Lakeland Gem Club

Newsletter

December, 2009

The Lakeland Gem Club, Ltd was founded July 20, 1970.
The purposes shall be to promote general interest and education in Earth Sciences, Geology, Mineralogy and especially in all phases of the Art of Lapidary, to aid in Gem material and mineral identification. Also, for instruction in the art of handcrafting jewelry and for all related subjects in Geological Hobbies.

Officers and Meeting Info

Daniel Erickson, President
Sue Vallee, Vice President
Ken Wierschem, Secretary & Newsletter Editor
Ron Zimmer, Treasurer

Meetings are usually the fourth Wednesday of the month at 6:30 PM at the Church of the Pines Methodist church in Minocqua. The next meeting is **January 10, 2010 at 1:00 PM and it is our Christmas Party. See the separate article.**

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Lakeland Gem Club, Ltd.
Minutes of the regular meeting of November 18, 2009
Church of the Pines, Minocqua

Call to Order: President Dan Erickson called the meeting to order at 6:33 PM.

Approval of Minutes of October 28, 2009. The minutes were printed in the November newsletter. The motion to "approve" the Treasurer's Report was changed to "accept" the Treasurer's Report in the Minutes of October 28, 2009. It was MOVED by Patti Hartmann, SECONDED by Sue Vallee, to approve the minutes as printed and corrected. **Voice vote: All Ayes; The motion carried.**

Treasurer's Report. In the absence of the Treasurer, there was no report.

Old Business.

Bylaws Committee. Verbal report by Sue Vallee. Because of the holidays and the family demands on the committee's time, the committee will try to get back on task after the holidays.

Christmas Party Food. After discussing the costs to cater the food for the Christmas party, it was MOVED by Sue Vallee, SECONDED by Jane Wierschem, to remain with a pot-luck for the Christmas Party; and the have ham as the main entrée. **Voice vote: All Ayes; The motion carried.** More details about the Christmas party will follow the minutes as a separate article.

Discussion of Klondike Days, February 20 and 21, 2010. President Dan has lined-up 10 (10 foot long) tables for club member use; which hopefully will result in one table per club member. He reminded us that to keep this "benefit" part of the table should be for "educational exhibits or demonstrations" and that part of any sales go to the club.

The following observations were made at this time:

Jan Reed mentioned that Trinity Church has just purchased new tables for their fellowship room, and some of their old tables might be for sale. (We had to rent some tables for last year's show.)

Jan Reed asked if we need to buy more T-shirts before Klondike days.

Virginia Neff observed that we need more black material to cover the tables. The material is black double knit polyester: 60 inches X 12 feet.

Winter "Field Trip". Two possible "combinations" were suggested: Weiss Museum followed by Red Granite Rock Shop OR A.E. Seaman Museum followed by Keweenaw Gift Shop. No action was taken.

New Business.

New meeting room for the LGC on a trial basis. The Town of Minocqua has some meeting rooms available for groups to use free of charge. The Bylaws committee has been meeting in the Torpy Room. This is on the third floor of the Community Building, which is the building that also houses the Minocqua Public Library. Physically, it is located one block east of the Methodist Church of the Pines. There is an elevator to the third floor. (There will be a map provided in the newsletter before we meet there.)

It was MOVED by Sue Vallee, SECONDED by Valerie Burns, to try the Torpy room for the regular meeting in February. **Voice vote: All Ayes; The motion carried.** The regular meeting date is February 24, 2010, but that would be after Klondike days. So there is a possibility that the meeting could be moved up a week, if we need to have one before Klondike days. Hopefully the newsletter can keep you informed OR a special email blitz.

Dues. It was MOVED by Virginia Neff, SECONDED by Sue Vallee, to set the dues for 2010 at $5.00 per person or $10.00 per family. **Voice vote: All Ayes; The motion carried.**

Tara Lee Norin reported that Joan Larson, who was a member of LGC for many years, is not doing well health-wise. She will bring a card to the Christmas Party for all to sign.

Two books were recommended for purchase for our library: *Fossils of Iowa, A Fieldguide to Paleozoic Deposits*, by Robert Wolf and *Common Paleozoic Fossils of Wisconsin.*

Adjournment. It was MOVED by Casey Vallee, SECONDED by Laura Peterson, to adjourn at 7:45 PM.

Program(s). The Ugly Rock Contest. Valerie Burns won the big trophy.

Dale Hartmann gave 2 programs: A DVD on Transfer Dump Safety and on Native American Artifacts.

Dan Erickson talked on Green Stones and finding them in the Keweenaw; and showed some artifacts from the mines that you can still find if you are very skilled or lucky. (I'll take "lucky" over "skilled" everyday.)

Attendance: Ken & Jane Wierschem, Linda Albers, Virginia Neff, Valerie Burns, Jan, Kerstin, Matthew, Brandon & Brian Reed, Laura & Kathy Peterson, Joan Juresh, Dale & Pattie Hartmann, Kenny Weinborn, Dan Erickson, Casey & Sue Vallee, Aaron Sauter.

