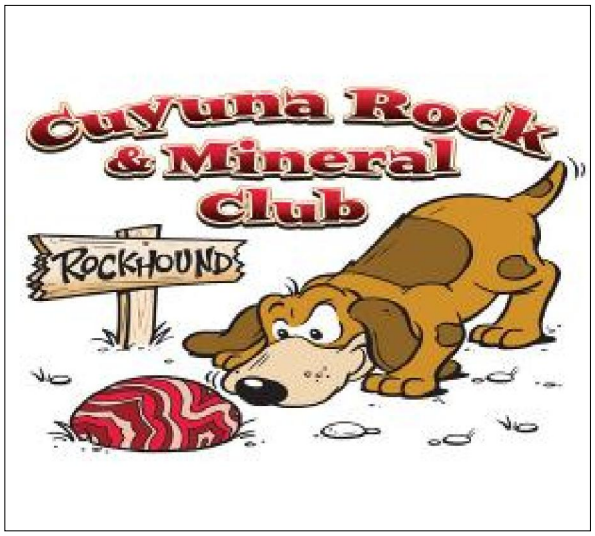

THE AGATE EXPLORER

Volume 22 Issue 5 Cuyuna Rock, Gem & Mineral Society May 2013

Club Calendar

Saturday, May 11

~Board Meeting: 12:30 p.m.

~Club Business Meeting: 2:00 p.m.

~Program: 2:30 p.m.

~Shop Day: May 18 9am-Noon

~Mineral Study Group:

Next meeting date to be announced...

Here is your abbreviated May newsletter! With the show coming up in just a week, I haven't had much time to spend on it. Thanks to Harry W. for submitting great articles and newsy items!

I really hope all of you will either be attending or helping with our annual show. Publicity is out and there is a lot of excitement in the community about the show. Keep spreading the word!
Sharon Smith, Editor

May Program a Feast for the Eyes!

Michael Carlson, author of "The Beauty of Banded Agates" has provided us with his magnificent slide-show featuring amazing specimens of banded agates from around the world.

We regret that Michael will not be able to join us in person but are delighted to have his excellent photos to share with our members and visitors.

You will see some of the worlds most beautiful agates during this presentation. Bring a hanky - there will be a lot of drooling over these stones!!!

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Joe Casey gave us some excellent tips and advice on gravel pit safety at the April meeting. Many THANKS Joe!

THE CUYUNA ROCK, GEM, & MINERAL SOCIETY

MEMBER OF AFMS & MWFS

CLUB PURPOSE

To foster an interest (and encourage young & old) to study Earth Sciences, enjoy the art of lapidary, hunting for rocks and semi-precious stones. We also strive to use what we know and acquire, to further educate everyone who has an interest in our hobby.
We are a not-for-profit organization

CLUB INFORMATION

Meeting Place: Cuyuna Range Community Center
Directions: 2 blocks north of stop sign at Hwy 6 & 210 intersection in Crosby. Meet in Basement on the 2nd Saturday each month at 2:00 p.m.

CLUB DUES

$18 Family $9 Sponsored Juniors
Membership runs from Jan. 1st-Dec. 31st

CLUB OFFICERS

President: Harry Wagoner————(hpwagy@centurylink.net)————-218-927-9983
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VOLUME 22 ISSUE 5 May 2013

American Lands Access Association

The following is, in part, a letter the club received:

ALAA is glad you joined us. We welcome you and ask you to help us make the public aware that our public lands are shrinking before our eyes

We ask you keep a wary eye on our public lands around you and keep us informed as to events unfolding in local, state and federal offices that might change the status of our public lands.

Our organization is national, but we have limited resources and rely on all members to help keep each other informed. A central hot line for information is info@amlands.org . The only way we are going to have a voice is to make that voice loud with thousands of members willing to stand together.

Morton Gneiss is one of the oldest rocks in Minnesota and is about 3.6 billion years old, making it one of the oldest rock units on the planet. It is believed to have originally been a granite before it was metamorphosed.

Actually the rock is a migmatite, a mixed metamorphic rock consisting of a schist or gneissose component, and a granitic component forming layers or pods.

Migmatite may be very similar to granite in composition. A coarse-grained rock with a granular texture, it often shows banding like gneiss formed in areas of high-grade metamorphism.

Talking Minerals
By Harry Wagoner

MONTANA AGATE

SOME VIEWS ON THE ORIGIN AND DISTRIBUTION

Montana agate is made of silica (SiO2). The formation of Montana agate is intimately related to the occurrence of silica and color-producing minerals in Montana's past.

