinurus, Cybeloides, Heliomeroides, Physemataspis, Cybellela, Atractopyge
CALYMENINA	Thulincola, Flexicalymene, Platycalymene, Gravicalymene, Brongniartella
PHACOPINA	Calypatulax, Scetaspis, Eomonorachus
PROETIDA	Raymondites, Bathyurus, Agerina, Dimeropyge, Mesotaphraspis, Chomatopyge, Toernquistia, Glaphurus, Telephina, Otarion(Harpidella), Panarhaeogonius, Cyphoproetus, Decoroproetus, Rorringtonia, Astroproetus
ILLAENINA	Illaenus, Bumastoides, Platillaenus, Nan-illaenus, Bumastus, Thaleops, Stenopareia, Failleana, Eobronteus, Stygina, Shumardia

TABLE 2. REPORTED TRILOBITES FROM THE BROMIDE FORMATION OF OKLAHOMA:(23 GENERA TOTAL)

SUBORDER	GENUS & SPECIES	MLM	PM
ASAPHINA	Vogdesia bearsi		x
	Vogdesia bromidensis	x	x
	Isotelus sp.	x	x
CHEIRURINA	Ceraurus ruidus		x
	Ceraurus trapezoidensis	x	
	Cybeloides sp.	x	x
	Encrinuroides capitonis		x
	Pandaspinapyga salsa		x
	Pliomerops canadensis		x
	Remopluerides sp.	x	x
	Sphaerocoryphge sp.		x
HARPIDA	Dolicoharpes proclavia	x	x
ILLAENINA	Bumastoides milleri	x	
	Illaenus americanus	x	x
	Nanillaenus punctatus	x	
	Platillaenus limbatus		x
	Thaleops ovata	x	
LICHIDA	Amphilichas subpunctatus	x	x
	Probolichas rhinoceratus		x
ODONTOPLUERIDA	Apianurus sp.		x
PHACOPINA	Calypatulux annulata	x	x
	Eomonorachus divaricatus		x
PROETIDA	Bathyurus superbus		x
	Otarion sp.		X
* TRINUCLEIDA	Lonchodamus megehei		x

TABLE 3. REPORTED TRILOBITES FROM THE LOURDES FORMATION OF WESTERN NEWFOUNDLAND, CANADA: (14 GENERA TOTAL)

SUBORDER	GENUS & SPECIES
ASAPHINA	Isotelus sp.
	Anataphrus glomeratus
CHEURINA	Ceraurus cets,C. sp. C. dentatus, C. sp.
	Ceraurinella sp.
	Cybeloides sp.
	Sphaerexochus sp.
	Encrinurus gibber
	Sphaerocoryphe sp.
HARPIDA	Dolicoharpes sp.
	Scotoharpes filiarum
ILLAENINA	Illaenus kayi
	Thaleops sp. A, Thaleops sp. B
PHACOPINA	Calyptaulux leithi
REMOPLUERIDACEA	Remopluerides sp.

TABLE 4. REPORTED TRILOBITES FROM BROMIDE-EQUIVALENT BEDS OF EASTERN TENNESSEE: (12 GENERA TOTAL)

SUBORDER/SUPERFAMILY	GENUS
ASAPHINA	Isoteloides
	Isotelus
CHEURUINA	Ceraurus
	Ceraurinella
	Cybeloides
ILLAENINA	Illaenus
	Nanillaenus
	Bumastus
PHACOPINA	Calypatulux
REMOPLUERIDACEA	Robergia
TRINUCLEACEA	Ampyx
	Ampyxina

TABLE 5. REPORTED TRILOBITES FROM THE UPPER LENOIR,HOLSTON, & WHITESBURG FORMATIONS OF EASTERN TENNESSEE: (15 GENERA TOTAL)