From the Editor

I know what you are thinking – if this is the December newsletter why is it coming in January! I could answer that, but it would just sound like lame excuses – which in many ways would be true. I did have very good intentions of sending this out before Christmas but as you know ---it just didn't happen. Hey, besides, this is our LGC Christmas party coming up next Sunday, January 10th.

On December 13th we used some frequent flyer miles to fly down to Houston for eight days. Our granddaughter was graduating from college, our grandson was singing in a school choral concert, and we celebrated an early Christmas with our daughter and family. We flew out of Central Wisconsin Airport to Minneapolis-St. Paul. When we got in the terminal, I bought a cup of coffee, and we just sat down when we saw Mike and Carmel. They flew from Rhinelander to MSP on their way to a cruise through the Panama Canal (if I remember correctly.) It's a small world and it seems as if you can run into someone you know almost anywhere.

Our daughter had to work all week and I thought I would have a lot of time to work on the newsletter. I not only took the computer, but I hauled everything I needed as resource material. As you know – it just didn't happen.

Coming home on Dec 20th we faced the prospect of a quiet, peaceful, Christmas. No house guests – just the two of us and lots of time to work on the newsletter AND all those boxes I am still working on and throwing junk away. In fact, we felt like we would borrow a script from Scrooge and not decorate at all, except for maybe one of those little 15 inch trees with the tiny ornaments you always leave on the tree. You store it that way with a tall garbage bag over it. It is called decorating in 27 seconds!

But those best made plans dissipated in a hurry when our son and family decided about 2 days before Christmas to come up after Christmas for a winter get-a-way and the 3 boys could do a lot of sledding. Up went to outdoor decorations, up went the big tree indoors, up went all of the other Christmas decorations, away went the partially gone-through boxes. We had a great time, but were very tired when they left on New Year's Day.

The year 2009 was quite a year for us. I have probably used this expression in an earlier newsletter or said it at a meeting: An old Jewish expression says; "When you stop learning, you start dieing." If that is true, this rock hounding, lapidary, geology hobby probably took some years off of me this year. (But then why do I feel so tired – especially climbing up the tailings piles in the Keweenaw.)

Writing the newsletter this year was a major undertaking for me, and one that I have enjoyed. There was a paper issue, I think Dec 2008 or Jan 2009, that I showed to some of the officers but it was only a "test" and never was sent out. The first issue was the Feb 2009 issue and I still have all of the issues on my computer and can send them to you, if you didn't get all of them. I do consider this present issue to be December, 2009 and I will have a January, 2010 issue sometime after the party even though there will not be another meeting in January, unless plans change at the party.

Jane and I had a lot of first's this year; Klondike Days, working the show in July and the Heart of Wisconsin show in May, the Copper Country Mineral Retreat in August, the Red Granite Rock shop trip, the trip to South Dakota, learning to saw and grind and polish slabs, and building our own lapidary workshop with the help and advice and encouragement from many of you. I made my first cab and did grind and polish some agates; Jane made over 100 cabs and wire wrapped some of them, and has cut hundreds of nodules from the UP. We are very appreciative to all of you who helped.

I am not going to make some resolutions for the New Year, because it is already January 3rd, and a high percentage of the New Year's resolutions have already been broken by now. I found out years ago, if you don't makem you don't breakem. (The spell check just went wild!) I would never make a resolution to start on newsletters earlier each month, because after ten years of doing the genealogy newsletter I know I will never get an earlier start. I think I work better with deadline pressure – the newsletter isn't better but I work better.

I have a lot of articles to share with you and the emphasis will be on fossils this year since that is our theme for Klondike Days AND our show in July.

Jane and I would like to wish all of you a belated Merry Christmas and a Happy New Year! May all your "finds" be great!

LGC Christmas Party January 10, 2010 at 1:00 PM

The Christmas Party will be held at The Methodist Church of the Pines. The main entrée will be ham the year. Please bring a dish to pass. The sign-up list created at the meeting has the following "dishes" on it: sweet potato / cranberry casserole, choco-cherry bars, baked apple dish, corn casserole, peanut butter cookies, Ham and gravy, mashed potatoes, fruit salad and cranberries, brownies, cranberry salad, bread/condiment/snouts. (Yes that is what it says.) If you can't remember what you signed up to bring, email me or call me and I will tell you. kenwierschem2003@yahoo.com or 715-356-3468. If you haven't signed up yet, this can be a guide of what we can use – but anything works at a pot-luck dinner.

We also ask everyone to bring 3 small ($3 to $5 value) wrapped gifts for game prizes. The prizes should be rock related and can be rocks and/or minerals.

There will be a short business meeting, with a minimum agenda. My guess is that we might need to talk about Klondike days and if we want to move up the February meeting.

Show Calendar

The only shows that I am aware of at this time are the Heart of Wisconsin show on May 1 & 2, 2010 in Marshfield and Lakeland gem Club July 16 & 17, 2010 in Minocqua.

