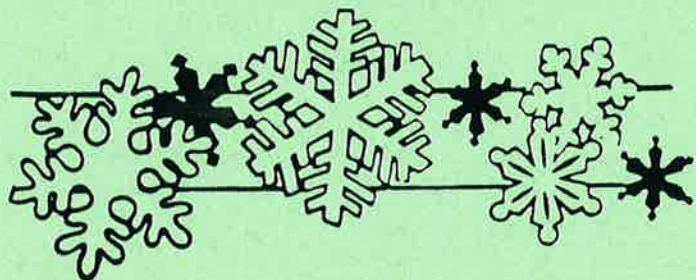


# THE ROCKFINDER

Michiana Gem & Mineral Society  
Tom Noe, Editor  
305 Napoleon Blvd.  
South Bend, IN 46617

# HAPPY HOLIDAYS



# THE ROCKFINDER

DECEMBER, 1996

**MICHIANA GEM & MINERAL SOCIETY**  
**1996 BOARD OF DIRECTORS**

President	.....	Margaret Heinek	7091 E. East Park Lane, New Carlisle, IN 46552-9400
Vice Pres.	.....	Michael Slattery	52332 Carriage Hills Dr., South Bend, IN 46635
Secretaries	.....	Marie Crull	17651 Bryan St., South Bend, IN 46635
		Emily Johnson	62295 Pine Rd, North Liberty, IN 46554
Treasurer	.....	Pam Rubenstein	1316 Catherwood Dr., South Bend, IN 46614
Liaison	.....	Jessica Zieger	11923 McKinley, Mishawaka, IN 46545
Past Pres.	.....	Jim Russell	27911 North St., North Liberty, IN 46554

**HEADS OF COMMITTEES**

Programs	.....	Michael Slattery	52332 Carriage Hills Dr., South Bend, IN 46635
Hospitality	.....	Pat McLaughlin	515 N. Clay St., Mishawaka, IN 46545
Educational	.....	Gordon Dobecki	11900 Laughlin St., Mishawaka, IN 46544
Librarian	.....	Bob Miller	1106 Clayton Drive, South Bend, IN 46614
Historian	.....		
Sunshine	.....	Sister Jeanne Finske	Bertrand Hall, St. Mary's, South Bend, IN 46556
Publicity	.....	Tom Noe	305 Napoleon Blvd., South Bend, IN 46617
Membership	.....	All Members	
Field Trips	.....	Kathy Miller	1106 Clayton Drive, South Bend, IN 46554

THE PURPOSE of the Michiana Gem & Mineral Society is to promote interest in and study of the earth sciences and the lapidary arts, and the sharing of knowledge and techniques.

General meetings are held the fourth Sunday of each month, 2:00 pm EST, at Our Redeemer Lutheran Church, 805 S. 29th St., South Bend, IN. Exceptions include field trip meetings, June (field trip), July (no meeting), August (club picnic) and December (Christmas Party).

Board meetings are held the second Wednesday of each month, 7:00 pm, St. Joseph County Public Library, basement level.

The annual club show is Labor Day Weekend.

The Michiana Gem & Mineral Society, a not-for-profit organization, is affiliated with the Midwest Federation of Mineralogical Societies and with the American Federation of Mineralogical Societies.

*Rockfinder* staff:

Editor, Tom Noe, 305 Napoleon Blvd., South Bend, IN 46617  
Co-Editor, Margaret Heinek, 7091 E. East Park Lane, New Carlisle, IN 46552-9400

Reporters, Bob Heinek, Herb Luckert, club members  
All contributions for publication should be in the hands of the editor by the 10th of each month. Call (219) 289-2028 or (219) 654-3673. Permission is hereby granted to reprint any original *Rockfinder* articles, as long as due recognition is given along with the reprint.

cut

**Yearly Membership Dues (Payable before January 1)**

_____ Individual	\$ 6.50 per year
_____ Family	\$10.00 per year
_____ Junior	\$ 2.00 per year

Please send your dues and this form to

Michiana Gem & Mineral Society  
c/o Margaret Heinek  
7091 E. East Park Lane, New Carlisle, IN 46552-9400

