M·A·P·S Digest

Official Publication of
Mid-America Paleontology Society
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Volume 43, Number 3
Fall 2020

"A LOVE OF FOSSILS BRINGS US TOGETHER"

Calendar

NOTE 1: All MAPS monthly meetings and both the CVRMS and MAPS EXPO Show dates are very tentative and dependant on the status of COVID-19.

NOTE 2: Until further notice, all MAPS monthly meetings will be held virtually via ZOOM, NOT in-person in Trowbridge Hall. Check the website and watch for e-mails for further information.

2021

March 27-28
CVRMS Show
Location: Hawkeye Downs, Cedar Rapids
Theme: Meteorites

April 16-18
MAPS EXPO XLII
Location: Sharpless Auctions
Exit 249 I-80
Iowa City, Iowa
Theme: Ordovician II
Keynote Speaker: Dr. Dennis R. Kolata
Topic: The Platteville Formation Fauna of the Upper Midwest U.S. - A Snapshot of the Great Ordovician Biodiversification Event
www.midamericapaleo.org

Contributions to Digest Needed

The Digest editors encourage the members to submit articles for publication in the Digest issues. The Digest is for the members and should reflect their interests. If you have specimens that you collected and would like to share with other members or would like to describe a favorite collecting site, please write an article in Word, Times New Roman size 12 font, single spaced with one inch margins, and send to the editors. Photos and diagrams can be e-mailed separately or incorporated in the article.
John: Fossilnautiloid@aol.com
Chris: CDCozart@aol.com

Call for Papers

The theme for the **2021 EXPO** is the **Ordovician II**. Any paper dealing with fossils, stratigraphy, or site-specific paleontology of the Ordovician Period would be appreciated. The papers should be in Word, Times New Roman, size 12 Font, single spaced with one inch margins, and e-mailed to one of the Digest Editors by the **last week of February 2021**. Diagrams/Photos can be sent separately or imbedded in text. **We have room for 1-2 additional papers.**

John: Fossilnautiloid@aol.com
Chris: CDCozart@aol.com

DUES INFO

Please send your $20 2020 MAPS dues to:

Dale Stout
2237 Meadowbrook Drive S.E.
Cedar Rapids, Iowa 52403

About the Cover

The cover photo for this issue features a specimen of the Mifflin Member (Platteville Formation) trilobite *Thaleops ovata*. The specimen was collected in Grant County, Wisconsin, and photographed by MAPS member John Catalani.

Mid-America Paleontology Society Board Meeting Minutes
Virtual Zoom Meeting, Monday July 27, 2020

Present: Marv Houg, Dale Stout, Jim Preslicka, Bob Rondinelli, Tom Williams, Karl Stuekerjuergen, Doug DeRosear, John Catalani, Sharon Sonnleitner, Tiffany Adrain (scribe).

Marv called the meeting to order at 7.23pm and thanked Sharon for organizing the Zoom.

2021 Expo: Tentatively going ahead with April 2021 Expo plans. Sharpless Auctions venue is booked. Covid-19 health and safety protocols will be developed by Tom and Marv for publication in December newsletter, and followed up with venue owners. Venue for the motel trade show needs to be confirmed. Discussion about how many Expo ad cards to print due to lack of venues to distribute them as other shows are cancelled due to pandemic. Decided to print 5,000 cards (half the usual number) to mail to scheduled shows, and use more social media and club newsletter announcements. Marv will get access to MAPS Facebook page. Checks for table fees will not be cashed until the end of March 2021, after Expo is confirmed to go ahead.

Membership dues: some renewals were included in table fee checks that were destroyed when Expo 2020 was cancelled. Jim will update the membership list and send reminders to members who have not yet renewed. A renewal reminder will be added to the next Digest newsletter. Renewals should be sent to Dale Stout.

Digest newsletter: Articles welcome now for a newsletter before November. Tiffany will send templates and instructions for collection catalogues, labels, etc. in preparation for her November presentation. Late September for a December Digest. Some Digest newsletters are returned to sender. Jim will try to track down new contact details for these members.

Next meeting: On Zoom, Monday November 9, 2020, at 7pm. Tiffany will organize the Zoom meeting and give a presentation "Caring for your Collection." Jim will send the Zoom link to MAPS members two weeks prior.

Treasurer: Jim will send financial report to Board before next meeting. Awards made by MAPS will be reviewed at the next meeting, considering there was no Silent Auction this year due to Expo 2020 cancellation.

501(c)(3) status: Marv thanked Bob Rondinelli for working so hard to get this charitable status for MAPS. Bob will apply for the $275 fee for the earlier, unsuccessful, application to be refunded, and will circulate annual reporting requirements for maintaining status. Bob will write an explanation of the new status for the Digest, with information about tax deductible donations.

Fall Field trip - Marv will find out about quarry access and Covid-related protocols.

Marv adjourned the meeting at 8.43pm.

