



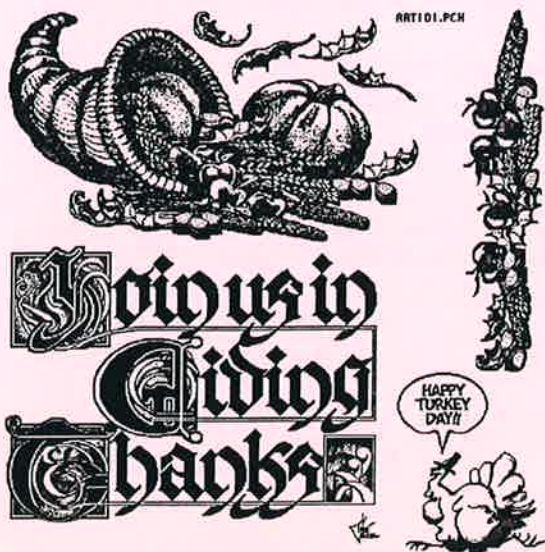
THE ROCKFINDER

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Larry Hess, Rockfinder Editor
 15358 Kerlin Drive
 Granger, IN 46530



DUES are DUE. Please mail your dues to Treasurer, Marge Collins. And please do not pay your dues on the bus or at the party. Thanks.

MICHIANA GEM and MINERAL SOCIETY

1994 BOARD OF DIRECTORS

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Sunshine	---	Molly Elwell	105 N Ironwood Dr, South Bend IN 46615
Publicity	---	Meg Auth	1308 E Monroe, South Bend IN 46615
Membership	---	All Members	

The Michiana Gem & Mineral Society, a non-profit organization, is affiliated with the Midwest Federation of Mineralogical and Geological Societies and with the American Federation of Mineralogical Societies.

Regular Meetings

Time:	2:00 PM EST	Place:	Studebaker National Museum
	4th Sunday of each month		525 S. Main Street
	June - Field Trip Meeting		South Bend IN
	July - No meeting		in downtown South Bend
	August - Annual Club Picnic		
	December - Christmas Party		

ROCKFINDER STAFF

Editor	Larry Hess	15358 Kerlin Dr, Granger IN 46530
Co-Editor	Margaret Heinek	7091 E East Park Ln, New Carlisle IN 46552
Staff	Bob Heinek / Club Members	

All contributions for publication should be in the hands of the Editor by the 10th of each month. (219 272-5431) Permission is hereby granted to reprint, at any time, items published in the ROCKFINDER provided due recognition is given.

cut

Membership Dues are:		Please send your dues and this form to Michiana Gem & Mineral Club, Treasurer Marge Collins 3017 Niles-Buchanan Rd Buchanan MI 49107
_____ Individual	\$ 6.50 per year	
_____ Family	\$ 10.00 per year	
_____ Junior	\$ 2.00 per year	

Please make address corrections to the mailing label on the reverse side and fill in the optional information below. Your Birth Mo/Yr _____

Check your SPECIAL INTERESTS:

General Geology	_____	Gems & Minerals	_____	Fossils	_____	Artifacts	_____
Cabochons	_____	Faceting	_____	Silversmithing	_____	Carving	_____
Micromounts	_____	Beads	_____	Other	_____		_____

Family Members (include information on spouse and children):

Name	_____	Birthday	_____	Will attend meetings	_____
Name	_____	Birthday	_____	Will attend meetings	_____
Name	_____	Birthday	_____	Will attend meetings	_____

THE ROCKFINDER

Volume 34
Number 9

November 1994

Published by:
Michiana Gem & Mineral Society

Meeting: Meeting:
Doors Open 1:30 PM
Meeting at 2:00 PM

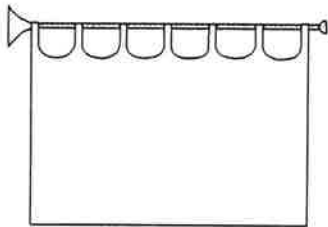
NOVEMBER

A bus trip to Chicago - No Meeting. Call Margaret for available seats -- right now, the bus is full.

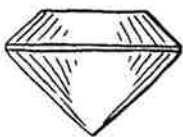
Place: Studebaker Museum
525 S. Main St.
Downtown South Bend

November Happy Birthday & Anniversary:

Hosts:



2 Bill Schuster
5 Dick Rosback
8 Tom McLaughlin
11 Tom Noe
17 Cheryl Milchak (Anniv)
27 Bess Wise
30 Cindy Hess



Interesting facts (and fiction) about your BIRTHSTONE.

