

On the Rocks



A Newsletter of the Michigan Basin Geological Society

2004-2005 Number 5

www.mbgs.org

January, 2005

EVENTS

January 12, 2005: This month we have the pleasure of hearing from 5 students who received MBGS scholarships last year. They will present talks and posters on the following wide variety of subjects. Come and see how these students have used their MBGS scholarships to further the study of geology.

Evaluating Controls on the Formation and Reservoir Architecture of Niagaran Pinnacle Reefs (Silurian) in the Michigan Basin: A Sequence Stratigraphic Approach by Tony Sandomierski

Paleoceanography of the Michigan Basin in Silurian Time as Revealed From Stable Isotopic Analysis of Brachiopods by Peter Voice

Investigations of the Spatial Distribution and Geometry of a Shallow Bedrock Aquifer in Central Lower Michigan by Niah Venable

Poster: Genesis and Evolution of Paleozoic Algal Mounds – Application to Reservoir Distribution by Audrey Ritter

Poster: Martian Aeolian Structures by Jessica Crisp

January 21, 2005: Ohio Geological Society Winter Gala. For information contact Amy Lang at (614) 717-9262 or e-mail AmyLang@columbus.rr.com.

May 5-16, 2005: MBGS Grand Canyon Field Trip.

Outreach Initiatives

As a reminder to MBGS members, our society encourages geologist outreach activities to help spread the understanding and interest in geological sciences. MBGS has a limited number of specimen kits of 15 Michigan rocks and minerals for distribution. We purchase approximately 150 packets each year and they are available on a first come basis to members to be used for the outreach program. If you would like to request specimen kits please contact Tom Hoane at 517-241-3769 or hoanet@michigan.gov.

MBGS would like to keep a record of our members outreach to the public. After you have given a presentation to a group (school class, boy scouts, etc.) please fill in the requested information and send to: Tom Hoane, 1748 Danby Lane SE, Grand Rapids MI 49506, or hoanet@michigan.gov.

MBGS Geological Outreach Form

Name _____ Date of Talk _____
School/Location _____ Grade/Age _____
Number of people/students _____ Length of talk _____
Handouts Given _____
Title/Other Info _____

November 17, 2004

Tom Hoane
recently
received
this letter from
Julie Baldwin
about her
recent
activities.

Mr. Tom Hoane
Michigan Basin Geological Society
1748 Danby Lane SE
Grand Rapids, MI 49506


Thank you,
Julie!

Dear Tom and Michigan Basin Geological Society –

Recently, I received 60 Michigan Rock and Mineral kits from MBGS to give to my 2nd grade son's class and the 1st grade class with whom they share science lessons. I gave the kits to the kids as part of a Michigan rock presentation. Mark Nida and Pat Poli have amassed fantastic rock collections from years of collecting and are more than willing to share the rocks and their geology knowledge. They both worked with me to come up with info cards on each sample (I usually show 15 samples). I like to focus on samples from Michigan and also mention briefly how the rock or mineral might have been formed and what we use it for today. The kids absolutely loved hearing about rocks and holding the samples. At the end of the presentation, when the rock and mineral kits were passed out, they couldn't believe they actually got to keep them. Several parents have contacted me to let me know that their kids like the sample kits and are interested in geology.

I want to thank MBGS for the kits. They fit in very well with the samples I had to show. There were only 3 samples in the kit that weren't part of the 15 samples I borrowed from Mark and Pat. Thanks for being so generous!