I am sure that the calendar will start filling up soon.

Ed Note: The following three articles were found by "Googel"-ing "January Birthstone Information"

January Birthstone : Garnet

Birthstone Color: Deep Red

The word "garnet" comes from the Latin word "granatus," meaning "grain" or "seed." This name was given to the garnet because of its close resemblance to the succulent pomegranate seed.

There are many myths and legends surrounding the garnet. One Biblical legend is that Noah hung this gem on the ark to light his way through the dark and stormy nights of God's wrath. A Greek myth linked to the garnet is the story of the young goddess of sunshine, Persephone, who was abducted by Hades, god of the underworld. Hades eventually released Persephone, but not before he offered her some pomegranate seeds, which guaranteed her return to him.

First mined in Sri Lanka over 2,500 years ago, the garnet is also found in Africa, Australia, India, Russia, South America; and in the United States, in Arizona and Idaho. Although most commonly known as a red gemstone, the garnet comes in a variety of other hues, including muted yellows, vibrant oranges, rosy pinks, lime greens, and violets—a virtual bouquet of colors. This diversity is due to unique combinations of elements within each particular gem, such as iron, calcium, and manganese.

Archaeologist findings of primitive style garnet jewelry among the graves of lake dwellers dates the early use of this gemstone to the Bronze age. But not all gar-

net is of gem quality. It is also a very effective abrasive and is used commercially for grinding and polishing. Garnet coated sandpaper is one such industrial use.

The garnet continues to be the protective gem of journeyers. A gift of garnet is thought to be symbolic of love and the desire for a loved one's safe travel and speedy homecoming. It is January's birthstone, but far from being only a winter gem, the garnet, with its brilliance and multitude of colors, is truly one for any season.

January's Birthstone is Garnet

The Synthetic Stone for January is Simulated Garnet.

The Garnet was considered to be a gem of faith & truth. Garnets were used medicinally as a remedy for hemorrhage and inflammatory diseases. Asiatic warriors believed that glowing garnets, used as bullets, inflicted more severe wounds. In 1892, during hostilities on the Kashmir frontier, the Hanza tribesmen fired on British soldiers with garnet bullets, believing them to be more effective than lead bullets.

Garnets were once believed to hold medicinal powers. In Medieval times, it protected its wearer against poisons, wounds and bad dreams, and cured depression. Red garnets relieved fever, hemorrhages and inflammatory diseases. To modern users, the garnet symbolizes a light heart, loyalty and enduring affections.

The name "garnet" is derived from the Latin "granatum" meaning "pomegranate" because the crystals resemble the red color and seed-like form of this fruit. Most people think of the garnet as a red gemstone, but in fact, it exists in all kinds of colors, such as black, many shades of red and green, or even colorless. The garnet's variety of colors comes from metals such as manganese, iron, calcium, and aluminum. Some varieties even contain mineral fibers that produce the illusion of a four- or six-rayed star within the stone. Green garnets are most highly prized but are very rare. Emerald green and colorless stones are highly valued, followed by pure red garnets.

Garnets are commonly found as small pebbles in streams**,** where the igneous and metamorphic rocks that contain them have weathered away. They're found in many places around the world, including North and South America, Australia, India, Asia and Spain.

In the former Czechoslovakia, evidence of garnet jewelry dating to the Bronze age was found -- garnet necklaces were discovered in the graves of ancient lake dwellers. Garnet jewelry has also been discovered dating back to 3100 B.C. in

Egypt, 2300 B.C. in Sumeria, and 2000-1000 B.C. in Sweden. Garnets were treasured in 3rd and 4th century Greece, and continued in popularity during Roman times. Across the Atlantic, Pre-Columbian Aztec and Native Americans also used garnets in their ornaments.

January Birthstone - Garnet

Unique Birthstone Jewelry

Garnet is the modern January birthstone and the gem designated for the 2nd and 6th wedding anniversary. See other ***January birth stones*****:** Traditional, Contemporary, Mystical, Ancient, Zodiac and Star signs.

There are no known enhancements for garnet, it occurs in every color of the spectrum, except blue. Any of these colors is permissible to wear as the January birthstone.

The name Garnet appears to originate with the Latin granatum malum which means pomegranate. Pomegranate is the name of the bush which produces a red fruit with seeds. Jewelry made with garnet has been found as early as the Bronze Age (3000 BC) in burial sites. It is thought that early communities valued garnet and believed that it offered protections in the afterlife.

Legends, Myths and Healing Properties:

During the Middle Ages primitive cultures believed that the red stones would stop bleeding. Many early cultures believed that garnets were helpful in preventing and curing blood disorders and infections.

Colors:

Almandine

- *Description*: Deep, dark, rich red to purplish red to orange red (the more valuable Almandines are less orange and brown in color).
- *Sources*: Brazil, India, Madagascar, Sri Lanka, U.S. in Arizona, Idaho, New Mexico, Utah, Arkansas and Kentucky.