Our New 501(c)(3) Status: What It Means and Why It's Important to Our MAPS Membership

Robert Rondinelli, MD, PhD; MAPS Board Member

As an Iowa Nonprofit Corporation, the Mid-America Paleontology Society (MAPS) is required to file a biennial report to the Iowa Secretary of State and also must file federal tax returns annually in order to maintain its tax exemption status. MAPS originally had a 501(c)(4) status which is applicable to organizations that promote the common good and general welfare of a specific community (think homeowner's associations, volunteer fire departments, etc). MAPS was formerly classified as a 501(c)(4) tax exempt organization and our status in that regard was revoked in 2014 after failure to file the requisite tax returns for three consecutive years. Most nonprofits seek 501(c)(3) status – which is reserved for organizations that provide educational or charitable benefits to the general public. In 2018, the MAPS Board of Directors decided to pursue a 501(c)(3) status under the IRS and our initial application using the "1023-EZ" form was turned down in spring of 2019. We re-applied using the "1023 Long Form" in January of this year and our status as a 501(c)(3) organization was approved by the IRS on May 14, 2020.

The following discussion is provided to our membership to clarify what constitutes a 501(c)(3) designation and why it is important to our organization, and what requirements exist in order for us to maintain this designation going forward.

What is a 501(c)(3) designation?

The US Internal Revenue Service Code allows for a federal tax exemption for nonprofit organizations under section 501(c) that is regulated and administered by the US Department of Treasury through the Internal Revenue Service. Under the umbrella of 501(c) there are a number of entities of which 501(c)(3) applies to those organizations specifically considered as public charities, private foundations, or private operating foundations. (A private operating foundation is a private foundation that primarily operates their own charitable programs. Unlike a non-operating private foundation, a private operating foundation is required to spend a certain portion of its assets each year on charitable activities.) A 501(c)(3) determination from the IRS may be extended to entities which include corporations, trusts, community chests, LLCs, and unincorporated associations. The majority of these organizations are nonprofit corporations, such as MAPS.

What is a Public Charity?

501(c)(3) organizations fall into one of three categories – public charities, private foundations, or private operating foundations. Public charities may include churches, animal welfare agencies, other benevolence entities, and educational organizations. They usually receive a substantial portion of their annual revenue income from the public (in the form of membership dues and contributions to support their active programs.) MAPS is considered a public charity.

In order to remain a public charity (as opposed to a private foundation) the 501(c)(3) must derive at least 1/3 of its donated revenue from public sources including individuals, companies and other public charities. Donations to public charities can be tax deductible to the individual donor up to 60% of the donor's income. Corporate deductions are generally limited to 10%. Additionally, public charities are required to maintain a governing body that is primarily composed of independent and unrelated individuals.

Unique Provision of a 501(c)(3) Entity

The distinct and unique provision of Section 501(c)(3) organizations - as compared to other tax-exempt

entities - is the federal income tax deductibility to donors for their charitable donations. As MAPS continues to actively engage in, and to expand our meaningful fundraising efforts from within and outside of the organization, the playing field has now been leveled with other worthy and potentially competing recipients. Hopefully, this is a new opportunity to enhance our resources and to better support such traditional activities as hosting featured national speakers for our annual Expo; incentivizing donations from our Expo exhibitors to support our annual Expo fund raising auction; and encouraging monetary donations to further our charitable donations to the Paleontological Research Institute; the University of Iowa Rhodes Memorial Fund; the Paleontological Society General Scholarship Fund; and the Strimple Award.

Additionally, an added state income tax deductibility is also afforded to donors for these charitable donations. (Note: Iowa follows Federal Law regarding 501(c)(3) regulations, so the tax benefits to MAPS are the same.)

Furthermore, the public charity is also exempted from sales tax on purchases as well as being exempted from property taxes. (For example, if MAPS were to design and manufacture T-shirts with a unique fossil logo and sell them to subsidize a featured speaker or other charitable activity the proceeds from same are tax exempt.) Special nonprofit discounts on bulk rate postage are available from the U.S. Postal Service to qualifying organizations.

Compliance Requirements for Maintaining 501(c)(3) Status:

To remain tax exempt under section 501(c)(3) MAPS must be organized and operate exclusively for exempt purposes and none of its earnings may be paid to any private shareholder or individual. Additionally, it may not engage in political action (i.e. attempts to influence legislation or to engage in campaign activity for or against political candidates) as a substantial part of its activities.

In order to maintain the 501(c)(3) status MAPS must now provide the following on an annual and recurring basis:

- File an annual Form 990 - Return of Organization Exempt From Income Tax Form (Form 990-EZ). {Note: This is a simple and straightforward form and we will qualify to use same since our net annual income is below $50,000.}
- Maintain detailed records of our Accounting Periods and Methods, and supporting documents.
- Follow the governance procedures and practices contained in our Bylaws and Articles of Association.
- Report significant changes in our Annual Information Return as part of Form 990, if indicated.