Sincerely,



Julie Baldwin
Staff Engineer
MPSC

MBGS Meeting

January 12, 2005 (WEDNESDAY)

Coyote Creek

6951 Lansing Rd, Dimondale, MI.

Schedule: 5:30 to 6:15 pm Social Hour

6:15 pm Dinner

Presentation after dinner

Cost \$25.00/member \$15.00 Student (includes dinner)

Evaluating Controls on the Formation and Reservoir Architecture of Niagaran Pinnacle Reefs (Silurian) in the Michigan Basin: A Sequence Stratigraphic Approach by Tony Sandomierski

Paleoceanography of the Michigan Basin in Silurian Time as Revealed From Stable Isotopic Analysis of Brachiopods by Peter Voice

Investigations of the Spatial Distribution and Geometry of a Shallow Bedrock Aquifer in Central Lower Michigan by Niah Venable

Poster: Genesis and Evolution of Paleozoic Algal Mounds – Application to Reservoir Distribution by Audrey Ritter

Poster: Martian Aeolian Structures by Jessica Crisp

MBGS Dinner Meeting Reservation

Name _____

Number attending _____ Society _____

Enclosed Registration Fee _____

Please make checks payable to **MBGS** and return to Pat Poli by **January 10, 2005**. Members are welcome to attend the presentation after dinner for no charge. Please contact Pat Poli to ensure adequate seating. Send reservations to:

Pat Poli
Engineering Section
Engineering and Service Quality Division
6545 Mercantile Way
Lansing, MI 48909
Ph: Bus 517-241-6141, Fax 517-241-6071
E-mail: pmpoli@michigan.gov

2004-2005 MBGS Officers

The Executive Committee meeting minutes are available on the website.

PRESIDENT: DR. MICHAEL GRAMMER, WMU
GEOLOGY DEPARTMENT
Ph: 269-387-3667, fax 269-387-5513
mike.grammer@wmich.edu

VICE PRESIDENT: DR. ROBB GILLESPIE, WMU
GEOLOGY DEPARTMENT,
Ph: 269-378-5354, fax 269-387-5513 .
robb.gillespie@comcast.net

SECRETARY: ROBERT REYNOLDS,
Reynolds Geological LLC
Ph: 517-676-9936, fax 517-676-8169
reynoldsgeo@voyager.net

TREASURER & PUBLICATIONS: TOM HOANE,
FMFM, DNR
Ph: Bus 517-241-3769, fax 517-373-2443
hoanet@michigan.gov

BUSINESS MANAGER: PAT POLI,
MPSC, Energy Operations Division
Ph: Bus 517-241-6141, Fax 517-241-6071
pmpoli@michigan.gov

PAST-PRESIDENT: TOM GODBOLD,
GLMD, DEQ
Ph: 241-1545, fax 517-241-1595
godboldt@michigan.gov

CO-FIELDTRIP DIRECTORS:
MARK WOLLENSAK, CPG
HAMP, MATHEWS & ASSOC, Inc.
Ph: 517-641-7333 Fax 517-641-7337
Cell 517-719-8321
wollensak@voyager.net

LEONARD ESPINOSA, FMFM, DNR
Ph: 517-335-3248, Fax 517-373-2443
espinosl@michigan.gov

NEWSLETTER EDITOR: TOM WELLMAN,
GLMD, DEQ
Ph: 517-241-1530, fax 517-241-1595
wellmant@michigan.gov

ELECTRONIC PUBLICATIONS, MARK WOLLENSAK
(see above)
WEBMASTER: GREG VARNUM
me@gregvarnum.com

University Talks and Seminars Websites

Western Michigan University:
www.wmich.edu/geology/SeminarGeos.html

Michigan State University:
www.glg.msu.edu/news/lectures.html

University of Michigan, Turner Lecture Series:
www.geo.lsa.umich.edu/announce/turner02b.html

Michigan AIPG Section website: www.aipg-mi.org

MEETING CANCELLATION POLICY

Monthly meetings will be automatically cancelled whenever the National Weather Service issues a "Storm Warning" for the Lansing area. If driving conditions are poor but a "Warning" has not been issued please contact any member of the Executive Committee for the status of the meeting.