Demantoid

- *Description*: Medium green to slightly yellowish green. Rare and valuable, sought after by gem collectors.
- *Sources:* Italy, Korea, Russia, Zaire.

Hessonite

- *Description*: The hessonite garnet from Sri Lanka varies in color from a brilliant yellow to yellowish brown.
- *Sources*: Kenya, Sri Lanka, Tanzania.

Pyrope

- *Description*: Deep, dark, rich red to slightly purple red.
- *Sources*: Australia, Czechoslovakia, South Africa - Zimbabwe and Mozambique. United States produces a highly saturated dark red almandine/pyrope garnet.

Rhodolite

- *Description:* Shades of pink through reddish lavender.
- *Sources*: Sri Lanka, Tanzania, Zimbabwe.

Spessartite

- *Description:* Medium orange to reddish orange.
- *Sources:* Brazil, Namibia, Pakistan, Sri Lanka, US. Spessartite is found in Europe with the main source of these deposits found in Bavaria, Germany.

Tsavorite

- *Description:* Medium, intense green to slightly yellowish green. Rare and valuable.
- *Sources:* Tsavorite is found in Kenya around the Tsavo National Park area. The jewelry company, Tiffany and Company imported tsavorite from Tanzania.

Uvarovite

- *Description:* Bright green. This green-colored garnet occurs in fine crystal clusters. This form is sometimes referred to as drusy because of the tiny crystals.
- *Sources:* Uvarovite was discovered in Russia and was named for a Russian nobleman by the name of Sergei Uvarov.

Ed. Note: The following four articles are on fossils and hopefully get you thinking about our theme for Klondike days and our show in July. Remember the text in blue are a link to more information; but you have to be online for the link to work.

Geologic Time Line

The purpose of this geologic time line is to help you easily find in-depth information on eons, eras, and periods of earth's history. We think it is convenient and useful to see the time periods all laid out in chart form. As a reference tool, you can easily note the sequence of the various divisions and the length of each unit of time. Just like the layers of the earth, the top divisions of the chart represent the most recent time. Moving down the chart, you go further and further back in time.

The names of each Eon, Era or Period are linked to pages that contain information on the geology, biology, and climate of that particular time. Note: At present, information about individual epochs can be found within their respective periods.

Below the chart, you will find links to lesson plans and activities for kids related to the geologic time line.

<table>
<tr><th>Eon</th><th>Era</th><th>Period</th><th>Epoch</th><th>Old Periods</th></tr>
<tr><td rowspan="14">Phanerozoic Eon
543 mya to Present</td><td rowspan="7">Cenozoic Era
65 mya to Present</td><td rowspan="4">Neogene</td><td>Holocene</td><td rowspan="2">Quaternary
1.8 mya to Present</td></tr>
<tr><td>Pleistocene</td></tr>
<tr><td>Pliocene</td><td rowspan="3">Tertiary
65 to 1.8 mya</td></tr>
<tr><td>Miocene</td></tr>
<tr><td rowspan="3">Paleogene</td><td>Oligocene</td></tr>
<tr><td>Eocene</td></tr>
<tr><td>Paleocene</td></tr>
<tr><td rowspan="3">Mesozoic Era
248 mya to 65 mya</td><td colspan="3">Cretaceous 144 mya to 65 mya</td></tr>
<tr><td colspan="3">Jurassic 206 to 144 mya</td></tr>
<tr><td colspan="3">Triassic 248 to 206 mya</td></tr>
<tr><td rowspan="6">Paleozoic Era
543 to 248 mya</td><td colspan="3">Permian 290 to 248 mya</td></tr>
<tr><td colspan="3">Carboniferous 354 to 290 mya</td></tr>
<tr><td colspan="3">Devonian 417 to 354 mya</td></tr>
<tr><td colspan="3">Silurian 443 to 417 mya</td></tr>
<tr><td colspan="3">Ordovician 490 to 443 mya</td></tr>
<tr><td colspan="3">Cambrian 543 to 490 mya</td></tr>
<tr><td rowspan="3">Precambrian Time
4,500 to 543 mya</td><td colspan="4">Proterozoic Era 2,500 to 543 mya</td></tr>
<tr><td colspan="4">Archaean 3,800 to 2,500 mya</td></tr>
<tr><td colspan="4">Hadean 4,500 to 3,800 mya</td></tr>
</table>

How are Fossils Formed?

So how are fossils formed anyway? There are several processes that plants and animals or their parts can be preserved. No matter which way preservation occurs it takes a lot of luck, pure happenstance. Most living things are quickly recycled upon death. Scavengers and bacteria usually consume all but bones and shells.

Still millions of fossils have been found. If you think about all of the museums, university paleontology labs, fossil dealers, and private collectors, there really are a lot of fossils that have been discovered! However when you think of the billions and billions of living things that have inhabited the earth over the last 550 million years only a very small percentage are immortalized in stone!

The following is a list with descriptions answering the question “How are fossils Formed?” Generally the top of the list has methods that preserve best though their occurrence is seldom seen.