Please make address corrections to the mailing label (reverse side) and/or fill in the optional information below:

Check your SPECIAL INTERESTS:

List Family Members (spouse and children):

General Geology \_\_\_\_\_ Beads \_\_\_\_\_  
Gems & Minerals \_\_\_\_\_ Silversmithing \_\_\_\_\_  
Fossils \_\_\_\_\_ Artifacts \_\_\_\_\_  
Cabochons \_\_\_\_\_ Rockhound \_\_\_\_\_  
Faceting \_\_\_\_\_ Crystals \_\_\_\_\_  
Carving \_\_\_\_\_ Micromounts \_\_\_\_\_  
Other \_\_\_\_\_

Name \_\_\_\_\_ Birth Mo/Date \_\_\_\_\_  
will attend meetings, yes \_\_\_ no \_\_\_  
Name \_\_\_\_\_ Birth Mo/Date \_\_\_\_\_  
will attend meetings, yes \_\_\_ no \_\_\_  
Name \_\_\_\_\_ Birth Mo/Date \_\_\_\_\_  
will attend meetings, yes \_\_\_ no \_\_\_  
Name \_\_\_\_\_ Birth Mo/Date \_\_\_\_\_  
will attend meetings, yes \_\_\_ no \_\_\_  
Address \_\_\_\_\_  
Phone \_\_\_\_\_ Anniversary Mo/Date \_\_\_\_\_

Name \_\_\_\_\_  
City, St., Zip \_\_\_\_\_

# THE ROCKFINDER

Volume 36  
Number 12

The Newsletter of the  
Michiana Gem & Mineral Society

DECEMBER, 1996

The December meeting was our Christmas party. The next regular meeting will be in January. Many joys of the season to one and all!




## Up and coming

If your tastes run to gem-encrusted, gem-covered and dripping-with-gems, you may want to check out a major Faberge exhibit on view from March 9 through May 11 at the Cleveland Museum of Art. Peter Carl Faberge was the court jeweler to the last two Russian czars, and his firm was the most important source of luxury items in the Europe of his day. Tickets are available through Advantix at 800-766-6048.

## MIDWEST FEDERATION NEWS

MWF President Bob Miller would like to receive comments from MWF club members (including Michiana Gem and Mineral Society members -- that's us) regarding the activities and impact of the Midwest Federation. Do club members know what the MWF is? What its purposes are? Why there have been fewer exhibits at recent conventions? What the MWF does to benefit local clubs?

If you have any comments or observations or questions about the MWF, contact Bob. Please send your thoughts to him on one sheet of paper (no reduced print), including your name, return address and club affiliation. Anonymous or lengthy submissions will not be accepted. Bob's address is 1106 Clayton Dr., South Bend, IN 46614.



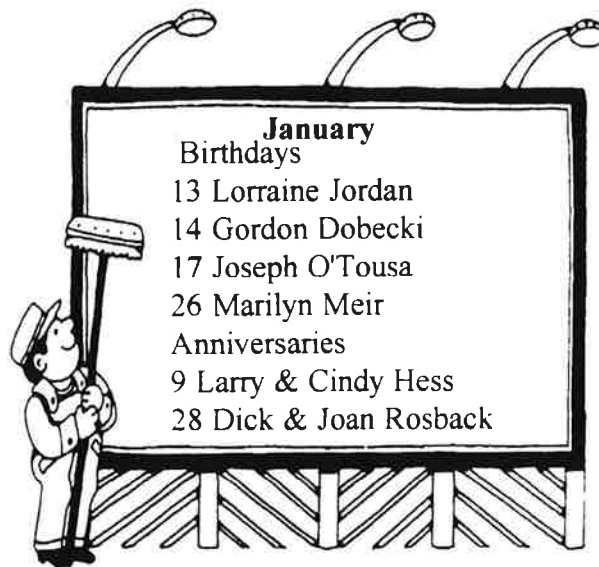
**December**

Birthdays

- 9 Margaret Schultz
- 10 Marge Hawkins
- 11 Molly Elwell
- 24 Clayton Merrill
- 24 Joan Rosback
- 29 Bob Heinek, Sr.