{Note: There is a 501(c)(3) provision for "Unrelated Business Income" (UBI) – the basic idea of this is that if a public charity has a revenue source that does not substantially relate to their charitable mission and the associated revenue exceeds $1,000.00 in that calendar year, the portion of that revenue exceeding the $1,000.00 cap is subject to income tax.}

Additional information concerning the above can be found in the Compliance Guide for 501(c)(3) Public Charities which is available on line at <www.kirs.gov/charities.> and enter "4221-PC" in the search bar.

I wish to extend my personal gratitude to Christine Halbrook, Attorney with the Bradshaw Law Firm in Des Moines, Iowa, for her instrumental help in completing our successful 501(c)(3) application, and for reviewing the above descriptions for completeness and accuracy. Also, I wish to thank James Lee, CPA with Cedar Valley Tax Services, for his helpful and informative input.

North American Middle Ordovician Crinoid Banks

Thomas Williams

Ordovician paleo-environments showed a real explosion in life. Echinoderms were no exception and resulted in an explosion of echinoderms in Laurentia. Forms of echinoderms present in the Ordovician included ophiuroids, asteroids, echinoids, bothiocidaroids, cylocystoids, edrioasteroids, cystoids, carpoids, paracrinoids, crinoids, and even primitive blastoids. Echinoderms live typically in open marine conditions where water temperatures are warmer. Ordovician seas saw many types of echinoderms sometimes all of these were together but it was the crinoids that used this period to really expand their numbers and varieties. Crinoids during the Ordovician period would use this expansion with development of forms not only making them more successful but also able as a group to survive the extinction at the end of the period. While some of the other types of echinoderms also survived, it was crinoids that potentially gained the most diversity leading to the Upper Ordovician. Carbonate platforms of the Middle Ordovician provided areas for the explosion of crinoid faunas and development. Faunas collected from famous localities such as the Lebanon limestone in Tennessee, Trenton Group of New York, Galena formation of the Upper Midwest, Lake Simcoe Bobcaygeon formation of Ontario, and the Bromide Formation of Oklahoma along with others provided a base for further evolution. Upper Ordovician faunal diversity during the Cincinnatian resulted in thirty-seven species in twenty genera showing how Middle Ordovician diversity allowed for more expansion. In addition, crinoids collected from the Upper Ordovician Girardeau Limestone of Missouri and crinoids from the Maquoketa formation of the Midwest extended what began in the Ordovician. Crinoids developed in these faunas have been described as crinoid gardens in places and illustrate the continued evolution of crinoids in the Paleozoic (Hess and Ausich 1999).

One very interesting note from crinoid dispersion referring to world-wide dispersion is that a large part of today's Scotland was once part of Laurentia. This part of Scotland became part of Laurentia when the Iapetus Ocean closed bringing the two land masses together. This was true until the Atlantic Ocean opened up and Scotland was split away to Europe in the Mesozoic and widened in the Cenozoic. This deposit is part of the British Ordovician sequence which includes the Lady Burn Starfish beds of Threave Glen and includes good numbers of crinoids representing most of the types of echinoderms occurring during the Ordovician. This fauna consisted of twenty species including Disparids, Camerates, Flexible, and other Inadunates. When the two land masses split and widened carrying the existing fossil crinoids across the new forming ocean which, for a time, was a mystery. This echinoderm fauna and the similarities to Laurentian echinoderm faunas makes more sense since the two now separated were once the same land mass (Hess et al. 1999).

Laurentia was located across the equator during the Ordovician in tropical waters in the Iapetus Ocean with most of the land mass located south of the equator (Figure 1). Dispersed globally along the equator provided warmer ocean temperatures and helped foster the radiation of life in the warm shallow seas around Laurentia. Equatorial oceans are excellent environments for carbonate deposition favorable to echinoderms in general with occasional shales and quartz sands intermixing with the limestones. Shallow seas were created by geographic high areas below the surface of the ocean including the Cincinnati and Kankakee arches. Figure 2 shows Laurentia with the lighter blue being what could be described as shallow seas that would allow carbonate platforms to develop. These higher areas would allow corals and other reef building organisms to establish more stable areas. In addition, carbonate deposition and limestone formation around the flanks of these areas allowed development of larger shelf areas. Periodic transgression and regression influenced by Southern Continent Gondwana glaciation didn't seem to affect overall world temperatures but may have altered the depth of the oceans some. Crinoids are periodically forced to move living positions regarding water depth but most prefer to below the wave base but still within the photic zone (Hess et al. 1999, Stanley and Berry 2010, Meyer and Davis 2009).