How are fossils formed?Freezing (refrigeration)-This is the best means of preservation of ancient materials. It happens only rarely. The animal must be continually frozen from the time of death until discovery. That limits the possibilities to cold hardy animals from the last ice age. There have been remarkable discoveries of mammoth and wooly rhinoceros found in ice from Alaska and Siberia. Specimens with flesh, skin, and hair intact have been found. Some of these finds suggest that they were flash frozen, with food still in the mouth and stomach.

Drying (desiccation)- Mummified bodies of animals including humans have been discovered in arid parts of the world. The soft tissues including skin and organs are preserved for thousands of years if they are completely dried.

How are fossils formed?Asphalt- In what is now downtown Los Angeles lies a 23 acre park called The La Brea Tar Pits, officially Hancock Park. Within the park are over 100 pits filled with sticky asphalt or tar. The tar pits were formed by crude oil seeping through fissures in the earth. The lighter elements of the oil evaporate leaving thick sticky asphalt.

The pits are famous for the number and high quality of Pleistocene fossils that have been pulled from the pits. The fossils date between 10 and 40 thousand years old. Asphalt is an excellent preservative. Bones, teeth, shells, the exoskeletons of insects, and even some plant seeds have been pulled from the pits.

How are fossils formed?Amber- Insects, spiders, and even small lizard have been found, nearly perfectly preserved in amber. Picture this scenario: A fly lands on a tree branch in an area that is now the Baltic sea. While looking for food it steps in sticky sap that the tree has made to protect itself from fungal infection.

As the fly struggles to escape it becomes more and more entombed in the sap until it is completely engulfed and suffocates. The tree eventually dies and falls into the swampy water from which it grew. Over the course of millions of years the tree along with countless others becomes a coal deposit and the sap with our fly inside is polymerized and hardened into amber. As more time passes the coal bed is submerged as the sea level rises. Eventually the currents uncover the coal bed, slowly eating into the Surface, little by little. When the erosion reaches the amber it floats to the surface because it is lighter than the salty water. It is then washed ashore where it can be found.

How are fossils formed?Carbonization (distillation)- In this process of fossilization plant leaves, and some soft body parts of fish, reptiles, and marine invertebrates decompose leaving behind only the carbon. This carbon creates an impression in the rock outlining the fossil, sometimes with great detail.

How are fossils formed?Permineralization-This is the most common method of fossil preservation. Minerals fill the cellular spaces and crystallize. The shape of the original plant or animal is preserved as rock. Sometimes the original material is dissolved away leaving the form and structure but none of the organic material remains. For a detailed and illustrated description see How Are Fossils Formed? The Work of Ages.

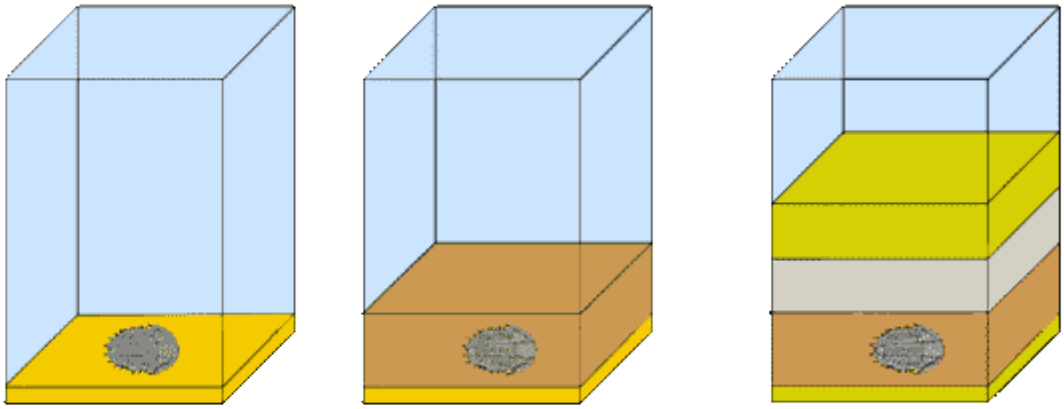
Fossils have also been created by peat bogs, paraffin deposits, and volcanic ash.

Fossil Formation
The Work of Ages

Permineralization
When it comes to fossil formation **Permineralization** is the most common process for preserving ancient plant and animal material. Common is a relative term when used in regards to fossils. Though there are millions of fossils that have been discovered and millions more waiting to be discovered, fossilization is a rare occurrence.

Fossil Formation Is A Rare Occurence
There have been untold billions of creatures that have lived on the planet during the last 550 million years. When conditions on Earth caused mass extinctions, literally thousands, perhaps hundreds-of-thousands of species went extinct. For these species to be preserved, a series of truly fortunate events had to have occurred. If even one of these events failed, that animal or species would never be seen by modern eyes.

Nature Recycles
Because of this, fossilization is actually a rare occurrence. It goes against the laws of nature that favor recycling. Just about everything that exists naturally on



the planet, animals, plants, rocks and minerals, are designed to be reused or re-formed to support some other species or life-form.