Anniversaries

- 18 Joe & Janet O'Tousa
- 22 Bob & Judy Heinek



**January**

Birthdays

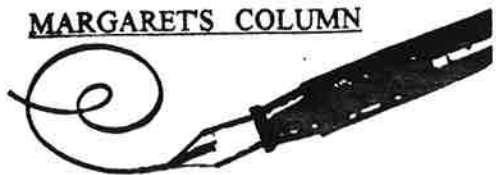
- 13 Lorraine Jordan
- 14 Gordon Dobecki
- 17 Joseph O'Tousa
- 26 Marilyn Meir

Anniversaries

- 9 Larry & Cindy Hess
- 28 Dick & Joan Rosback

The only complete satisfaction is that which we learn through kindness, understanding and appreciation. The only true happiness is that which we give to others.

**MARGARET'S COLUMN**



Merry Christmas, Happy Hanukkah,  
Happy Holiday Season  
From Margaret & Bob

This will be short and hopefully sweet! First, I would like Tom to know what a nice job he is doing with the *Rockfinder*, and Herb Luckert is also a really big help. Thank you, fellows. Everyone that had a committee has done a super job, too. To all, **THANKS**.

We had an extremely nice Christmas party. The food was delicious and the decorations were very nice. Thanks to those who did the decorating. If you were unable to attend, we missed you, and hope to see you in January.

Well, it is time for some of our members to leave for warmer climates, and they will all be missed. Snow Birds, enjoy the weather, and come back safe and early. A couple of members are taking a trip to Australia, but they will be back in late January. Wish I was going with them! Oh well, we will enjoy the winter here.

Dues are due! If you haven't sent your dues to Pam, now is the time to do it. The roster will be printed by the end of January, and if you want your name and address in it, send your dues. We sure don't want to lose you.

See you in January.

With every passing hour our solar system comes forty-three thousand miles closer to globular cluster 13 in the constellation Hercules, and still there are some misfits who continue to insist that there is no such thing as progress.

-- Ransom K. Ferm

**Dues are Due!**

**FOSSILS**

**Bryozoa**



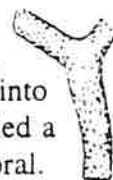
Bryozoa are tiny colonial animals with stony skeletons of calcium carbonate. The skeleton has numerous tiny holes, each of which is the home of a minute animal. The skeleton can be mound shaped, lacy, tree-shaped, or screw-shaped.



Bryozoa are common as fossils, so common that their broken skeletons formed entire limestone beds during their Mississippian Period. These animals are present today and spend their lives attached to the sea floor, to stones or to other marine animals.

**Corals**

Corals are small brightly colored marine animals that look much like flowers. The animal grows an external stony skeleton, connected on the inside with radial partitions which divide the body into chambers. The animal itself is called a polyp, and the skeleton is called coral.



Some corals live together in colonies made up of hundreds of individuals that are attached to each other by their outer skeletal walls. Some form coral reefs that are hundreds of miles long.



The skeletons of solitary polyps may be shaped as a cushion, a tube, or a horn, each with a depression in the top in which the animal lived.



The animals were common throughout geologic time and fossil corals are most common in limestone. They may also be found in shale and sandstone.

FROM: Serendipity Gems 6/95

MINUTES OF THE MICHIANA GEM  
AND MINERAL SOCIETY FOR  
NOVEMBER 24, 1996

President Heniek opened the meeting at 2:10 P.M. She wished everyone a Happy Thanksgiving holiday.

Jessie Zeiger made a motion to accept the minutes as printed in the ROCKFINDER. Bob Miller seconded the motion.

Pam Rubenstein gave the treasurer's report. President Heniek said the report will be filed for audit.

Mike Slattery gave a program on cataloging specimens.

Hostesses were Kathy Miller and Gladys Pacholke.

Our sunshine chairman, Sister Jeanne, sent out birthday cards to the members.