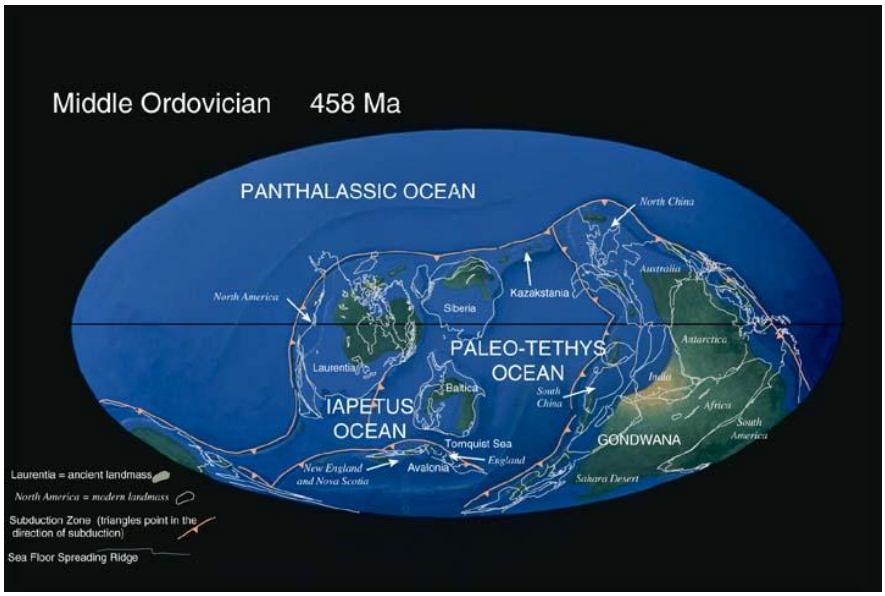

Figure 1. World Map Middle Ordovician (Wikipedia).

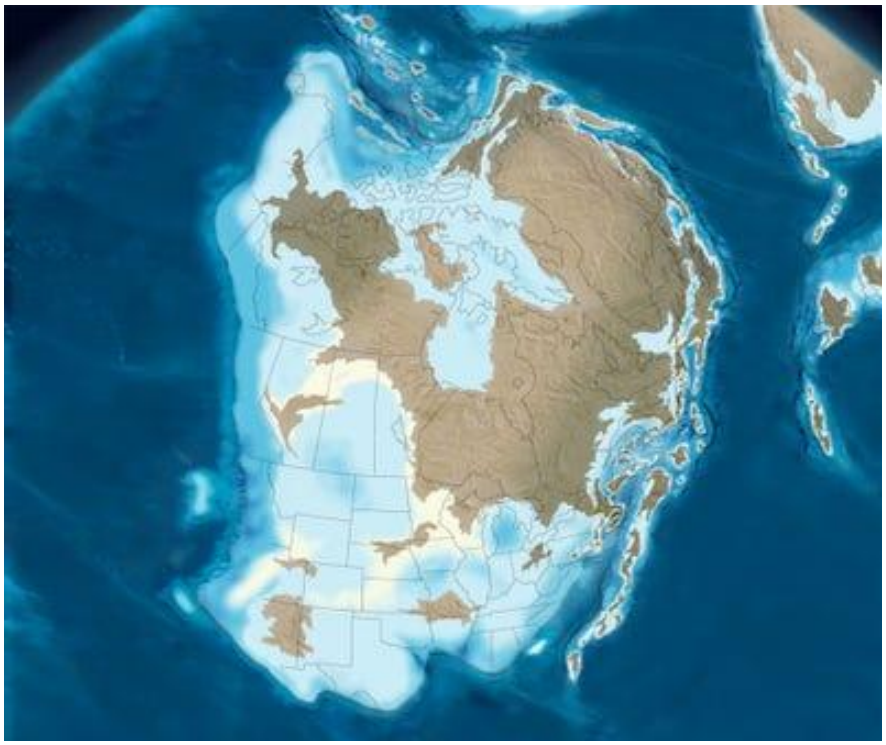

Figure 2. Laurentia (North America) during Ordovician time. (Wikipedia).

Crinoids by the Middle Ordovician were well represented in all three main classes: Inadunates (cladids and disparids), Flexibles, and Camerates. Middle Ordovician crinoid gardens, as they could be described, developed on mostly shallow carbonate platforms with most associated with deeper water basins. One of the best examples and most important crinoid collections of this is in the Trenton Group Walcott Rust Quarry which has a very diverse fauna of echinoderms including crinoids and cystoids as well as a very famous trilobite fauna. This fauna developed on what could be described as a middle shelf in only a few tens of meters of depth. In particular, this deposit of well known crinoid beds was dominated by more primitive Disparid crinoids like *Ectinocrinites* (Figure 3), *Cincinnaticrinus* (Figure 4), *Iocrinus,* Calceocrinid *Cremacrinus,* and the less common camerate *Glyptocrinus.* This fauna is often preserved by being buried quickly in dark black shales or other fine grained materials possibly from tropical storms as indicated by study of the sediment bedding and structures (Hess et al. 1999, Moore and Teichert 1978).

Figure 3. *Ectinocrinites sp.* (Wikipedia).

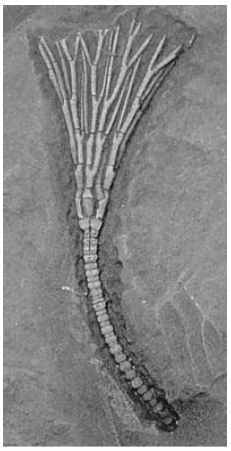

Figure 4. *Cincinnaticrinus heterodactylus* (Hess et al. 1999).