November - TOPAZ & CITRINE

Topaz: In ancient times just about any gem was likely to be called topaz. The name itself may have been derived from a Sanskrit word meaning "fire". Blue topaz is said to bring meditation, psychic powers, spiritual growth, tranquility and leadership ability. Orange and yellow topaz enhances generosity, happiness, sense of humor, abundance and attracts love.

generosity, pleasure, protection, strength, alignment, confidence, healing, stability, moderation, comfort, career success, truth, warmth, digestion, assimilation, enjoyment of life and spiritual growth.

Citrine: Citrine is yellow quartz. The color is due to the presence of iron. The primary source of citrine is Brazil. Citrine is said to foster prosperity, creativity,

Topaz occurs in high temperature veins, in pegmatites, and in granites and rhyolites, where it is one of the last minerals to form. It has a hardness of 8. Common topaz is widespread, and fine gem material comes from Saxony, the Ural Mountains, Brazil, Japan, Mexico, and Scotland.

MARGARET'S COLUMN

The next time we get together will be on the bus for the trip to the Field Museum on Nov 27th. We will leave from the bank on Cleveland and 33 at 8 am and will go by toll road to the museum. We will return by 6 pm. (Indiana time) Chicago will be on slow time by the first of November.

You may take a brown bag lunch, or there are lunch counters in the museum. We will leave the Field Museum about 1 pm and go to the Lizzadro Museum (which does not open until 2 pm our time). Since we will be home early, there will not be a dinner stop on the way home.

The bus is FULL! If you have signed up and then find you will be unable to go, PLEASE let me know, in case there are others that would like a seat. And if you show up for the trip and have not made a reservation, you will be unable to get on the bus, sorry.

The Michinan Society's officers for 1995 are, Margaret Heinek, President; Ed Miller, V-president; Marge Collins, Treasurer; and Paul Godollei, Liaison. Congratulations!

Our Christmas Party will be held on December 4th at the Pin Hook Park Pavilion, at 1 pm. Chuck Collins, who I understand is a good cook, will take care of the meat. I understand it will be ham and turkey. Marie Crull and Kathy Miller will serve the cheese and punch before the dinner. Every family must bring their own dishes and silverware. Please bring a dish to pass for each two members of your family (or bring a larger dish).

Bring an item for the gift exchange, something that you would appreciate getting. Make sure you mark it for man, woman, or junior. As I saw last year the juniors liked to pick something that was intended for an adult, so use your good judgement, and pick something they would appreciate.

I would like to thank Chuck Collins for taking the juniors "under his wing" and giving them something to do during the meetings.

We have lost a member, Dale Douglas of Mishawaka, who passed away October 20th. Dale was an expert on fossils and we are sorry to lose him.

Three memorials are being sent to the MW Endowment Fund in memory of Delton Miller, a member who passed away this spring, Dale Douglas, and a former president of the Michiana Society, Carlton Pletcher.

Margaret.

Who Says, We can't lobby?

by Dan Lingelbach, AFMS 5th Regional VP

In the April '94 AFMS Newsletter under Local News-Oregon, an item caught my attention. The statement was from the Oregon Council of Rock and Mineral Clubs. It stated, a "not-for-profit, tax exempt organization (as many societies are) is not permitted to lobby for or against impending legislation." I know this notion has been generally accepted and is brought up often when clubs have been asked to respond to proposed actions of various agencies in the government. The statement, "is not permitted", is not true. We can lobby, but not a substantial part of our activities can be influencing legislation (lobbying).

What follows are sections of the IRS Tax Code with some of my comments. Like most government rules, some are open to their interpretations. Even so, I don't think we should let some other groups tell us what those rules say we can or can't do as an exempt organization.

(...)

The bottom line is, if it affects your organization's existence and its purpose, it is not considered to be influencing legislation. Also, you can influence legislation, but are limited to 20% of your activities. In addition, communications with government bodies is not considered influencing legislation since government bodies are not supposed to legislate. Hopefully, this discussion will help when someone says that we can't lobby because we are a tax exempt organization (corporation).

Reduced from: AFMS Newsletter, October 1994.

MINUTES OF THE OCTOBER 1994 MICHIANA GEM & MINERAL SOCIETY

President Margaret Heinek called the meeting to order. Pam Rubenstein filled in for Marie Crull as secretary. The September minutes were accepted as printed in The Rockfinder. The treasurer's report was accepted and filed for audit.

Committee Reports

Program - There will be a trip to a gravel pit in Buchanan after today's meeting for anyone interested.

Hospitality - Lorraine wants to know if you will serve as host/hostess for a meeting.

Sunshine - Dale Douglas, club member, passed away this week. Viola Robinson sends regards.

Library - Return your books!

Education - Advanced classes start in November. Call Gordon if you're interested.