MICHIGAN BASIN GEOLOGICAL SOCIETY PUBLICATIONS

Historical CD #1: Nine out-of-print publications from 1949 through 1965 and 1998, Devonian to Silurian Rock Fieldtrips to MI, WI, IL and Ontario, 2000, \$15

Historical CD #2: Four out-of-print publications from 1947, 1959, 1983 and 1991, Northern Devonian and UP Fieldtrips in MI, 2001, \$10

Historical CD #3: Six out-of-print publications from 1947, 1959, 1983 and 1991, Northern Devonian and UP Fieldtrips in MI, 2001, \$12

Special Price - Historical CD #1, #2 & #3, \$30

Stratigraphic Lexicon for Michigan, 2001, prepared by MBGS and published by DEQ, 56 pp., chart, \$2.65 picked up or \$4 mailed, Can be ordered from MBGS or Geological Survey Div. of the DEQ

Prices include postage, handling and any applicable sales tax. MBGS Members receive a 10% discount on MBGS publications.

Orders for publications should be prepaid in U.S. Funds and addressed to:

MBGS – Publications
PO Box 18074
Lansing MI 48901-8074

MBGS Mug and Jacket Sale

The Michigan Basin Geological Society is offering mugs and jackets with the society logo for sale. The mugs are \$5.00 each. The jackets are \$60.00 each plus postage. Please contact Dan McGuire at: Phone (517) 772-5219, Fax (517) 772-7021, or danmcguire@sensible-net.com. Remember to include the correct size of the jacket and the quantity of each item. Checks should be made out to the MBGS.

Evaluating Controls on the Formation and Reservoir Architecture of Niagaran Pinnacle Reefs (Silurian) in the Michigan Basin: A Sequence Stratigraphic Approach

by Tony Sandomierski

Abstract: Silurian-aged, Niagaran (or Guelph) pinnacle reefs have been productive in the Michigan Basin for more than 60 years, but extensive lateral and vertical heterogeneity has limited primary production efforts, resulting in estimates of stranded hydrocarbons as high as 75%. Enhanced recovery efforts are generally focused on water and CO₂ floods, along with horizontal drilling, but connectivity of reefs in both lateral and vertical dimensions has been unpredictable. Evaluating the pinnacle reefs with a sequence stratigraphic approach has provided a framework for understanding and predicting vertical compartmentalization of these reefs.

Based on reservoir-scale observations, restriction of water circulation related to changes in relative sea-level was a major controlling mechanism on vertical facies distribution. Microbial mounds at the base of reefs are interpreted as forming in a dysoxic environment related to initial flooding of the basin, while stromatoporoid reefs flourished during highstands as normal marine circulation was established.

Vertical facies patterns indicate a general shoaling upward sequence from microbial mound to reef core, followed by tidal and supratidal environments typically capped by impermeable exposure surfaces. Discovery of these vertical facies successions, each bounded by exposure surfaces with evidence of subsequent flooding, has challenged the current dogma of the pinnacle reefs being the result of continuous long-term growth, in favor of an episodic growth model. By identifying cycle and sequence-scale vertical patterns, facies distribution and resulting reservoir architecture can be better predicted in pinnacle reefs in the Michigan Basin and may also provide insight into similar structures in the geologic record.

Biography: Mr. Sandomierski, after serving in the Army as a Paratrooper, took advantage of his military college fund by attending Northwestern Michigan College in his hometown of Traverse City. He started out as an engineer, but after taking a summer course in Michigan Basin Geology from Richard (Dick) Cookman, he found his niche. He transferred to Michigan Technological University, where he received his bachelor's degree in geology. While at Michigan Tech, Tony participated in many research projects including petroleum geochemistry surveys, mapping igneous dike swarms for economic mineral development, and patent research for downhole technology devices. While on a fieldtrip during a reservoir engineering class taught by Dr. Albert (Buddy) Wylie, he viewed a massive waterflood project by Shell Oil. The waterflood was intended to flood nearby pinnacle reefs for enhanced recovery of hydrocarbons. The reefs that actually produced more hydrocarbons were over a mile away from the intended field. Thus began his Master's Degree research interest of Michigan's Silurian pinnacle reefs under the guidance of Dr. Mike Grammer and Dr. Bill Harrison at Western Michigan University and The Michigan Basin Core Lab. Recently, Tony has completed an internship with ExxonMobil in Formation Evaluation and has accepted a job offer where he has been invited to participate in training rotations in Exploration Company; Geologic Operations, Formation Evaluation Group, and Upstream Research Company in the Carbonate Research Group.