Volcanic material (lava flows, ash, etc.) is a common source of silica for agate formation. The silica content of lava ranges from relatively-low (basaltic lava) to relatively-high (rhyolitic lava). Rhyolite lava is thicker (more viscous) than basalt lava, and rhyolite volcanoes (such as Mount St. Helens) may be much more explosive than basaltic volcanoes (such as Kilauea on the island of Hawaii). Much of the volcanic activity in Montana and the super-massive, explosive Yellowstone volcanoes were rhyolitic, or high in silica content.

Silica is slightly soluble in groundwater at ambient temperature and pressure conditions. If silica is present in intact, relatively unfractured rock, then the rate of dissolution of silica from the rock will probably be relatively low. Much of the Montana-Yellowstone volcanism was of the explosive, rhyolitic variety, and resulted in the deposition of fine volcanic ash over extensive land areas. Volcanic ash has a high ratio of surface area to weight and, as a result, volcanic ash can react very readily with circulating groundwater to liberate silica and other minerals.

80 million years ago The last major tectonic period that completed the uplift of the Rocky Mountains.

~ 50 million years ago The Absaroka volcanic center in southwest Montana is active, and results in ash/mud flows, and burial of organic matter. Today, petrified wood is commonly found in the in-situ (i.e., not transported after deposition) geologic strata that date from this period.

~40 million years ago Montana enters into a period of dry climate. An interesting feature of the dry periods in Montana is that precipitation likely consisted of infrequent, intense storms. These energetic storms helped to move gravel deposits eastward from the toe of the Rocky Mountains onto the western Great Plains.

~20 million years ago Montana enters a tropical climatic period, with the formation of lateritic (iron-rich) soils.

~10 million years ago Montana again becomes dry. Again, infrequent, intense storms move immense gravel deposits eastward from the toe of the Rocky Mountains onto the western Great Plains. The 6-Mile Creek and Flaxville Formations are present-day, distinct, mappable gravel strata that contain Montana agate, and which date from approximately 10 million years ago.

~2.5 million years ago Montana experiences glaciation, which contributes to the establishment of the present-day stream system.

2 million years ago Several periods of super-massive volcanic activity occur in the Yellowstone Park area, with heavy ash deposition over thousands of square miles. The heaviest ash deposition is closest to Yellowstone Park.

Eastern Montana was mostly a shallow inland ocean, almost a swamp with huge forests lining it's shores and islands of volcanoes spewing forth lava to entomb parts of the forest in lava and ash . The bowels of Yellowstone bulged and roared and flowed mountains of lava that decimated thousands of acres of mighty redwoods and sequoias for hundreds of miles around. This decimation continued for hundreds of years with layer upon layer of forests growing up and then being driven down under the ponderous weight of all the mega-tons of lava and ash. The hot lava devoured most of the wood in it's rush to cover the trees, but some of the shape and ingredients of the limbs remained trapped in the cooling lava. When the time of volcanoes and lava was subdued and the rains came, mineral laden silica-water flowed into the cavities and pockets left by the

dying trees and bubbling lava. As flow after flow slowly filled the pockets with liquefied silica, Montana Agate was born.

Very little published data resulting from scientific investigation has been directed at the origin and distribution of Montana agate.

One of the earliest analytical tools in geology was the recognition that individual rock strata may have distinctive, recognizable characteristics (such as fossils), and the occurrence of these rock strata may be mapped over a large land area. If a recognized (i.e., studied and with known characteristics) rock stratum is found in a new area, one may be able to deduce the relative age of the rock stratum based upon its position in the vertical rock sequence (stratigraphic position). Montana agate is not generally found in the location or in the rock stratum in which the agate formed, and does not contain fossils, so we can't date Montana agate by its position in the stratigraphic sequence.

Another early tool in geology (and in deductive logic, in general) is the principle of Occam's Razor, which states that "the simplest explanation that adequately addresses all of the facts is usually the correct one". To apply Occam's Razor to the origin and distribution of Montana agate, we need to start by tracking Montana agate backwards in geologic time.

In addition to being found in recent deposits along the Yellowstone River, Montana agate is also found in gravel deposits (6-Mile Creek and Flaxville Formations) that have been reliably dated to about 10 million years ago. Therefore, Montana agate must be at least 10 million years old. This also means that the super-massive volcanic explosions at Yellowstone Park that occurred up to about 2 million years ago didn't directly contribute to the original formation of Montana agate. The agate that is found in the River today was most likely washed into the river from the adjoining, upland or plateau gravel deposits.