SUBORDER/SUPERFAMILY	GENUS & SPECIES	L/H/W
AGNOSTIDA	Arthrorhachis elaspethi	x
ASAPHINA	Basilicus sp.	x
	Vogdesia (Homotelus) sp.	x x
CHEURURINA	Ceraurinus? sp.	x
	Encrinurus sp.	x
	Pliomerops canadensis	x
	Sphaerexochus sp.	x
ILLAENINA	Bumastus lioderma	x x
LICHIDA	Acrolichas prominulus (Amphilichas)	x
PHACOPIDA	Pterygometopus sp.	x
PROETIDA	Glaphurina brevicula	x
	Telephus bipunctalus	x
	Telephus gelasinosus	x
	Telephus bicornis	x
REMOPLUERIDACEA	Remopluerides sp.	x
TRINUCLEACEA	Ampyx sp.	x
?	Hypoaspis shuleri	x

TABLE 6. REPORTED TRILOBITES FROM THE LOWER PLATTEVILLE FORMATION OF THE NORTHERN MISSISSIIPPI VALLEY REGION: (8 GENERA TOTAL)

SUBORDER/SUPERFAMILY	GENUS & SPECIES
ASAPHINA	Basilicus barrandi
	Ectenaspis beckeri
CHEURURINA	Ceraurus pleurexanthus,C. hermanni
HARPINA	Eoharpes (Dolicoharpes) ottawaensis
ILLAENINA	Bumastus milleri
	Illaenus americanus
	Thaleops ovata
PROETIDA	Bathyurus spiniger

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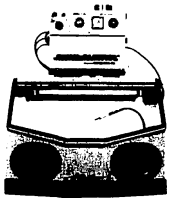

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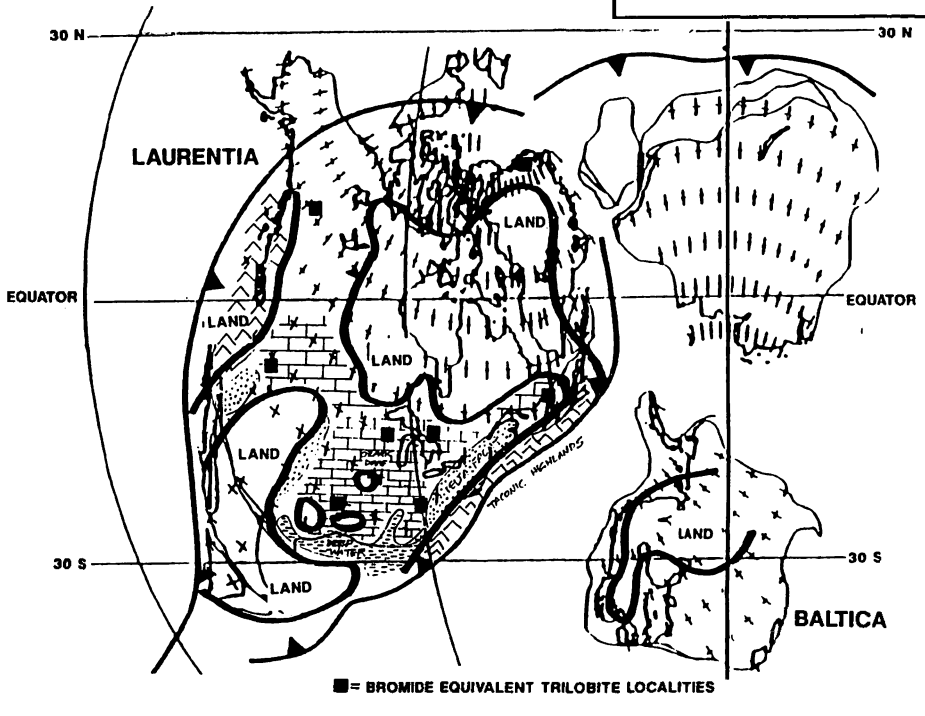

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Frank L. Marchino
362 Tradition Lane
Danville, IN 46122
317-745-6709

Manufacturing Engr. (retired). Will trade. Major interest invertebrates. Has for trade calymene (trilobite), brachiopods (from Ord.-Sil.). Wants to learn more about fossils.

John M. & Mary M. Moody
1020 W. Morton
Denison, TX 75020-2114
903-465-8998

Retired. Will trade. Interested in all types of fossils, esp. echinoids. Member Dallas Paleo Soc. and Austin Paleo Soc. Wants to gail knowledge from Digest and occasional association with members.