Paleoceanography Of The Michigan Basin In Silurian Time As Revealed From Stable Isotopic Analysis Of Brachiopods

by Peter Voice

Abstract: Stable C and O isotopic analyses of microsampled brachiopod shell material from the middle Silurian Burnt Bluff Group has established fundamental information on the paleoceanographic conditions in the Michigan Basin during the Silurian. These data indicate that, despite clear lithological evidence for highly restricted conditions at times during the Silurian, the Michigan Basin was also characterized by periods of normal marine circulation.

The Michigan Basin is an intracratonic basin that was an active depocenter throughout much of the Paleozoic. Lithofacies patterns and distribution in the basin indicate that circulation within the basin varied widely throughout the Paleozoic. Fluctuations between normal marine conditions indicated by periods of luxuriant reef growth with deposition of restricted marine facies and evaporites are especially prevalent during the Silurian. Little geochemical evidence exists, however, to establish the timing and magnitude of variability in paleoceanographic conditions within the basin and how minor fluctuations in salinity and circulation patterns may have controlled the distribution of reef growth during this time.

Samples of pentamerid brachiopod shells were isolated from limestone intervals of cored material and examined with both cathodoluminescence and petrographic methods to establish that the shells had not been diagenetically altered. The samples have average isotopic values of $-4.50 \pm 1.0\text{‰}$ ($\delta^{18}\text{O}$) and $+1.21\text{‰} \pm 0.99$ ($\delta^{13}\text{C}$). These values are consistent with other established normal marine data for the Silurian at other sites around the world indicating that deposition of the Burnt Bluff Group took place during a period of open marine circulation within the Michigan Basin.

Establishing isotopic conditions of marine waters in the Michigan Basin provides additional data points for the composition of normal Silurian seawater for comparison with other basins, while also shedding new insight into the circulation patterns within the Michigan Basin. Fluctuations between highly restricted and normal marine conditions in the Michigan Basin may be a result of Milankovitch band orbital variability in response to resulting high amplitude sea level change, and/or to periods of increased structural sag.

Biography: Peter Voice received his BS in geology at Western Michigan University in 2002. He wrote an honors thesis titled "Predicting Metal Adsorption onto Natural Sediments through Model Mineral Mixtures" and graduated Magna Cum Laude. He went on for his MS in geology at Western with degree work emphasizing sedimentary geology and paleontology. His thesis work has focused on characterizing the isotopic nature of the Burnt Bluff Group through analysis of brachiopod shell compositions. He has presented his work in carbonate sedimentology at Eastern section AAPG and his thesis work at National GSA. While at Western, he has taught lab sections for six different courses, including experience teaching a Marquette mapping field course. In May, he will be co-chairing a symposium on Biomineralization models and mechanisms at the Goldschmidt conference.

Investigations of the Spatial Distribution and Geometry of a Shallow Bedrock Aquifer in Central Lower Michigan

by Niah Venable

Abstract: The Pennsylvanian Saginaw aquifer supplies the majority of water supply needs for several counties surrounding the Metro Lansing area. The Saginaw aquifer exhibits a wide range of porosity, hydraulic conductivity, and transmissivity values in this area. Highly variable aquifer properties apparently result from significant lithologic heterogeneity of the bedrock units composing the aquifer. In light of the need to delineate high quality, shallow bedrock aquifers and to identify possible aquifer vulnerability in Central Lower Michigan this work attempts to apply conventional, subsurface, reservoir characterization methodology to shallow bedrock aquifer stratigraphic units.

Currently, little is known about the regional stratal geometry and chronostratigraphic relationships between the units that make up the Saginaw Aquifer, the Saginaw and Grand River formations. Previous workers suggest that the Saginaw was deposited in shallow to marginal marine deltaic environments in the Michigan basin and comprises heterolithic sandstone, mudstone, shale, limestone, and coal. In contrast, the Grand River has been interpreted as coarse-grained meandering river deposits comprising predominantly sandstone, channel fill facies with net thicknesses of 80 feet or more. The stratigraphic relationships between these units are not clearly established.