Figure 5. Hybocrinid (Wikipedia).

Middle Ordovician crinoids of the Bobcaygeon and Verulam formations from the Lake Simcoe area of Ontario developed again on shallow carbonate shelfs or shallow shoal deposits associated on hardgrounds near deep shelfs. *Hybocystites*, a short stemmed hybocrinid (Figure 5) classified as a monocyclic inadunate, is the most common crinoid in the locality. In particular, this crinoid showed a definite tendency to a reduction of arms and a replacement by recumbent ambulacral grooves. Classification of this group of crinoids may be considered somewhat under review as to where it actually belongs in the Inadunata because it is substantially different from Disparids, not really a Cladid, depending upon your point of view. *Hybocystites* had a short stem only 1.5 cm in length used to attach to a small holdfast where these crinoids were found in pockets on the seafloor in small pockets. Bobcaygeon crinoids also contain disparid crinoids including *Isotomocrinus typus* and the Calceocrinoid *Cremacrinus.* Calceocrinoids which lived directly on the bottom would become more prolific in later periods. Cladids like *Cupulocrinus, Praecuplocrinus, Plicodendrocrinus,* and *Carabocrinus* (Figure 6) can occur in greater numbers in the Verulam Formation. Camerates like *Archaeocrinus*, though not dominant, were present throughout the sequence. Another interesting feature of this deposit the presence of volcano-shaped holdfast structures on hardground for the Flexible crinoid *Cleiocrinus.* These volcano-shaped attachments will become common on hardgrounds throughout the remainder of the Ordovician (Hess et al. 1999, Moore and Teichert 1979).

Figure 6. *Carabocrinus sp.* (Wikipedia).

Figure 7. *Cupulocrinus gracilis*

Figure 8. Praec*upulocrinus sp.* Brechin Ontario.

Other Middle Ordovician deposits in the Midwest in the Galena group in Minnesota, Iowa, Wisconsin, and Illinois contain numerous crinoids from the Dunlieth formation and other mid-Ordovician formations. Again, a common feature of these crinoid gardens is the shallow carbonate platforms in warm tropical seas with some at least slightly deeper water forms present. Twenty-one different crinoids have been reported from the Dunlieth formation. An interesting determination made by the work of James Brower is that the crinoids had variations in depth. Various attachment structures to the substrate include recumbent stems, open distal stem coils, and lichenocrinid-type holdfasts that attach to shells. These types of attachment structures would stay throughout the Ordovician period. *Cupulocrinus* (Figure 7) and *Praecuplocrinus* (Figure 8) are both found in sequences of the Dunlieth Formation along with the camerate *Euptychocrinus.* Echinoderms in the Upper Midwest Katian are complex in their relationships to the environmental conditions of the geologic deposit. Many of these deposits are extremely fossiliferous with many different taxa whereas the Trenton deposits are significantly less fossiliferous overall (Brower 2013, 1992).

Echinoderms of the Lebanon limestone of Tennessee is without a doubt the most interesting due to its diversity and preservation including Camerates, Inadunata, Disparids, and Hybocrinids. Flexibles at least to this point have not been reported, however, this fauna has many other of the Echinoderms not as commonly present in many of the other faunas. Crinoids are the most common of the echinoderms with a large represented group of Camerates which include Diplobathrisda; *Clieocrinus, Reteocrinus,*

Gustabilicrinus, Archaeocrinus, Diablocrinus and the Monobathrida *Abludoglyptocrinus.* Inaduantes include a large group of Disparids which include; *Aspodasmocrinus, Cremacrinus Doliocrinus Columbicrinus, Tryssocrinus, Anamoalocrinus,* and *Tornatilicrinus*. Cladid Inadunata include: *Carabocrinus, Porocrinus, Quinquecaudex and Cupulocrinus*. This fauna also includes the strange Inadunate *Hybocrinus*. This fauna also existed on a large cratonic carbonate shelf in the central part of Laurentia with a very large continental margin (Figure 2). The larger size of this area is potentially the reason many of these crinoid groups carried over to the Upper Ordovician and the crinoid fauna found in the Cincinnatian. This carbonate shelf or much of it geographically and ecologically was in probability very much the same condition (Guensburg 1984, Meyer and Davis 2009).