Food For Thought
Let's narrow it down to animal species for a moment. All animals are designed to be someone else's lunch. All parts, even the leftover bones, can be consumed by one species or another…right down to the bacteria that decomposes the sturdiest bones and shells. This makes a very bad situation for the formation of fossils. Since every part is designed to be gobbled up, the fossilization process has to happen before someone or something gets a hold of the food!

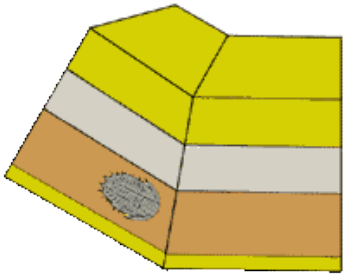
Fossil Formation
In the first step of fossil formation an animal or plant must die in water or near enough to fall in shortly after death. The water insulates the remains from many of the elements that contribute to decomposition. In the following example a trilobite has died of old age on the bottom of the sea. Bacteria consume the soft body parts but leave the hard exoskeleton intact.

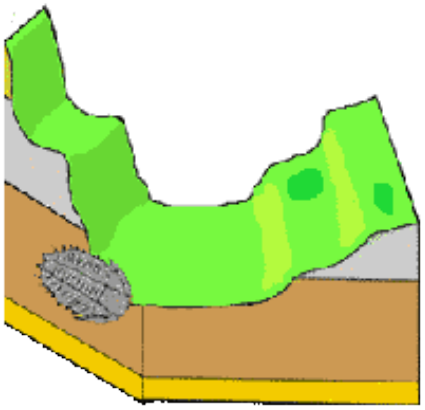
Sedimentation
As time passes sediments bury the exoskeleton. The faster this happens the more likely fossilization will occur. Land and mud slides definitely help. River deltas are also good for quick accumulation of sediments. This further insulates our trilobite from decomposition. Now we have fossil formation in progress.

The sediments themselves have a huge influence on how well our trilobite fossil turns out. Very fine grained particles, like clays, allow more detail in the future fossil. Course sediments, like sand, allow less detail to show. The chemical make up of the sediments also contributes to the future fossil. If iron is present it may give the rock a reddish color. Phosphates may darken the rock to gray or black. The possibilities are truly endless.

Permineralization
As the sediments continue to pile on, the lower layers become compacted by the weight of the layers on top. Over time, this pressure turns the sediments into rock.

If mineral-rich water percolates down through the sediments, the fossil formation process has an even better chance of preserving our ancient animal. Some of the minerals stick to the particles of sediment, effectively gluing them together into a solid mass. These minerals make an impact on our original trilobite as well. Over the course of millions of years they dissolve away the outer shell, sometimes replacing the molecules of exoskeleton with molecules of calcite or other minerals. In time the entire shell is replaced leaving rock in the exact shape of the trilobite. That is fossil formation at work.





Uplift
As the continental plates move around the earth, crashing into each other, mountains are formed. Former sea floors are lifted up and become dry land. This is exactly what has happened to our trilobite in the picture below. Now fossil formation is complete but our trilobite is buried under hundreds or even thousands of feet of rock! Thanks to the movement of the plates, our trilobite will come closer to the surface and nearer to discovery by some fortunate fossil hunter. Luckily nothing stays the same.

Erosion at work
Fossil formation is revealed by erosion. Wind, rain, freeze and thaw, even earthquakes will help force the trilobite out of its burial ground and out into the light. If he or she is lucky enough, the trilobite will reveal itself in time to be spotted by a rock-hounder or fossil-digger. Who knows? It could even be YOU!

You might be a fossil if . . . .

Fossilization of a particular living organism in sedimentary deposits is a rare event. Yet, past life is so boundless in number that there exists, in fact, countless numbers of fossils buried in the earth. You might say that fossils are both common and rare at the same time. While they may be countless, finding fossils is generally not easy. Normally, a fossiliferous layer of sedimentary rock will lie between non-fossiliferous layers. In the former, the conditions enabling fossilization to occur existed, and in the latter, they did not. The gaps in between the fossiliferous layers constitute gaps in the fossil record that could be hundreds, thousands or even several millions of years.

There are numerous factors that influence whether a particular organism eventually becomes a fossil, some of which increase the probability and some of which decrease the probability of fossilization. Let your imagination roam, and consider that you are an organism in a population of like-kind organisms that existed some time between 4.5 billion years ago and much more recently.

You've probably heard jokes like: You might be a redneck if, your `huntin dawg' cost more than the truck you drive him around in, or if you have the local taxidermist's number on speed dial. Or, you might be an engineer if, you know vector calculus but you can't remember how to do long division, or, the salesperson at Circuit City can't answer any of your questions, or, you think that when people around you yawn, it's because they didn't get enough sleep. The section below looks at fossil formation in a similar stylistic manner.