Tom Noe, our editor, ask for your articles for the ROCKFINDER. Please help Tom out!!

Kathy Miller suggested a trip to Falls of Ohio State Park next September 20th and 21st 1997. Phyllis Luckert mentioned a one-day trip to Sylvania, Ohio, to collect fossils and minerals. Sister Jeanne made a motion, seconded by Dave Peltz.

The Christmas Party will be December 8 at the church. Doors open at 1:00 and we will eat at 1:30 P.M.

New business was discussed and President Heniek ask for help with Science Alive at the downtown library on Saturday, February 8th from 10:00 to 4:00. She and Bob will work on Friday. Dave Peltz and Gordon Dobecki will help on Saturday. We need more volunteers.

It was voted on by the members to donate \$50.00 each to Hope Rescue, Salvation Army and Homeless Shelter.

Mike Slattery ran the election of officers for the coming year:

President Margaret Heniek  
Vice-President Emily Johnson

Secretary Marie Crull  
Treasurer Pam Rubenstein  
Liaison Mike Slattery

Bob Miller made a motion to accept the slate, seconded by Sister Jeanne Finske.

President Heniek read article from Nov. 18th newspaper about memorial honoring the nuns of Sisters of Holy Cross, of which Sister Georgia Costin is the historian. Jessie Zeiger's picture was in the paper on October 6th spinning wool in New Carlisle.

Displays were brought in by Bob Miller, Bob Heniek, Tom McLaughlin and Lisa Gilman.

Door prizes were won by Bob Miller, Pam Rubenstein, Sister Jeanne and Dan Zeiger.

There were no visitors, 18 adults present and 1 junior member.

Respectfully Submitted,  
Marie Crull, Secretary

### YOU'RE A ROCKHOUND

By Petrified Pete

If you hit the road at ten to four,  
And drive a hundred miles or more,  
Then look for rocks till your eyes are sore,  
YOU'RE A ROCKHOUND.

If you dig all day in the broiling sun,  
Pack a sack full home, when the day is done,  
And still insist you're having fun,  
YOU'RE A ROCKHOUND.

If you camp at night where rattlers crawl,  
Where coyotes howl and doggies bawl,  
And your dreams are not disturbed at all,  
YOU'RE A ROCKHOUND.

If you head for home with an overload,  
Down a rutted, rocky mountain road,  
And you break a spring and don't complain,  
YOU'RE A ROCKHOUND.

But when your club puts on a show,  
To strut their stuff and raise some dough,  
If your Braggin' Rocks aren't there,  
YOU'RE NO ROCKHOUND.

From *Sooner Rockologist* (Jan., 1993)

## SHARKS IN CENTRAL ILLINOIS?

The remains of a rare 300-million-year-old shark were discovered near the Spoon River in Knox County during a field study in March by Bradley Wiscons, a geology student of Dr. Merrill Foster from Bradley University.

The find was made while on a field biostratigraphic study of Pennsylvanian age rocks and happened shortly after Dr. Foster had told the students not to spend too much time splitting the shale as "nothing impressive had been found there." That is all changed now and this summer students expect to spend quite a bit of time in the area.

The part of the jaw and several teeth found were located in the Pennsylvanian Age Mecca Quarry shale member of the Carbondale formation. Dr. Foster says the remains could indicate this to be one of the largest vertebrates at that time, possibly 30 feet long. The teeth resemble those of the living great white shark but are more coarsely serrated, indicating an ability to bite more cleanly through heavily protected flesh.

from *Fulton Co. Rockhounds*, (June, 1996)

### Additional Information from the Illinois Geological Survey

By "Dino" Russ Jacobson

These are not the first shark remains from the Mecca Quarry. There have been a number of studies by Zangerl and Richardson, including a monograph on sharks and fish from the Mecca Quarry that were found in Indiana back in the 1960s and 1970s. It should be noted that "Mecca Quarry" is actually the name of a member of the Carbondale formation; it is not a hole in the ground. It is named for Mecca, Parke County, Indiana. Shark and fish remains are found occasionally in the Mecca Quarry and other black shales above other Pennsylvanian coals, so you should always be splitting and looking at the black shales when finding outcrops!