Conclusion

In conclusion, Laurentia's location in the Iapetus Ocean along the equator was an ideal area for the development of reef environments. These tropical reefs with large shelf areas and open marine conditions are perfect for crinoid development forming large crinoid gardens. Large groups of crinoids developed and evolved in the many Middle Ordovician environments setting the stage for continued expansion in the Upper Ordovician. Development of crinoids during the Middle Ordovician included Disparids, Cladids, Hybocrinids, two groups of Camerates, and Flexibles. These crinoids were morphologically very diverse with some of these groups developing to dominate later in the Paleozoic. Disparids would remain an important group throughout the Ordovician but diversification would drop off after the End Ordovician extinction. Calceocrinoids would remain important into the Mississippian and some other Disparids would survive into the Permian. Hybocrinids would last to the end of the Ordovician potentially a casualty of the End Ordovician extinction despite some very interesting developmental structural elements. Flexible crinoids would diversify and become top-tier crinoids of the Mississippian time in deposits such as those found at Crawfordsville and Alabama. Some Flexible crinoid stems would reach lengths of five to six feet towering over many of the other species. Camerates would continue to develop and become dominant crinoids in environments in both the Devonian and Lower Mississippian developing large calyxes. Camerates would fall off in their importance and numbers into the Chesterian of the Mississippian. Inadunate Cladids in particular would continue to grow their numbers of genus and species after the Middle Ordovician. During the Mississippian, Cladids would become the dominant type of crinoids in the Late Mississippian and continue to thrive into the Permian period. However, it was during the Middle Ordovician that Cladids would set their foundation for this rise for the number of genera and species in the Mississippian.

References

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Protect Your Collection – Document it!

Tiffany S. Adrain

I hope MAPS members have been spending pandemic social-distancing time collecting fossils! As we head into winter and possibly feeling more stuck at home than usual, I would like to remind you that this is a great time to work on your existing fossil collection. No matter what the size of your fossil collection, or how serious a collector you are, caring for a fossil collection is an engaging challenge. Fossil collections require physical care, maintenance, and good record-keeping to remain enjoyable, useful, and protected for years to come.

Record-keeping, or collection documentation, is the focus of this article. For me, as the Collections Manager at the University of Iowa Paleontology Repository (UIPR), the intrinsic value of a fossil lies not so much in aesthetics or monetary value, but what it tells us about the history of our planet. The UIPR collection is a prime research resource because of the data accompanying the specimens. Information about the exact place the fossil was collected tells us where the organism it represents existed in space (geographic locality) and time (stratigraphy). This information adds to the interest of the specimen in a private collection and is vital for research should the specimen be donated to a museum or research facility. In fact, at the UIPR, collections without documentation are rarely accepted because they are less useful for research. Over time, you may forget exactly where you found individual fossils and their importance to you may fade. If you want your collection to be your legacy into the far future, this will better be achieved if it is documented. Too many potentially important collections are thrown away because there was no information associated with them. Document your collection and preserve it for the future with a Field Notebook, Locality Register, and Collection Catalogue.

Field Notebook

Documenting a fossil collection starts at the point of discovery. This is where information like geographic location, GPS location, rock unit (if known), and collecting observations are best recorded. It is very difficult to determine this information by looking at an undocumented fossil in a collection later. Photos of the rock outcrop or collecting site can be very helpful. If you are uncertain of the rock unit, a location and photograph will help determine that later. If you have a map (either paper or an electronic app), mark the location on that. Better still, for each different location and rock formation, write all this information as a **numbered** entry in a Field Notebook (Figure 1). Use a sturdy, preferably water-resistant notebook with numbered pages and a pencil (writes in the damp, doesn't fade or run) to record information. Record the date of collecting, who did the collecting, anecdotes, general observations about the site and rock formations, notes about what was found, etc. Detailed collecting may involve measuring the exposed rock face, working out where boundaries between stratigraphic units occur, and descriptions of the rock type (lithology) as observed in the field. If recording GPS location, include the coordinate system and datum your GPS uses. As you collect specimens and wrap or secure them to take home, mark them or include a label with the number of the entry in the Field Notebook. Take care not to discard this information when you unwrap. If you want to make notes about a specific find, give it a field number comprised of the Field Notebook entry number followed by a unique consecutive number for each specimen, e.g. 31/1 for the first fossil noted in Field Notebook entry number 31. Label the fossil with this number and record it with information about the fossil in the Field Notebook. You might do this when collecting from more than one formation or bed at a single locality. This will allow you to record and refer back to relevant information in your notebook when you are ready to document your collection.

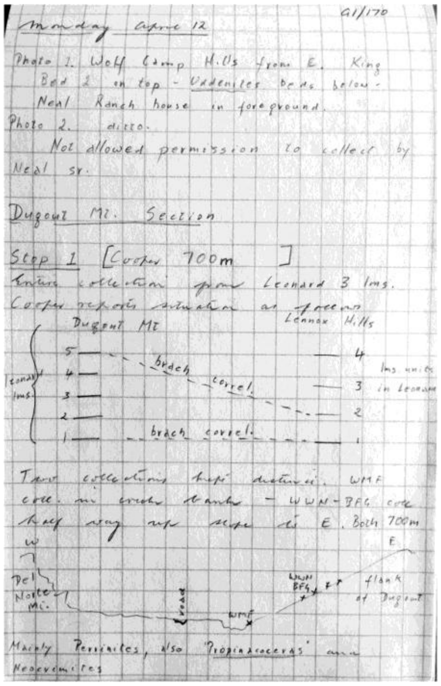

Figure 1. Example Field Notebook entry. This book has the locality number already assigned Gl/170. Note recorded date (notebook is labeled 1965), location of site, reference to photos, site access, collecting areas, and what was collected. Handwritten field notes can be cryptic so transcribing and expanding information into the Locality Register is helpful. From B. F. Glenister Archive, UI Paleontology Repository.