An interesting side note on the Flaxville Formation is that, to the south, gravel deposits of the same age are known as the Ogallala Formation, and these gravels host the most productive water supply aquifer in the Great Plains from Wyoming to Texas. Everywhere you look, gravels of roughly this age were transported from the eastern slopes of the Rocky Mountains out onto the Great Plains..... however, Montana agate is generally found only in the Yellowstone River basin.
One difference between the Flaxville gravels and the Ogallala gravels is in the differences in the drainage basins in which these gravels are found. The Yellowstone and Missouri rivers formerly flowed north into Canada. The relatively recent glaciation caused damming of the Missouri, resulting in nudging its channel to its present-day, more southerly course.

So, prior to the emplacement of the 6-Mile Creek and Flaxville gravels, what was happening in Montana? Approximately 20 million years ago, Montana was in the midst of a tropical period, during which distinctive, tropical soils (laterites), enriched in iron and other minerals, were formed. The formation of Montana agates probably didn't begin before this time.

Approximately 40 million years ago, Montana was in another dry period. Infrequent, intense storms carried gravel deposits (Renova Formation) eastward from the eastern toe of the Rockies. Montana agate isn't reportedly found in these deposits, so the erosion that moved these gravels probably either a) worked on strata that are higher (younger) than the strata in which Montana agate originated and/or b) acted across a different elevation gradient than existed during the placement of the 6-Mile Creek and Flaxville gravels, and/or c) diagenetic changes (changes in rock that occurs after the rock is formed, such as alteration by minerals in groundwater) may not have occurred the same way within the Renova gravels and the Flaxville gravels.

50 million years ago, the tectonic activity and uplift that created the Rocky Mountains was coming to a close. At the same time, the Absaroka volcanic center was active in southwestern Montana (just east of the present-day location of Yellowstone Park), causing widespread ash deposition and ash/mudflows. In places where the Absaroka ash deposits can be observed in-place today, petrified wood is common..... evidently, the Absaroka ashfall buried appreciable stands of vegetation in silica-rich ash-fall.

In terms of the simplest explanation that fits the facts, the Absaroka volcanism seems to fit the bill for the event that began the formation of Montana agate. Montana agates are found in gravel deposits from the Pleistocene age (10,000 - 1,6000,000) in the area of the Yellowstone River and its tributaries.

In the millennia since the Absaroka volcanism, incipient Montana agate has been transported down the evolving Yellowstone River basin and across the northern Great Plains and High Plains physiographic provinces. To-

Today, Montana agate is found in Yellowstone River gravels from near Emigrant, MT (Yellowstone River near the Wyoming-Montana border, at the western border of the Absaroka volcanic center) to the Montana - North Dakota border.

The older, in-place deposits, such as are found in the Flaxville gravel benches and plateaus mostly to the north of the Yellowstone River Valley, contain agates that may have the distinctive, red banding and black dendrites, but these upland agates may be more checked and cracked than the agates that are found along the River.

The upland agates may also be covered by a distinctive, bluish-white crust that seems to develop on agates that are exposed to the weather. This crust is similar in appearance to the crust that develops on volcanic-origin agates in other locations in the volcanic, Pacific northwest (and elsewhere). Agates found in the River often lack the crust, whose formation is evidently inhibited or prevented when agates are tumbled along the streambed.

Agates that are found in and along the River are more likely to be unchecked or cracked, or else you can see evidence of cracks that have healed. Many people would say that the best lapidary-quality Montana agate comes from along the River.

The Yellowstone River shows abundant evidence of highly variable, geochemical micro-environments..... periodic variation of the water table surface, mineral-rich groundwater seeps, and the annual slug of silica-rich volcanic ash/soil in the river each spring. These micro-environments likely contributed significantly to the unique, distinctive appearance of Montana agate.

Hydrogeologists describe porosity in bedrock as being primary (porosity between individual grains in the rock) or secondary (porosity in cracks and crevices in the rock). Some would also add tertiary porosity, or porosity in large open spaces (such as caves or solution channels in karst berock). Groundwater circulation through bedrock is dominated by secondary and/or tertiary porosity features, with much slower movement of water through primary porosity features in intact bedrock. The same hydraulic principles apply, on a much smaller physical scale and over a longer time scale, to the circulation of water through a Montana agate.

Small changes in temperature, pressure, and/or micro-scale geochemistry can cause silica (and other minerals) dissolved in groundwater to precipitate out of solution. Agate is porous and may contain an appreciable amount of water ..... when precipitation of minerals occurs within an evolving Montana agate, the result may be colorful inclusions or else "healing" of cracks in the agate matrix. Inclusions consist of iron, manganese, and other minerals. These inclusions form when mineral-laden water is “wicked” into the rock through cracks or fractures and the mineral content of the water is deposited within the rock.