---

The minister had come to call on Pat. "At your age you should be thinking of the Hereafter," he admonished. "Oh I do," Pat assured him, "all the time -- in the kitchen, the living room, the back porch, I keep asking myself, Now, what am I here after?"

## THE READER'S CORNER

### MYSTERY BOOKS FOR PETROLOGISTS

Someone asked me about murder mysteries in which clues were mineralogical in nature. Minerals, especially gold and gems, are often causes of fictional crime. In *The adventure of the Blue Carbuncle*, (1891), Sherlock Holmes muses, "Of course it is a nucleus and focus of crime. Every good stone is. They are the devil's pet baits."

Arthur Conan Doyle let Holmes use his gem expertise in other stories, including *The Adventure of the Beryl Coronet* (1891) and *The Adventure of the Mazarin Stone* (1927).

The legendary riches of *King Solomon's Mines* were the basis for H. Rider Haggard's 1916 book. Another classic, *The Moonstone* (1868) by Wilkie Collins, is about the priceless gem originally in the forehead of a Buddhist temple idol.

Miraculous healing powers attributed to an octahedral crystal led to a murder among New York diamond dealers in Gerald B. Browne's *Stone 588* (1986). A million dollars worth of flawless diamonds are the motive in *Diamond Eyes* (1990) by John Lutz.

Tony Hillerman incorporates details of Native American culture and belief along with anthropological digs in books like *Dance Hall of the Dead* (1973). His *Thief of Time* (1988) involves a search for Anasazi relics. Louis L'Amour drew upon the disappearance of the Anasazi for *The Haunted Mesa* (1987).

Agatha Christie, married to a real-life archeologist Max Mallowan, accompanied him on digs throughout the Middle East for over twenty years. They met when he was an expedition assistant uncovering evidence of Sumerian civilization at Ur. This dig provided the setting for *Murder in Mesopotamia* (1937) in which Hercule Poirot solves homicides at an Iraqi dig.

Elizabeth Peters is the pen name of Dr. Barbara Mertz, who holds a Ph.D. in Egyptology from the University of Chicago. This gives authenticity to her mystery tales revolving around Amelia Peabody and family, including *The Last Camel Died at Noon* (1991) and *Trojan Gold* (1987). Finally, though not specifically about gems and minerals, *Murder at the Smithsonian* (1983) by presidential daughter Margaret Truman does have an interesting setting.

By Diane Dare in *Rocks Digest 2/95* and *CGMS News*, via *Rock Writings June 1996*



## CLEANING MINERAL SPECIMENS

by John Betts

(continued from last month)

### MECHANICAL METHODS

This month we are reviewing mechanical methods of cleaning and preparing mineral specimens. By mechanical we mean using force of some sort to remove unwanted minerals or encrustations. Obviously this method has the potential for damaging the specimen by scratching or fracturing the crystals. As usual, care should be taken to test the methods on lesser specimens to see if there is any damage resulting from the process. The mechanical cleaning of minerals ranges from the use of a toothbrush to dental picks to ultrasonic cleaners to water guns to sandblasting. I am not going to discuss the more ordinary use of chisels and saws to trim a specimen.

#### Brass Brush and Dental Picks

The first thing we do after a field trip is to wash the specimens and pray that they will clean up to look like the minerals sold by dealers. They never do. Dirt and pocket mud are often very tenacious and require more than running water. The first mechanical tool to try is a brass brush. They are available in hardware stores for use as a cleaning tool and for wood refinishers. Make sure you get brass bristles because brass is between 3.5 and 5 on the Mohs scale of hardness. In theory, you can scrub a specimen of any mineral harder than 5 and not damage it. In reality, though, you should always perform a test to make sure. I have used brass brushes on quartz successfully for many years without any damage. Occasionally on etched crystals a burnished appearance results, but this usually disappears in later chemical treatments.