Old Business

Field trip - We have one extra person signed up for the field trip Nov. 27. We will board the bus at 7:45 at the bank on the corner of US31 and Cleveland Road and should return to that location by 6:00. We will visit the Field Museum of Natural History and the Lizaddo Museum. Each museum has a small admission charge which members will be responsible for. You can take a sack lunch to eat at the Field Museum or buy lunch there.

New Business

Club dues are due by the January meeting for inclusion in our roster.

Our Christmas party will be held Sun. Dec. 4 at Pinhook Park. Dinner will be served at 1:00. Be sure to bring a dish to share plus your own plates, silverware, napkins, etc.

Kathy Miller discussed visiting Cave-in-Rock State Park as a possible field trip location for next year. She circulated a very interesting article about another club's trip to that site.

It was moved and passed that we send a

contribution to the Endowment Fund in memory of Dale Douglas. A contribution of \$15 will be sent to the Endowment Fund in memory of each active member that passes away.

Bess Wise brought the club vest pattern. Anyone who wishes to borrow it should let her know.

The nominating committee present the following slate:

President - Margaret Heink

Secretary - Marie Crull

Vice President - Ed Miller

Treasurer - Pam Rubenstein

Liaison - Jessie Zeiger

The following additional nominations were made from the floor:

Treasurer - Marge Collins

Liaison - Paul Godollei

After voting by secret ballot for positions of contention, the following board was elected.

President - Margaret Heinek

Secretary - Marie Crull

Vice President - Ed Miller

Treasurer - Marge Collins

Liaison - Paul Godollei

Congratulations to the new board! We all look forward to another great year for the Michiana Gem & Mineral Society.

Door prizes went to Elizabeth Jordan, Louis Jordan, Alec Rubenstein, Michael Slattery, Jessie Zeiger, and Gordon Dobecki.

23 members and 3 juniors were present.

Respectfully submitted,

Pam Rubenstein, Secretary Pro Tem

***** Upcoming Events *****

Nov 25-27 Christmas Jewelry-Gem- Mineral Show
DuPage County Fairgrounds
Wheaton IL

Aug 12-13 MGAGS Rockhound Seminar
MTU Houghton Michigan
Cathy Hodgson 810-664-8985

Common Fossils Found in Indiana

Brachiopods - marine animals having two unlike shells, differing from clams (pelecypods) which have two shells which are alike in shape and size. Brachiopod shells are usually ribbed and sometimes with small short projections suggesting spines on the shell of the living animal.

Cephalopods - marine animals with segmented shells, some straight, some coiled. It had a head, tentacles, sharp teeth, and two good eyes. The usual fossil is the endocast after the shell has been dissolved. Modern descendants are the Pearly Nautilus, Squid and Octopus.

Pelecypods - animals (clams) with marine and fresh water representatives. They have two like shells which can be smooth or ribbed. Fossils are not as common as brachiopods and usually found as endocasts.

Arthropods - represented in Indiana rocks by Trilobites, are the favorite fossil collected by amateurs. Fascination for this three lobed, crawling marine animal is probably due to its having compound eyes similar to those of the housefly. Trilobites are extinct. Many other Arthropods both marine, fresh water and land animals are living today, eg. horseshoe crabs, spiders, insects, centipedes, millipedes, sow bugs and crayfish.

Anthozoa - corals (the animal) lived singly and as colonies and show that the seas which covered Indiana in ancient times (100's of millions of years ago) were at times shallow and tropical. The fossil coral are the limey deposits of the living animal, created for protection against predators.

Bryozoans - the living animal, both marine and fresh water, combines the feeding mechanism of the brachiopod with the life style of a coral; it makes a limey deposit to surround its soft body. The limey deposit in the form of crusts on the shells and rocks, or branching like antlers is the fossil found in rocks.

Gastropods - snails are found on the ground, in the trees, in fresh water and in the seas. The fossil snails

are similar, numerous and of many kinds.

Crinoids and Blastoids - both related to the Star Fish, Sea Urchin and Sand Dollar. Crinoids live in the seas today. Blastoids are extinct. Both animals lived atop flexible stems anchored to the sea bottom and had arms with hair-like cilia to filter nutrients from the sea water and direct them to the animal's mouth. Modern crinoids live in the tropical seas and in much colder waters near the poles.

Plants - commonly called "fern fossils" when discovered by cracking stony nodules collected from the coal strip mine spoils, are not always ferns. Single leaves, sometimes stems, and sometimes radially branched joints of plants similar to Rushes are found.