Locality Register

A Locality Register is helpful for compiling information about the geographic location and stratigraphy of a collecting site. This is something you would keep at home rather than take out collecting. Spending a little time learning about the geology and history of a site will reward you with greater understanding of the original context of your finds and the general geologic history of an area. It will help you determine each fossil's place in space and time, including its geologic age. Use guidebooks, scientific research papers, and Internet research to compile as much information as you can about the collecting location. Assign each location a unique Locality Number, e.g., Locality 1. Create a Locality Register (Figure 2) listing all your localities and their information. When you refer to this locality elsewhere (Field Notebook, Collection Catalogue, specimen marking), you can use the Locality Number to refer to all the information recorded in the Locality Register. You can keep adding information as you make new field observations whenever you return to a locality, or review information before visiting. Record directions to the site, contact information for access, best time to visit, state of the site over time, etc.

Information in your Locality Register can be recorded as free text in a notebook or binder or captured electronically in a spreadsheet. Information can be divided into categories (columns or fields) in a spreadsheet. Here are some Locality Register fields and their explanation:

- Locality Number: can be consecutive numbers or include collector name/initials, or state abbreviation, but must be unique to the locality.
- Geographic location: Country; State; County; nearest town; description in relation to town or permanent features.
- GPS (with coordinate system and datum) or latitude/longitude coordinates or Township and Range coordinates. .
- Stratigraphy: Geologic Age; System; Series; Group; Formation; Member; Bed; stratigraphy details and observations, measurements of rock section describing location and thickness of beds. This category can be subdivided in a), b), c), etc., for each specific rock stratum that you wish to distinguish.
- Notes and any other records.
- Cross reference to Field Notebook entries for this Locality.

The goal is to be able to compile as much information about a collecting locality as possible, cross reference it to your Field Notebook entries, and details of the fossils collected there. Information about the individual fossils is recorded in the Collection Catalogue.

Locality Number	Geographic location	Field Note-book entry #	GPS or lat/long coordinates	Stratigraphy
1	United States, Oklahoma, Pontotoc Co., Lovelady School locality, eastward-draining gullies and grass-covered slope, 1800ft N and 200ft E of SW corner sec4, NW1	31		Pennsylvanian, Wewoka Formation
2	United States, Arkansas, Independence Co., in large gully called "Buffalo Wallow", 0.5 mi. N of Homer Smith farm. 2 mi. S of Moorefield and 4.5 mi. ESE of Batesville.	32		Mississippian, Moorefield Shale
3	United States, Alaska, Brooks Range, Kiruktagiak River, USGS Loc 10864 or 10866	33	68°25'00.0"N 152°48'00.0"W	Mississippian, Alpha Limestone

Figure 2. Locality Register compiling information about each collecting locality (basic fields shown)

Collection Catalogue

In the UIPR, individual fossils are given their own, unique, catalogue number, starting with 1, and reaching 147816, so far! This is because the collection is organized to specimen level, and individual specimens are identified by catalogue number in scientific literature. You may wish to record only the collecting information and leave it at that. However, if you want to keep records on what you have collected as well as from where, then a Collection Catalogue (Figure 3) is essential. The Collection Catalogue records all information about an individual fossil, or specimen, and cross-references to the Locality Register and the Field Notebook, so all information can be viewed. A spreadsheet is great for this because you can easily search for selected groups of fossils, e.g. by geologic age, species, collector, etc. Essential Collection Catalogue information includes:

- Catalogue number: a unique number assigned to the fossil or lot of fossils.
- Number of objects: how many fossils are recorded under this catalogue number.
- Identification: genus name, species name, species author and date of the original species description publication, classification.
- Identifier and date: Name of person who identified the specimen and the date of identification.
- Locality number: the number in the Locality Register that you gave to the location where the specimen was found.
- Geologic age: according to your Field Notebook and research: Geologic Age, System, Series.

- Stratigraphic location (data from Field Notebook and research) Group; Formation; Member; Bed; stratigraphy details. This may exist already in the Locality Register but should be written in full if you want to be more specific or be able to search your data.
- Description of the fossil, e.g., complete, what part, preservation type, etc.
- Who collected the fossil(s). Write their name(s) in full.
- Date of collection. 00/00/0000. Write the year in full - you may not survive a century, but your collection should!
- Cross-reference to Field Notebook entry for collecting information.
- Description of any preparation and conservation: note of types of glues used or preparation techniques. List any photos of the specimens or embed them if using a spreadsheet.