With this first wash there will always be sand and dirt deep in the crevices between crystals. These can be loosened with a set of dental picks. They come in a variety of shapes and sizes. Often a friendly dentist will give away his old ones. If you

are not friendly with your dentist (who wants to be friends with their dentist?) and you cannot find them at your hardware store, you can purchase them by mail order from Woodworkers Supply (1-800-645-9292), item no. 862-028, a set of four utility picks for \$8.95. These picks are steel, and therefore harder, so be careful not to use a scratching stroke. Just loosen the dried, caked dirt in the crevices.

#### Ultrasonic Cleaner

Obviously, with delicate crystals scratching is not the problem, because they will simply break off from the force. With delicate specimens we need to use an ultrasonic cleaner. These are simple stainless-steel basins with piezoelectric drivers attached to the bottom. They often have built-in timers and heaters. When turned on, they vibrate the solution at ultrahigh frequency, causing cavitation, the formation and collapse of bubbles. This cavitation scrubs off dirt and soluble minerals very fast without damaging delicate crystals. I can hear the skeptics out there saying that some minerals can be damaged, like herkimer diamonds (after all, aren't we supposed to pack them in temperature-shielding sand or sawdust)? Well, this may be true, but in my experience (and this article is nothing more than one person's methods learned through trial and error) I have only had one herkimer diamond damaged. (There was a large stress fracture in a 2" crystal that "popped" during cleaning.) In terms of odds, I have cleaned thousands of herkimers and only that one broke.

Unfortunately ultrasonic cleaners are expensive. If you shop around for the best price, you will pay around \$150.00 for every quart of capacity. I have a three-quart unit that is more than adequate. Unless you collect a lot of large specimens, a 1 1/4 quart unit will suffice.

I highly recommend getting a built-in heater. It is well worth the extra expense. It will heat the solution to just below boiling and keep it at that temperature. This is perfect for cleaning with oxalic acid. The heat accelerates the action of the acid, but prevents the acid from boiling.



You do not have to spend lots of money to clean your minerals. In many cases the brass brush is all that you need. Remember also that these mechanical methods are often the first in a many step process. You may start with brass brush then use hydrochloric acid and finish with oxalic acid.

(Continued next month. Sections on sandblasting, impact chisels and water guns will be omitted, but Herb Luckert has this information. Call him if you want it.)

## NEW FOSSIL CENTER OPENS IN WYOMING

By Joyce Hanschu, Education Chairman, MWF  
(Condensed from an article in the September, 1996, *MWF Newsletter*)

The Wyoming Dinosaur Center is now open, featuring a large fossil collection, conservation labs, tours of actual field sites where dinosaurs are being excavated, and a "Dig for a Day" program which allows the public to excavate and keep dinosaur bones.

The center consists of about 500 acres of fossil beds, excavation sites and a museum on the Warm Springs Ranch at the northern end of Wind River Canyon, about one mile east of Thermopolis, WY. The fossil beds on the Warm Springs Ranch were deposited during the Jurassic Period 208 to 145 million years ago, and are part of the Morrison Formation, which has yielded perhaps the richest dinosaur fauna in the world.

Since 1993 over 40 fossiliferous sites have been located on the ranch. Excavations have uncovered mainly sauropod dinosaurs (camarasaurus, diplodocus and brachiosaurus) at the main quarry. At other sites, scientists have tentatively identified apatosaurus, stegosaurus, allosaurus, camptosaurus and iguanadon remains. This site is important because of the number of different dinosaur species and the high quality of the preserved bones.

The center is open from May 1 through October 31 seven days a week, several hours each day with longer hours during the summer. From November 1 through April 30 it is open by special appointment only. Phone numbers are 307-864-

2997 or 307-864-3775. The address is P.O. Box 868, Thermopolis, WY 82443.

(Editor's note: Despite the name, this is a private corporation, not connected with the State of Wyoming. The owner plans to exhibit conserved skeletons excavated from the ranch, but when I visited there this summer none was ready for display yet. The museum consists of impressive fossils from the owner's collection and from donations, though the lighting was terrible. The Dig for a Day cost \$100, and you could keep the bone you excavated, provided it was not something needed by the museum. They are working in a layer which contains perhaps a million camarasaurus bones, so there should be plenty for everyone. I was there in July and 12 people had signed up to work all day for their bones in 100-plus temperatures.)