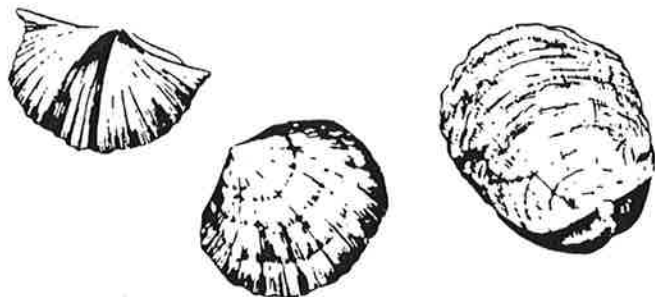
Travel: Prehistoric Trails

By The Associated Press

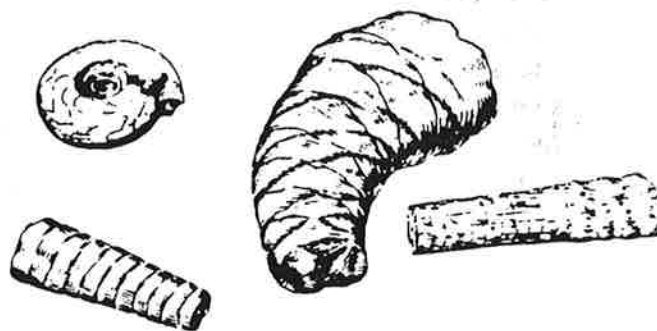
The oldest wild west creatures were dinosaurs and other ancient animals, and visitors to Wyoming, Montana, the Dakotas, and Nebraska can study their fossils at a number of sites:

- The museum at Rock River, Wyo., displays finds of paleontologist Robert Bakker from his work at the "Dinosaur Graveyard" at nearby Como Bluff in southeastern Wyoming.
- The Geological Museum on the campus of the University of Wyoming in Laramie displays a Brontosaurus skeleton, and there's a full-size copper mold of Tyrannosaurus rex outside the building.
- Western Wyoming College in Rock Springs has several dinosaur casts from around the area, including a Tyrannosaurus rex.
- The Fossil Butte National Monument near Kemmerer, Wyo., contains a highly concentrated number of fossilized fish and plants. Fossil Butte's Wasatch Formation rises 7,500 feet above sea level with bright red, purple, yellow and gray colorings.
- The Museum of the Rockies at Bozeman, Mont., is one of the country's best known dinosaur attractions, with displays of dinosaur eggs, embryos and nests found near Choteau, Mont., an area now known as Egg Mountain. Egg Mountain is replicated at the museum with life-size reproductions of 32 dinosaurs. Skeletons and skulls of Tyrannosaurus rex, Triceratops, and others are on display. (cont - pg 6)

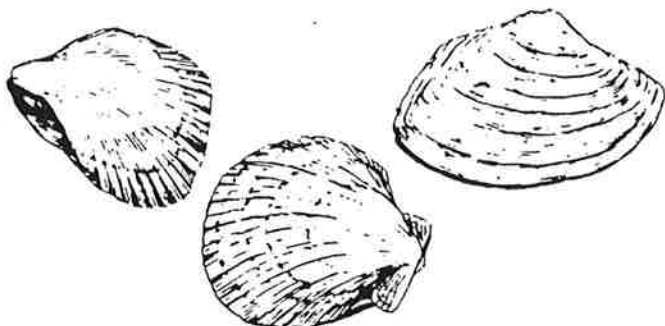
COMMON FOSSILS FOUND IN INDIANA



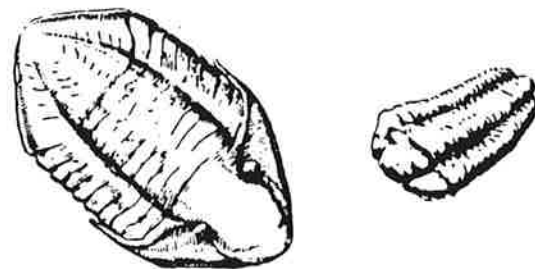
LAMP SHELLS (BRACHIOPODS)



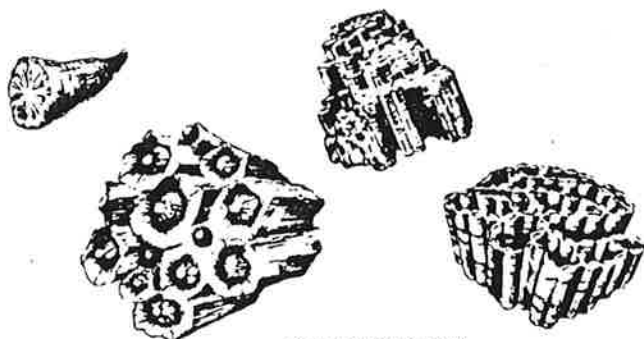
ANCESTORS TO THE PEARLY NAUTILUS (CEPHALOPOD)