Catalogue Number	Identification	Taxon	Locality	Stratigraphy	Field Note-book entry #	Collected By	Date Collected
0000001	Neodimorphoceras lenticulare (Girty)	Ammonoidea	Loc. No. 1	Pennsylvanian, Wewoka Fm. lower shale	31	Graffham, A. A.	05/20/1960
0000002	Goniatites granosus Portlock	Ammonoidea	Loc. No. 2	Mississippian, Moorefield Sh.	32	Drahovzal	Summer 1966
0000003	Beyrichoceras micronotum (Phillips)	Ammonoidea	Loc. No. 3	Mississippian, Alpha Ls, Kiruktagiak Mbr, probably bed b (Gordon, 1957)	33	Dixon, J. S.	06/05/1967

Figure 3. Collection Catalogue (with basic fields and example entries that correspond to the Locality Register).

YOUR NAME HERE FOSSIL COLLECTION
CATALOGUE NO. 0000001 NUMBER OF SPECIMENS:1

AMMONOIDEA
Neodimorphoceras lenticulare (Girty)

STRATIGRAPHY: Pennsylvanian, Wewoka Fm., lower shale

LOCALITY: Loc No. 1
Oklahoma, Pontotoc Co., Lovelady School locality, eastward-draining gullies and grass-covered slope, 1800ft N and 200ft E of SW corner sec4, NW1

FIELD NOTEBOOK ENTRY: 31

REMARKS:

COLLR: Graffham, A. A. **COLLD:** 05/20/1960

Figure 4. Example labels for individual specimens.

YOUR NAME HERE FOSSIL COLLECTION
CATALOGUE NO. 0000002 NUMBER OF SPECIMENS:1

AMMONOIDEA
Goniatites granosus Portlock

STRATIGRAPHY: Mississippian, Moorefield Sh.

LOCALITY: Loc No. 2
Arkansas, Independence Co., in large gully called "Buffalo Wallow", 0.5 mi. N of Homer Smith farm. 2 mi. S of Moorefield and 4.5 mi. ESE of Batesville.

FIELD NOTEBOOK ENTRY: 32

REMARKS:

COLLR: Drahovzal **COLLD:** Summer 1966

YOUR NAME HERE FOSSIL COLLECTION
CATALOGUE NO. 0000003 NUMBER OF SPECIMENS:1

AMMONOIDEA
Beyrichoceras micronotum (Phillips)

STRATIGRAPHY: Mississippian, Alpha Ls, Kiruktagiak Mbr, probably bed b (Gordon, 1957).

LOCALITY: Loc No. 3
Alaska, Brooks Range, Kiruktagiak River, USGS Loc 10864 or 10866
68°25'00.0"N 152°48'00.0"W

FIELD NOTEBOOK ENTRY: 33

REMARKS:

COLLR: Dixon, J. S. **COLLD:** 06/05/1967

Figure 4. Continued.

Numbering, marking, and labeling fossil specimens

To associate a fossil with its data, the fossil must be permanently marked with the unique catalogue number assigned to it in the Collection Catalogue. At the UIPR we use drafting pens (e.g., Pigma Micron, Rotring, even old-fashioned quill pens) to write the catalogue number directly onto the fossils. Choose an innocuous place to write, preferably a smooth area of the fossil or matrix so the number is legible. Do not use correcting fluid, nail polish, ballpoint pen, or felt-tip as these will either flake off or fade eventually. If it is not possible to write on the fossil, write the number on a small piece of acid-free paper and attach it with acryloid glue (we use a glue called Paraloid B-72). PVA glue dries clear but will dissolve if your fossil gets wet and the label may fall off. Very small fossils can be placed in a clear archival container (polyethylene is best) with a numbered label. Details from the Collection Catalogue can be added to a label or card placed with each fossil for quick access to information (Figure 4). If you are using an Excel spreadsheet or similar for your Collection Catalogue, you can send information to a word-processing document template using the mail-merge feature and create labels easily.

Documenting a fossil collection will increase your knowledge and appreciation of the important finds you have made, help organization and retrieval of specimens, safeguard your collection for the future, allow you to share information with others, and ensure that your collection becomes an important research resource should you wish to donate it to a museum or university.

Tiffany Adrain will present more information and examples on this topic at the November MAPS meeting. Check the MAPS website and look out for a members' email announcement.

The **M**id-**A**merica **P**aleontology **S**ociety (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: $20.00 per household covers one year's issues of DIGESTS. All Canadian and Overseas members receive the DIGEST by air letter post. For new members and those who renew more than 3 issues past their due date, the year begins with the first available issue. Institution or Library fee is $25.00.

MAPS meetings are held on the 2nd Saturday of October, November, January, and February and at EXPO in March or April. A picnic is held during the summer. October through February meetings are scheduled for 1 p.m. in Trowbridge Hall, University of Iowa, Iowa City, Iowa. One annual International Fossil Exposition is held in late March/early April.

The MAPS official publication, MAPS DIGEST, is published 5 times per year – Jan-Mar, EXPO EDITION, May-August, Sept-Nov, Dec. (EXPO Materials). View MAPS web page at: http://www.midamericapaleo.org

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