You, or a close relative of yours at least, **might be a fossil if**:

- **You were lower on the food chain**. - Organisms lower on the food chain are in greater abundance, have shorter life spans, high fecundity (make many offspring), and thus have a greater chance of appearing in the fossil record. Prey always far outnumbers predators, a balance of nature that always rules population ratios. Hence, Cambrian brachiopod or trilobite fossils that were prey far outnumber, for example, fossils of the soft-bodied terror of the Cambrian, the Anomalocaris that fed on them.
- Similarly, you might be a fossil if, **you were small and weak, rather than big and strong**. – Size does matter, as predators always choose the smallest and weakest prey available to them. For example, big, carnivorous dinosaurs outnumbered the herbivores of the Mesozoic, and small fish have always outnumbered the big fish. Bigger animals live longer because they can, so nature makes fewer of them, and there will consequently be fewer fossils of them. Evolutionary adaptation requires that there are many of the small and weak so some can survive and pass along their genes. Populations of the small and weak left more fossils behind. There are some exceptions to this rule, such as: (1) maybe you were too small to tempt a larger predator to even bother; or, (2) your diminutive stature enabled you to hind more effectively (maybe you were a tiny mammal during the age of dinosaurs).
- You might be a fossil if **you were slow, lacked eyes, were attached to the sea floor and thus immobile**, etc. Just like being small, being slow or immobile was not good, and evolution would have compensated by making more of you, and your family would have made more fossils. She or he who hesitates is lunch, so they say.
- You might be a fossil **if you lived in or near a marine or aquatic environment, as opposed to on land**. – The likelihood of your fossilization was markedly higher in aquatic and marine environments than it is on land simply because there exists a minute yet finite possibility that before you are scavenged or rotted away, you may have settled to the bottom, and was quickly covered with muck or silt. If you were really lucky, the mucky bottom would have a paucity of aerobic bacteria to eat your remains; such anoxic (lacking oxygen) environments are the stuff of which the famous

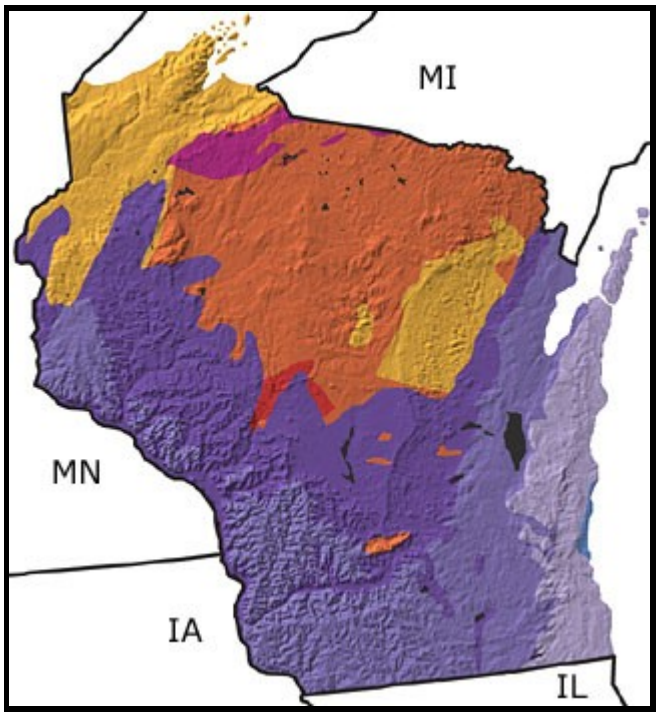
Lagerstatt fossil sites (for example, Green River, Solnhofen, Burgess Shale and Chengjiang) are made, but these are indeed rare.

- You might be a fossil if **you were crunchy rather than soft**. - If you were a real softy, lacking bones and exoskeleton, there is almost no chance you left a trace of your life in the earth. This is why the fossil record is almost non-existent prior to the Cambrian some 550 million years ago. If you were soft, maybe you left a footprint if you were an arthropod with legs, or an impression if you were a jellyfish, but, your actual carcass if not gobbled whole, would have fallen victim to a myriad of bacteria, the predominant life form on the planet throughout all of geological history. However, if you were a post-Cambrian organism, and was crunchy, your crunchy part(s) might have left a trace of your past existence. If you were an invertebrate, you might have had an exoskeleton that was preserved because it was already fairly solid and partly mineralized. In fact, if you were a Paleozoic trilobite, you probably left a legacy before your final demise of many your calcareous exoskeletons that you periodically shed in order to grow. If, however, you were a dinosaur-age insect from the Mesozoic, or any time since then, your thin little chitin exoskeleton would have afforded your meager carcass scant protection from the ravages of nature, but at least your little exoskeleton had a better chance for fossilization than if you were a softy and lacked one.
- You might be a fossil if **you expired in water or fell in some water after you expired**. – Regardless of where you lived, where you were exactly at the time of passing would make a huge difference in whether you would leave a trace of your existence. Unless you existed before the middle Cambrian, you surely would have expired in the sea In fact, if you existed prior to Devonian time when life adapted to living on land, your fossilization on land would be exceedingly rare, and even then only if you were washed into a tidal zone. Of course, you may have been washed ashore, or if you expired ashore, washed back out to sea. If you were any land-based organism throughout geological history, and expired near or in a river or stream, chances are good you would have ultimately been washed downstream, and your bones and crunchy parts hopelessly dispersed and further eaten. If you expired on an arid plain, your uneaten bones may have merely dried up and blew away before they could be buried; your teeth, however, had the best chance of surviving owing to their un-palatability and mineral constituency. If you died and fell in a lake, protected from currents and waves, and was buried in a mucky, anoxic bottom, your chances of becoming a fossil would be markedly enhanced.