CLAMS (PELECYPODS)



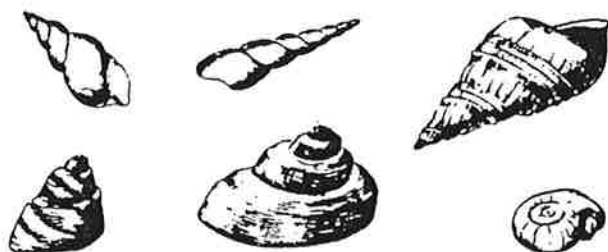
JOINT-LEGGED ANIMALS (ARTHROPODS)



CORALS (ANTHOZOA)



MOSS ANIMALS (BRYOZOANS)



SNAILS (GASTROPODS)



SEA LILIES AND SEA BUDS (CRINOIDS AND BLASTOIDS)



Polishing Slabs by Hand (Especially for the Kids)

Contrasted with the tumbling process of polishing stones is the process of polishing them by hand. Only flat surfaces are suitable for hand polishing, and the method, known as LAPPING involves grinding the flat face of the stone against more resilient material on a surface called a lap, and then giving it a final polish by means of a leather or felt buff and powered materials, in order to produce a shine.

GRINDING -- The first objective, when aiming for a high polish on a slab, is to remove any cutting marks or blemishes by grinding. Now we will need a piece of clear plate glass (or glass used in a window or taken from a picture frame) and various loose silicon carbide grits (coarse, medium, fine) and water.

Use a plastic squeeze bottle to hold the water, and squirt it over the glass (this is our "lap" surface). Starting with the coarse grit, sprinkle some of it on the glass (on clean newspapers resting on a firm surface) then rub the slab all over the glass, in a figure-8 pattern, for a few minutes. Move the slab around in your hand from time to time to avoid wearing it down unevenly. Add more grit when necessary (that is, when you no longer hear the noise of friction). Occasionally wash and dry the slab and inspect it under a good light for any scratches.

When the surface of the slab is completely smooth and free from any blemishes, wash and dry the slab again, along with the lap (glass) and your hands. Place the lap on clean sheets of newspaper to ensure that no old (coarse) grit is near. Now repeat the process again using the medium grit, and then the fine grit, until the dried slab shows almost a semi-polished finish. Remember to wash everything thoroughly between stages, as one particle of grit in the final polishing area can ruin the smooth surface of you slab.

FINISHING -- The slab should now have a smooth satin surface. The easiest method of finishing the slab is to apply two coats of hard varnish such as polyurethane, but a serious lapidary would not approve of such a method.

Here you can now use your different polishing agents. Using a felt pad or leather, wet and apply either tin or cerium oxide. For relatively soft stones (up to 5 on the Mohs scale), a polish may be obtained by applying tin oxide to a damp leather pad, and

polishing the stone. The leather polishes best when it is almost dry, but it still takes a long time. Here is list of guidelines for polishing stones of different hardness.

<u>STONE</u>	<u>POLISHING AGENT</u>	<u>LAP</u>
Amazonite	Tin Oxide	Felt
Adventurine	Cerium Oxide	Felt
Bloodstone	Cerium Oxide	Leather
Coral	Tin Oxide	Leather
Garnet	Cerium Oxide	Felt
Hematite	Cerium Oxide	Leather
Jasper	Cerium Oxide	Felt
Jet	Cerium Oxide	Felt
Labradorite	Tin or Aluminum Oxide	Leather
Malachite	Tin Oxide	Cork
Obsidian	Cerium Oxide	Felt
Rhodonite	Tin Oxide	Cork
Sunstone	Tin Oxide	Leather

-from Arkansas Rockhound News (April 1994)

(Travel - continued)

- The Carter County Museum in Ekalaka, Mont., has fossils, dinosaur bones and a complete skeleton of an Anatosaurus, or duck-billed dinosaur.

- A recent Triceratops discovery is centerpiece of a new Visitors Center at Makoshika State Park near Glendive, Mont. The park has a number of interpretive trails and part of the Hell Creek Formation, a 65-million-year-old rock layer that winds through the Badlands of Montana.

- You can watch technicians at the Dakota Dinosaur Museum in Dickinson, N.D., prepare a 2,000-pound Triceratops skull, found in North Dakota Bad Lands, for permanent display. This new museum, completed last summer, also has ten full-scale dinosaurs, including an Allosaurus.

- The Museum of Geology in Rapid City, S.D., displays an extensive collection of Badlands fossils, including ancient camels, horses and a mother oreodon with skeletons of unborn twins encased in her bones.