## MANUFACTURING FOSSILS IN MOROCCO

If you aren't aware that a high percentage of the fossils on the market from Morocco have been assembled or faked, you are now because I will guarantee it.

No, I am not talking about the cheap dollar or ten dollar specimens, but the showy, rare, and expensive ones. Most serious fossil collectors are well aware of this, and the reconstruction, manufacturing, or assembling of parts to make a whole fossil is tolerated, but it is usually labeled as such. Unfortunately, most of the Moroccan specimens are not labeled, and people often buy what they think is a natural grouping of fossils without knowing that the specimens have been assembled to look like what they are not. The groups of round and straight ammonites usually have added fossils, usually the round ones. Trilobites are the most common fossils that are created or faked from parts or from nothing.

Is this fraud? Probably not, because even though these manufactured specimens are not cheap, they are much cheaper than the cost of a natural assemblage or of a real fossil of the same quality. Also, it would cost many times more in this country to do the same job that is done in Morocco, and some Moroccan specimens are quite aesthetic. You probably get your money's worth or more. I am no expert and cannot pick out all the fakes; possibly no one can. One wholesaler has said to me that he considers more than 90% of some types of Moroccan fossils to be fakes, so he sells them all as such.

Do I think we should ban these from our Show? No, definitely not, but I think all of us as club members should be aware that what may be sold as natural may not be.

— Art Smith, *Backbender's Gazette*, 5/96





### FOR FURTHER READING....

Using a bronze and aluminum hydraulic replica of a T. rex's jaw, a Ph.D. student has estimated that the dinosaur was strong enough to capture and kill its own food. Paleontologists have debated for years whether T. rex was a scavenger or a predator. To estimate crunching power of the jaw, comparisons were made with a fossilized triceratops pelvis which had been chewed by a T. rex.

From *New Scientist* (Aug. 24, 1996)

Rocks now exposed in the Himalayas seem to have been unusually hot in their past, even hotter than the rocks below them. One previous explanation was that the extra heat was caused by friction along faults. A new and simpler explanation suggests that radioactive minerals were subducted under the continental plate and then built up heat because they were insulated by overlying rocks.

From *New Scientist* (Aug. 10, 1996)

High levels of nickel, platinum, copper and gold in the surface soils of a large smelting district in Russia may be worth mining, says an international team of pollution experts. The Kola Peninsula is the site of several metal processing plants, all of which discharge their waste into the air.

From *New Scientist* (Sept. 28, 1996)

The National Park Service has drafted a new management plan for Glacier National Park. It will eliminate motorboats, private vehicles, visitor centers and all camping except for tent use in limited areas. Visitor access will be available through a transit system which will take the public to specific scenic "staging areas." (An alternate plan would allow

private vehicles on Going to the Sun Highway, but they would not be allowed to stop at the scenic areas.)

From *Blue Ribbon* (Oct., 1996)

Well, dinosaurs are cold-blooded again. (They were warm-blooded for only about 10 years, compliments of Robert Bakker.) A Polish grad student at Harvard, Tomasz Owerkowicz, has shown that Armand de Ricqles's microscopic bone analyses were faulty. He linked dinosaurs' bones to birds' bones (and thus to warm-bloodedness) because of similar growth structures. Owerkowicz has done direct comparisons with living animals and found that these structures are related simply to exercise, not to metabolism. Thus, the bone data cannot be used to prove the point one way or the other.

Meanwhile, John Ruben at Oregon State (a physiologist) is pointing to the presence of respiratory turbinates in nasal passages as a near-perfect sign of warm-bloodedness. These turbinates help the animal by decreasing the amount of water vapor lost to the air when breathing. Modern cold-blooded animals have empty nasal passages. Modern birds and mammals (99% of them) have turbinates. CT scans of dinosaur skulls show no indication of any ridges which turbinates could attach to, and thus they were probably cold-blooded.