Joking aside, it is really pretty hard for any given organism to become a fossil. Moreover, while such things as where you were of the food chain, how fast you were, your size, being soft or crunchy, etc., would have a bearing on the probability of becoming a fossils, but there are exceptions to all the above. Fossil formation can occur through a number of processes, each of which is chemically complex, and not completely understood. There is no realistic way to simulate in a laboratory the processes that take place over thousands to millions of years on and in the water and earth that results in the formation of a fossil.

The unlikelihood of fossilization results in large gaps in the fossil record. Creationists like to use these gaps to argue against evolution and promulgate supernatural views. Darwin particularly worried about the absence of Precambrian fossils that had not yet been discovered during his time. They have since been found, but not many, and they are found in very few localities, since Precambrian animals were simple, small and soft-bodied, and perhaps not very abundant, the Precambrian fossil record is indeed sparce.

Wisconsin, US



SHOW
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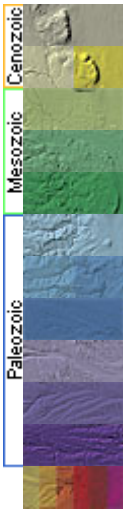

Quaternary
Tertiary
Cretaceous
Jurassic
Triassic
Permian
Carboniferous
Devonian
Silurian
Ordovician
Cambrian
Precambrian

SHOW
Dates (mya)
Time Scale Legend

Paleontology and geology

The Precambrian: The earliest history of Wisconsin is recorded by rocks over two billion years old. Some of these rocks represent the deposits of ancient seas, volcanoes, and underground bodies of magma. Though these rocks provide evidence of the physical environment, they do not contain fossils, thus we have no record of the organisms from the Precambrian.

The Paleozoic: Warm, shallow seas covered much of the state during the early to middle Paleozoic (Cambrian – Devonian). These seas have left behind an extensive record of marine life, including brachiopods, bryozoans, trilobites, corals, bivalves, gastropods, cephalopods, sponges, crinoids, and the scales and teeth of early fishes and sharks. Fossils of rare soft-bodied animals have been found in Cambrian sediments in the central part of the state. The record of the later

Paleozoic (Carboniferous – Permian) is missing due to erosion that followed an interval of gentle uplift.

The Mesozoic: Wisconsin continued to lie above sea level throughout the Mesozoic. Erosion outpaced deposition, thus there are no known rocks or fossils from this era in the state.

The Cenozoic: There are no Tertiary rocks in Wisconsin, as most of the state was above sea level and exposed to erosion. During the Quaternary, massive ice sheets covered most of the state. The classic glacial landforms in the state are so striking that the final North American ice advances are named the Wisconsinan. Animals adapted to a cold climate, such as the wooly mammoth, large beavers, and horses, inhabited Wisconsin's spruce and hemlock forests. Fossils of seal, walrus, and whale are found along the Great Lakes.

Links to more on Wisconsin paleontology

Education and Exhibits | Research and Collections | Resources

Education and Exhibits

Virtual Exhibits (showing 1 of 1 listings)

The Virtual Silurian Reef: This online exhibit maintained by the Milwaukee Public Museum describes the composition and geology of Silurian reefs. The site uses these reefs as a vehicle for students to learn about the ancient past.

Research and Collections

Ongoing Research Projects (showing 1 of 1 listings)

Upper Cambrian Sandstones: Photographic record of a field trip led by Dr. James W. Hagadorn, Amherst College. Fine photos of trace fossils and jellyfish from Blackberry Hill, WI, and related Cambrian sites.

Researchers (showing 1 of 1 listings)

BlackBerry Hill: In Italian, a page on the ichnofossils (with photos) from this famous lagerstätten.

Resources

On-line Journals/Publications (showing 1 of 1 listings)

Reinterpretation of *Climactichnites* Logan 1860 to Include Subsurface Burrows, and Erection of *Musculopodus* for Resting Traces of the Trailmaker: A 2008 journal article by P.R. Getty and J.W. Hagadorn concerning these enigmatic trace fossils.

ED. Note: I have to end with some humor.

A Winter Statistic

98% OF AMERICANS SAY "OH CRAP" (OR WHATEVER) BEFORE GOING IN THE DITCH ON A SLIPPERY ROAD.

THE OTHER 2% ARE FROM **WISCONSIN** AND THEY SAY, "HOLD MY BEER AND WATCH THIS."