- About 100 Columbian mammoths have been left entombed en situ at the Mammoth Site in Hot Springs S.D. It's believed the 10-ton creatures were entrapped in the watering hole over 26,000 years ago when they either slipped in or ventured in without being able to retreat up its steep banks. (cont - pg 7)

Fire Agate - The only gemstone never synthesized by man! Fire agate is a very rare gemstone, first discovered around 1939. Today there are only a few fire agate mines in the entire world. The richest of these is located in Graham County, in southeast Arizona. The only place you find fire agate is where there has been fairly recent volcanic activity. It is considered a gem stone because of the play of iridescent colors beneath its surface. Cutting fire agate is challenging yet rewarding. The unique shape and pattern of each stone is an important part of the character and charm of the gem.

Cutting Fire Agate

by Ken Cox Sr. "Mr. Fire Agate"

Orientation is a prime factor in cutting good fire agate, however that is impossible to describe here, as each stone has to be oriented on it's own merits. As a general rule, the white quartz is the top of the first stone (all stones are not layered but I like to be prepared for that).

I saw the chalcedony (white quartz) away, being careful not to cut into the brown agate (where the fire may be), using the rest of the stone for a handle.

I then carefully grind away the rest of the chalcedony with a hand grinder, using 100 grit diamond tools or small carborundum wheels. I contour the stone to show the most or the best fire. The fire bubbles are extremely thin and if the bubble is touched with the grinder or polisher, a black spot will result. A thin layer of the clear agate will let the fire show through and will protect the fire. A little practice will tell you when to stop grinding.

When the stone is fully shaped, I carefully saw it away from the rest of the rock, hoping to find another layer of fire. These rough stones are stored in a plastic bowl until I have enough to tumble polish them in a vibrating tumbler.

If one is only doing a few stones, they can be finished in the usual manner by using a dop stick and carefully sanding with 220, 400, 600 grits and then polished on a felt or leather with cerium or tin oxide.

To do quantity as well as quality, I use a vibrating tumbler, a four pound Vibrasonic. I do from 100 to 600 stones, using agate or petrified wood as a filler, adding two and one half heaping tablespoons of 600 grit (carborundum) and three quarters cup of water

with a pinch of detergent. Run this mixture for eight full days and do not let this slurry dry out. Keep adding water as needed.

After eight days, rinse, scrub with a tooth brush and rinse six more times. Place in a clean barrel with two and one half heaping tablespoons of Rapid "61", a pinch of detergent and 3/4 cup of water. Run this mixture for three and one half days, rinse three times and wipe dry with a soft cloth - Voila !! well polished fire agate.

(Travel - continued)

- Remains of exotic animals - three-toed horses, dog-sized camels, saber-toothed tigers, giant pigs, rhinoceros-like titanotheres - can be seen at Ashfall Fossil Beds State Historic Park between Royal and Orchard, Neb.

For more information, contact Old West Trail Country, in care of South Dakota Tourism at 711 East Wells Avenue, Pierre, S.D. 57501-3369

Noticeably absent from the AP list, among others, is the Black Hills Institute of Geologic Research (Hill City, SD). This is another must see stop for anybody travelling through the "West". The collections include hadrosaurs, ammonites, minerals, mastodons, etc, etc, etc., and a couple T rex's in prep. Definitely worth your while to stop in.

Dean Grier, North Dakota S.U.

Amber and Copal deposits containing authenticated bee fossils:

Baltic	40 Million Years
Dominican	25-40 Million Years
Mexican	22-26 Million Years
Sicilian	30 Million Years
Colombian	250 Years
Kenya	30-40 Years

From: "Bees in Fossilized Resin" by George Poinar, Bee World 75(2), 1994, p. 71-77.

"Eric", The Opalized Dinosaur

From "The Fossils Collector", May 1993

Nicknamed "Eric", the early Cretaceous fossil pleisosaur was discovered in mid-1987 by an opal miner at Coober Pedy, South Australia. In 1988, the remains were brought to Sydney by an opal dealer who enlisted the assistance of the Paleontology staff of the Australian Museum as consultants. The specimen was later purchased privately for possible display in a city development, although the difficult task of cleaning and reconstructing the shattered skeleton specimen was entrusted to the museum.

It took 450 hours of painstaking work to remove the rock from the numerous bone fragments and to reassemble them. All of the original bone in the pleisosaur's skeleton had been completely replaced with opal, mostly of a poor quality white variety; a type of preservation unique in Australia. The results were spectacular, most of the skeleton (85-90%) was recovered and successfully rebuilt.