Also, he has shown that cross sections of nasal cavities of warm-blooded birds and mammals are proportionately four times bigger than those of reptiles. CT scans show that the sizes of dinosaurs' nasal cavities fall right in line with those of lizards and crocodiles, but not at all with birds and mammals. So, nasal cavity size also seems to indicate that dinosaurs were cold-blooded.

Yet, dinosaurs were obviously capable of periods of high activity, which is more typical of warm-blooded creatures. Could the *Jurassic Park* velociraptors really steam up the windows with their hot breath? Stay tuned while the researchers hash this out.

From *Discover* (Dec., 1996)

## MICROBES' ROLE IN FORMATION OF EARTH'S CRUST STUDIED

By William J. Broad

N.Y. Times News Service

Deep in the heart of the Amazon jungle is a famous gold field known as Serra Pelada that lies far from the usual regions where the rare metal is mined. Discovered in the early 1980s, the find prompted many thousands of poor Brazilians to rush into the wilderness and, often digging by hand or with crude tools, to extract more than 100 tons of the precious metal. The episode is often referred to as history's biggest gold rush.

Surprisingly, scientists who later studied the site concluded that the rich lode was produced not by the accepted mechanisms of ore formation but by swarms of microbes that over millions of years concentrated the gold from jungle soils and rivers and rocks.

"There's lots of evidence that microbes played a crucial role," Dr. William A. Fyfe, a leading environmental geochemist based at the University of Western Ontario, in London, Ontario, said in an interview. "You find fossil bacteria and organic compounds all over the place."

Today Serra Pelada is seen as an example of a revolution that is quietly sweeping the earth sciences.

In hundreds and perhaps thousands of cases, scientists are discovering that microbes dwelling up to miles deep in the planetary crust are responsible for creating and arranging the rocks, seas, oils, soils, gases, metals and minerals that make up the earth's surface.

The implication--considered likely but so far unproved--is that this hidden biosphere of trillions of microbes and their ancestors has played a dominant role, perhaps *the* dominant role, in forming the planetary skin over the ages. Put irreverently, it is the rise of the shower scum.

"We're still at the very beginning" stages of understanding how microbes shaped the planet, said Dr. Henry L. Ehrlich, a biologist at Rensselaer Polytechnic Institute in Troy, N.Y., who is the

author of *Geomicrobiology*, a college text published by Marcel Dekker in Manhattan.

This new view of how the earth's surface was shaped, which stresses the importance of subtle biological processes over the more overt ones of chemistry and physics, is supported by a growing body of evidence and is shaking up the traditional disciplines of geology and microbiology. The hottest earth sciences today are exotic hybrids of the two, with names like geomicrobiology, microbial geology and environmental geochemistry.

Hundreds of scientists in these fields are producing a wave of new findings and clues about how microbes do things like generating fossil fuels, catalyzing geochemical reactions and concentrating valuable metals like iron and gold.

"It's becoming a flood," Fyfe said of the recent discoveries. "The main conclusion is that, if you don't understand the biosphere, you don't understand our environment."

As an example of the field's growth, Fyfe said that two decades ago scientists knew of 30 or 40 compounds and minerals that were made or amassed by microbes, often as excreta or body parts, much as humans concentrate calcium to make teeth and bones. "Today the number is hundreds," he said. "Every time we look harder, we find more." Dr. Grant F. Ferris, a microbiologist at the University of Toronto, said swarms of tiny microbes had proved to be adept at forming "an enormous variety of minerals--carbonates, phosphates, oxides, sulfides and silicates as well as silver and gold."

Dr. Debra S. Stakes, a geochemist at the Monterey Bay Aquarium Research Institute in Moss Landing, Calif., said the microbial revolution was often hard for physical scientists to accept and fathom because it undercut so many old beliefs and tenets.

"This is a huge challenge for geochemists," she said. "What it says is that most geological processes at their more fundamental stages could be biologically mediated, which challenges our models for inorganic thermodynamics for driving reactions."

From *South Bend Tribune* (Oct. 17, 1996)