Dan Racz
#133 - 3560 Pine Grove Ave
Port Huron, MI 48060
519-344-0800

Monument Builder. Will trade. Major interest invertebrate fossils of Devonian, Silurian, Ordovician & Cambrian. Has for trade Greenops, Phacops, Black opals. Member Sarnia Rock & Fossil Club, Sarnia, Ont., CAN. Wants to broaden list of collection sites, & gain more knowledge/skill of fossils and preparation techniques.

Robert Rose
4 Arrowhead Ct.
Sugar Land, TX 77478

Geologist. Just renewing fossil collecting hobby after many years of absence (93). Interested in all types of fossils, but tries to make as complete a collection of fossil types at each locality as possible. Not willing to trade at this time.

Jean Putney Secor
1313 - 170th Street
Gladbrook, IA 50635
515-473-2030

Semi-retired. Major interest excavation & preservation of specimens. Wants to more about these marvelous organisms.

Pauline Singleton
903 E. Archer Rd.
Baytown, TX 77521-9301

Andy Slack
726 Hillcrest Drive
Sleepy Hollow, IL 60118
708-428-0089

High School Student (93). Wants to learn more about paleontology and to try to get a job focused on paleontology.

Margaret Whiting
1974 Caras
Waterloo, IA 50701
319-291-6994

Artist. Will trade. Uses small fossils (less than 1") in her artworks. Wants to learn more about fossils and to meet people who are also excited about fossils.

PLEASE NOTE THE FOLLOWING CHANGES OF ADDRESS OR CORRECTIONS:

Stephen Alexander
2002 1/2 Lucile Ave.
Wichita Falls, TX 76301-4919
817-767-2217

John & Sharon Baron
Geo-Impressions
158 Bush Hill Rd.
Pelham, NH 03076
603-635-7923

Have fossil business. Will trade, buy and sell. Interested in all fossils.

Willem Bessem
2/267 Swanson Road
HENDERSON, AUCKLAND
NEW ZEALAND
8338733

David M. Cassel
c/o Aj. Nancy Cassel
Chiang Mai Univ., English Dept
Chiang Mai 50200 THAILAND
FAX 6653-278375

Will be back in states in Feb., 1994.

Alex Fabian
7016 Jackman Road
Temperance, MI 48182
313-847-1711

Keith Holm
1640 E. Division St.
Coal City, IL 60416-9758
815-634-2193

Norbert von Lipinski
Kleiststr. 8
22089 Hamburg GERMANY
040-200 69 87

Add to major interest: amber. Also has for trade amber with insects.

Jack Loftin
Box 87
Windthorst, TX 76389
817-423-6426

Gary Lumannick
11770 S.W. 29th Street
Miami FL 33175
305-221-4227

Also has pre-Columbian artifacts for trade.

Cecil & Helen Minshew
R.R. 1, Box 41 A
Perrin, TX 76486
817-682-7221

John Pojeta, Jr.
1492 Dunster Lane
Rockville, MD 20854
703-648-5288

Amel Priest
223 S 1st Ave.
Winterset, IA 50273-1901
515-728-4419

Harold & JoAnn Good Rice
122 Lois Lane
Mt. Clemens, MI 48043
313-463-5972

Robert J. Smith
Box 11 Mailroom
Seattle University
Seattle, WA 98122-4460
206-296-5505

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 $15.00 per household. Institution or Library fee is $25.00. Overseas fee is $15.00 with Surface Mailing of DIGESTS OR $25.00 with Air Mailing of DIGESTS. (Payments other than those stated will be pro-rated.)

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 Bloomington, IN, Gem, Mineral, Fossil Show & Swap. A picnic is held the fourth weekend in July. November through April meetings are scheduled for 1 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.

CYATHOCRINITES

MID-AMERICA PALEONTOLOGY SOCIETY

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

Dated Material - Meeting Notice

FIRST CLASS MAIL

MAPS EXP. DATE..... 93/12
Allyn & Dorris Adams
612 W. 51st Street
Davenport, IA 52806