The fragile skull came out in four separate blocks of rock. Inside the pleisosaur's rib-cage lay piles of smooth, round pebbles of gastroliths (stomach stone). Mixed in with them were a dozen tiny fish vertebrae, also opalized, the remains of the animals' last supper. Preliminary studies reveal this pleisosaur, a fast swimming marine predator with numerous sharp teeth, to be related to a form known as Peyerous, found in South Africa over 60 million years ago in rocks of approximately the same age. However, the Australian animal probably represents a new species.

Through contributions of over \$300,000 from all around Australia, the Australia Museum has been able to purchase "Eric", guaranteeing continued public display in Australia.

Editor's notes --

First, thanks for a great year, everyone has been very helpful with the Rockfinder and I have had a wonderful time. There's still a lot to learn! Recently a number of bulletin editor's have started a computer network users group to exchange material and ideas. I'll expand on that later.

The BIG event of October was a pleasant call from a new member, Herb Luckert. Herb is quite a computer expert and has offered to help with parts of the Rockfinder. First, please notice the *really* fancy mailing labels this month. Mr. Luckert made them. We'll have more surprises in future issues. Thanks Herb!

The BIG news of the year seems to be the issue of public land and the control of collecting there on. I have included, this month, an article on lobbying, from the AFMS bulletin, which specifically applies to the current issues. Probably, I will have more on this important topic next year. My study thus far, leaves me still a little confused on the implementation and enforcement of this legislation. (my, my, what a job).

For those of you with specialty interests, this month I report to you on the:

OPAL SOCIETY of AMERICA

PO Box 382

Anaheim CA 92815

Their yearly show was just last weekend (Nov 5) out in Anaheim, CA. Their bulletin, *The Opal Express*, is very well done and has interesting material (all about Opal). Happy Holiday's to you all!

PESEUDOFOSILS FOSSILS (continued)

1. Inorganic forms that look like fossils but are not include: Concretions, stains, dendrites, conchoidal rock fractures, slickensides, stylolites, glacial grooves.

BIBLIOGRAPHY: " THE FOSSIL BOOK", by Carroll Lane Fenton & Mildred Adams Fenton- pp 3-5
 American Fossils"by Ida Thompson- PP 11-15
 "Fossils- Prehistoric Animals in Hoosier Rocks", by T. G. Perry Ind. Dep't of Conservation, Geologic Survey ,pp 8-10

FOSSILS: by Paul Godollei, club member.

The concept of fossils as petrified remains of prehistoric organisms is inadequate. Countless fossils have "turned into stone", but there are also fossils preserved by other means-preservation in amber, charred wood, footprints, tar-soaked bones, and frozen dried flesh. Fossils are better defined as "remains" or traces of organisms that lived during ancient geologic times and were buried in mud or rocks or encased in ice or covered with volcanic ash that accumulated in the earth's outer crust. Including:

Fossils of the Invertebrates-shells, brachiopods, gastropods, cephalopods, trilobites, etc.

Fossil Plants-Algae, ferns, trees, bushes, leaves, seeds, trunks, roots, branches.

Fossil insects

Fossil Vertebrates-fishes, reptiles, amphibians, birds, mammals.

There are three main types of fossil remains:

1. Organic remains and impressions
2. Trails, tracks, and burrows of organisms.
3. Inorganic traces:-rain drop impressions, ripple marks, flint tools, coins, artifacts, pottery,,etc.

PRESERVATION OF FOSSILS

Organisms that were quickly covered by mud slides, volcanic ash, etc. had the best chance of being preserved. Those exposed to water and the atmosphere vanished more quickly. Almost 99% of all past life has vanished without a trace!

KINDS OF PROTECTIVE MATERIAL that helped preserve fossils.

1. Volcanic ashes.
2. Peat bogs and marshes.
3. Amber and fossil resin
4. Incrustations from minerals carried in solution by water.
5. Asphalt pools
6. Sediments- by far the greatest number of fossils were preserved in this way.-simple burial of plant remains, seeds, roots bark impressions, limy shells, were preserved for long periods without change. Logs buried in German lignite (coal) beds for 40 million years are only slightly decayed. Sand dollars,

sea urchins, and mollusk shells have lost their color, but their hard limy substance have suffered little change in over 75 million years. I have found Ordovician brachiopods over 425 million years old that are still transparent and pearly, and cephalopods over 200 million years old with the original pearly shell material intact!

7. Ice-the famous mammoths of Siberia and the freeze dried man in the Austrian Alps are good examples.

FOSSILS ACCORDING TO THE NATURE OF PRESERVATION

1. Unaltered fossils

- a. Soft and hard parts preserved
- b. Hard parts only preserved.