Methods used to make distinctions between the units and describe their spatial and geometric distribution include core descriptions, gamma ray wireline log analysis, and regional log-to-log

correlation. The use of appropriate depositional models combined with biostratigraphic data may clarify the stratigraphic controls during deposition of these units. This analysis should lead to a greater understanding of the relationships between the Grand River and Saginaw formations and the subsurface spatial distribution of high quality aquifers.

Biography: Niah Venable is originally from Stillwater, Oklahoma and received a B.S. in Forestry with a minor in Geology from Oklahoma State University in 1997. As a student, she spent a few summers working as a Forestry Assistant for the Michigan DNR. After graduation she was hired full-time as a Forester by the Wisconsin DNR, later transferring into a State Park Manager position. After 5 years with the State, she moved to Kalamazoo in support of her spouse's career. Niah decided to enter graduate school at Western Michigan University after the birth of her daughter. She currently holds a Thurgood Marshall Assistantship and is looking forward to completing her Master's of Earth Science degree in Hydrogeology by December 2005.

Poster: Genesis and Evolution of Paleozoic Algal Mounds – Application to Reservoir Distribution

by Audrey Ritter

Abstract: During the Late Paleozoic, calcifying green algae termed "Phylloid Algae" were the dominant reef builders in many parts of the world. Hydrocarbon reservoirs in phylloid algal mounds are known from the Paradox, Orogrande and Permian Basins in the U.S., and are also common elsewhere in the world, including some of the supergiant fields in Russia and Kazakhstan.

Current dogma on the formation of phylloid algal mounds is that they formed *in situ* through constructional processes. These processes included sediment baffling and binding by the algae and various other organisms, coupled with abundant submarine cementation. Recent evaluation of phylloid algal mounds exposed along the San Juan River in Utah, however, have shown that these 10-12m amplitude mounds are distributed in a near sinusoidal pattern suggesting that they may have formed under the influence of wave- or tide-generated ocean currents. In modern environments, both wave and tide generated currents may pile loose sediment into dunes or sand waves along the sea floor with a similar near-sinusoidal distribution.

Ascertaining the conditions under which these mounds initiated and grew may have important implications to exploration concepts devised for these reservoirs. High energy, current-induced mounds, for instance, may be aerally limited in the subsurface and may trend preferentially along strike (e.g. wave currents) or conversely along dip (e.g. tidal currents). In contrast, constructional mounds may have formed in much broader areas across an entire shelf or platform. Relative percentages of primary matrix muds, which are lower in current-induced mounds, may also affect reservoir quality and should be considered at both exploration and production scales.

Biography: Audrey Ritter is the daughter of Norma Lowery and Alan Ritter. She has one sister, Denise Ritter, who is also her best friend. She has attended Western Michigan University for five years and plans to graduate June 2005. Her studies in geology have provided many opportunities to explore outside of Kalamazoo, MI including a summer internship she has recently accepted through Equitable Resources in Pittsburgh, PA. Her current research, under the direction of her advisor Dr. Mike Grammer, evaluates the formation and evolution of Paleozoic phylloid algal mounds of the Paradox Basin. She is also the president of WMU's AAPG Student Chapter. When Audrey is not being academic, one can find her swimming in the pool for WMU's swim team. In the fall of 2005, she will be attending graduate school at Western Michigan University for a M.S. in geology with a focus on carbonate sedimentology.

Martian Aeolian Structures

by Jessica Crisp

Abstract: Aeolian sedimentary structures analyzed on Earth can be used as analogs for the formation of similar structures observed on the Martian surface. Inferences can be made about the genesis of these structures by comparing bed form geometries produced on Earth to those found on the Martian surface. Experiments were conducted with the primary goal being to create fore set beds in a controlled environment at ambient Earth pressure within the Mars Surface Wind Tunnel (MARSWIT). The creation of fore set beds at Mars pressure could then be attempted using a similar process. Establishing comparisons in Martian bed form genesis to Earth's processes allows one to develop possible hypothesis concerning Martian geological history.