2. Altered fossils- by mineralization at the time of burial or later or during weathering of the formation in which the fossils were buried. (Petrification) turned to stone.

Permineralization: The fat and other organic substances decay at the same time as water containing dissolved minerals soaks into every pore and cell of hard structures where minerals are deposited producing stony fossils containing a good deal of the original solid material.

Replacement: the original hard parts are dissolved and replaced with mineral matter such as calcite or silica. This happens very slowly, cell by cell. In some cases, replacement occurs very fast, and no trace of the original structure remains.

Agatized wood and coal balls with only the microscopic cells of the original plants remaining are examples of replacement.

Secondary replacement- this destroys the microscopic structures and dissolves and replaces them with minerals such as pyrite, calcite or silica.

KINDS OF PETRIFICATION

1. Calcification-(calcite-limestone) basic for most marine fossils.
 - a. Dolomitization. Negative fossils-dolomite-mostly molds and casts.
2. Silicification.. (Original fossil material replaced by silica). quartz.
3. Pyritization (Original fossils turned into pyrite or marcasite.)

a. Pseudomorphs-original material completely changed into pyrite, quartz, etc.

4. Replacement by hematite or limonite-(iron ores)

5. Cavity filling- molds and casts. The remains lie in sediment until it becomes firm and hard. Later the dead object dissolves or decays leaving a hollow or cavity known as a natural mold. This can be filled with plaster of paris, liquid rubber or wax to see the original shape of the fossil. If the cavity is later filled with hard material naturally and the outer mold falls away, the natural cast of the fossil is revealed, but only the shape has been preserved. The fossils in dolomite from the old Monon quarry were of natural casts and molds.

6. Carbonization-Plants, fish, graptolites, trilobites-the thin black carbon film impression is all that remains of the original material.

7. Mummification-the skin and bones were preserved by the dry desert hot sand or the constant dry humidity of some caves. Dried out remains of camels, ground sloths and mammals have been found in dry caves and graves in semi-arid countries in the Southwestern United States, Egypt and Africa and South America.

8. Wax, Asphalt & Amber- Natural paraffin has preserved most of a woolly mammoth in a paraffin mine in Eastern Poland. Asphalt has preserved the hard parts of mammals in the famous tar pits of California. Asphalt and sand mixtures in other areas have also helped preserve specimens. Amber, a resinous material from fir trees, has preserved insects, ants, bees, frogs, pollen, seeds, etc.

9. Geodization-the original parts are replaced by chalcedony (quartz). The fossil is completely transformed and is hard to recognize as a crinoid, cup coral or brachiopod, since it has been split open and altered to such a great degree.

PRESERVATION OF FOSSILS ACCORDING TO THEIR ORIGINAL COMPOSITION

1. Calcite-Calcareous algae, brachiopods, bryozoans, corals and echinoderms.

2. Aragonite-pelecypods (clams), gastropods (snails), cephalopods. (When very old, the aragonite gradually dissolves away.)

3. Silica- (Some plants, diatoms. Animals-radiolaria, sponge spicules.

4. Lime phosphate- Some brachiopods and in the

bones of vertebrates- the bone beds of central Florida are typical.

5. Chitin- found in all graptolites, crustaceans, trilobites, insects.

The outer exoskeleton of trilobites, insects, and lobsters is composed of chitin.

6. Cellulose- all plants, from algae up, are made of cellulose.

7. Color-rarely preserved.

OBJECTS INDICATING FORMER PRESENCE OF ORGANISMS, ETC.

1. External molds, internal molds, natural casts.

2. Trails, burrows and tracks.-worm trails, sponge borings, dinosaur footprints, trilobite nest impressions, tracks and trails in solidified mud of trilobites, crabs and trails of amphibians and reptiles are examples.

3. Impressions, concretions.- imprints of very thin objects such as leaves have been found in the concretions of coal age.

4. Coprolites, gastroliths.-petrified molds or casts of dung and excretions of dinosaurs and animals are called coprolites. Gastroliths are gizzard stones that are sometimes found where the gizzards of reptiles lay next to the bones. Only polished and rounded stones found with remains can be called gizzard stones.

Other naturally polished stones may have been formed by wave and beach action or by the wind, or whirled in potholes.

5. Castings-the undigested remains of meals ingested by worms and burrowing invertebrates sometimes hardened into twisted rope like remains that fossilized and mineralized and pyritized. Lugworms and sea cucumbers left similar remains.

CRUSHED AND DISTORTED SPECIMENS-make identification more difficult.

FAUNAS AND FLORAS-Dwarfed specimens and microfossils.

INORGANIC AGENCIES

1. Ripple marks, raindrop impressions, mud cracks.

See FOSSILS, concluded on page 8.