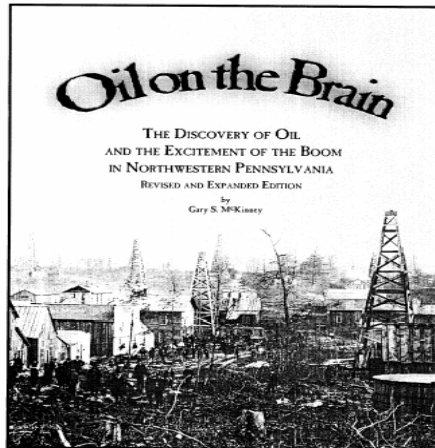
Biography: Jessica L. Crisp, originally from Saginaw, MI, will graduate from Western Michigan University with a B.S. in Geology in June 2005. She plans to work toward an M.S. degree starting in Fall 2005. Her main areas of interest include impact cratering, aeolian processes, paleontology, and 3-D modeling. Her goal is to work in either the petroleum industry or planetary geology research. Her other interests include traveling, physics, gaming, Judo, and literature.

A promotion for a potentially interesting publication:

Oil on the Brain: The Discovery of Oil and the Excitement of "The Boom" in Northwestern Pennsylvania

*Revised and Expanded Edition
2004 by Gary S. McKinney*

Many of the world's first true oil men hailed from Venango County, Pennsylvania. From there, Western Pennsylvania "Wildcatters" such as Watson and Bayne, Galey and Guffy discovered, developed and followed the great oil fields on through Clarion County and all across America.



The smell of crude oil fresh from the ground was a powerful lure. Everyone was afflicted with "Oil on the Brain" and great excitement followed each new find. Boom towns grew and died; personal fortunes were built and lost.

Nowhere were the vast pools of oil safe: Titusville and Petroleum Centre to Parker's Landing, from Greece City to Bradford. Onward they drilled, Oklahoma to Texas, "Spindletop" to California.

In this revised and expanded edition of *Oil on the Brain*, Gary McKinney entices the reader further into the fascinating history of the early days of oil discovery in the United States. It boasts of 85 more pages with over 80 new photos, maps and illustrations. Plus, township maps, personal biographical sketches and business directories have been added - an important source for genealogical family research.

This second edition, even more, brings the importance of the Titusville connection to the hunt for G. Bayne; Edwin C. Bradley; and John Fertig, mayor

of Titusville, all tell their forgotten stories.

Included in this volume is information on a new and exciting book called *Oil Region Reminiscences Souvenir*, published in 1907 and soon to be reprinted. *Souvenir* reveals the men, wells and boom towns of the lower Butler County, Pennsylvania fields. These two histories compliment each other and will be good reference guides well into the future.

Oil on the Brain will arouse the interest of any reader living in today's oil-dependent world. The author explains, "It was my intention to write a history that was interesting, light and readable by everyone."

This 309-page hardcover history is a fresh and interesting look at the old time oil business, and contains over 300 photographs, maps and illustrations.

ISBN 0-9744657-9-8 LOC 2004107938

Order your copy today for only \$39.95*

A good read - a lasting Christmas gift!

To order:

MECHLING
BOOKBINDERY

1124 Oneida Valley Road - Rt. 38 724-287-2120
Chicora, PA 16025-3820 1-800-941-3735

www.mechlingbooks.com

Oil on the Brain: \$39.95

*Shipping & Handling charges: \$7.00 for one book.

Please add \$2.00 for each additional copy ordered.

Pennsylvania Residents ONLY add 6% sales tax.

One copy: (\$39.95) + S/H (\$7.00) + tax (\$2.81) = Total (\$49.77)

Two copy's: (\$79.90) + S/H (\$9.00) + tax (\$5.33) = Total (\$94.23)