High-power microscopes show tracings of little canals, which once admitted water containing one or more of these metals (iron / manganese) in solution. The water dried out, the canals closed so tightly that the naked eye could not see them. The fern-like effects of trees, shrubs and mountains come from the fact that these tiny canals branched out forming smaller canals from a common center.

The background (matrix) of Montana agate ranges from nearly clear, through milky grey-blue to white. If the agate is composed of very fine layers, a small percentage of Montana agates may show rainbow iridescence (also known as iris agate).

Some of the dark brown ribbon with orange border in clear agate make a beautiful gemstone and are much sought after. Of course the dendritic or "spot" agate is the most prized of all. Many people call the dendritic agate "mossagate" due to the tree like or bush like inclusions of dendrites. However, this "spot agate" is not truly the "moss agate." Occasionally green moss agate is found but they are rare. The moss agate has inclusions that resemble long tendrils of moss scattered indiscriminately throughout the clear stone. Many of these green moss agates from this area are not good cutting material as they undercut due to the green oxides leaving tiny pits or sometimes there are tiny spots of quartz. However, occasionally one is found that is solid and cuts beautiful cabs.

There is some controversy as to where these agates originally came from and how they were brought here. The most accepted explanation is that they were formed in a rhyolitic or similar formation in the mountains to the westward and over eons of time were eroded out of the original strata and brought to their present location by water action, probably washed down by a huge prehistoric river. A few Montana agates still have some of the original matrix of a brownish rhyolite type of rock encased in cavities in the agate nodules. This would indicate that these agates were brought here from

another location for the area where these agates are found is in the Fox Hills Formation of the Tertiary period, and there has been little, if any, volcanic activity in this area.

A theory that some hold is that the agate bearing gravels were brought here by glacial action. Many agates have been studied for signs of glacial markings. The agates as well as the gravels show percussion marks as you would expect to see in stream transportation. There was no striation in the rocks, erratic, or other evidence of glacial action observed. This, with other observations would lead to the believe the material was brought here by water action.

While there were local glaciers, these comparatively small glaciers should not be confused with the huge continental glacial ice drift that extended as far south as the central part of Montana.

These huge glaciers did not extend as far south as Miles City, neither did they cover much, if any, of the northern agate bearing area.

There apparently were two or more geological periods that brought these agates here as the agates found from Terry westward to Custer are generally of a different color pattern than the agates from Terry northward to Sidney. The stones to the westward are ribbon and colored patterns of browns, reds, dendritic and sometimes a mixture of all the colors while the stones further east and north are more predominantly reds with some dendritic. The reds are not a bright red as a piece of cloth would be, but a brownish red. However, for all practical purposes they are called red.

Also, the "skins" or outside of the stones have a different look to experienced cutters; the ones to the north and east being slightly darker, generally, than the ones to the westward.

Most of the largest agates found on the Yellowstone were in the area between Terry
and Forsyth. The stones in this up-river part of the area, that is, to the westward, average larger in size than the stones to the northward. This does not necessarily mean the agates from one area are of better quality than agates from another area.

To the west of Custer between Custer and Billings, the agate bearing strata disappears under layers of sandstone and shale; therefore, it is useless to look for this type of agate west of Custer, although occasionally some agates are found near Billings. But generally speaking, the gravels west of Custer are almost barren of agates.

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Cuyuna Rock, Gem & Mineral Society

General Meeting Minutes April 13, 2013

Meeting was called to order by president Harry Wagoner

Treasurers report given by treasurer Kevin Martini

Minutes of March general meeting were approved by members.

Club picnic is scheduled for July 13. Location to be announced.
(We've since discovered this is the weekend of Moose Lake Agate Days - there may be a change coming on this date…)

Members voted to be in favor of having field trips in place of meetings this summer. Someone is needed to plan and organize field trips.

Sharon spoke about the show progress and needs.

The club needs to have donations of rough rock for tumbling in the club tumblers. Any size welcome as it can be broken up.

The club will have two tumblers going all year and the rocks will be used at the show.

Next board meeting to be May 11, 2013
Next general meeting to be May 11, 2013
Meeting adjourned.
Program : Collecting safety by Joe Casey.

Minutes submitted by Harry Wagoner

ANOKA COUNTY GEM & MINERAL CLUB
SPONSORED SHOWS 2013

HAR MAR MALL
JUNE 29 - 30 10:00 - 6:00; 12:00 - 5:00

ROCK SWAP / SALE
JUNE 15 10:00 - 2:00
OSSEO UNITED METH. CHURCH,
2ND AVE SE & 2ND STREET SE, OSSEO, MN

HAR MAR MALL
OCTOBER 12 - 13 10:00 - 6:00; 12:00 - 5:00

(For information call 763-421-8521)

This is one of the eye-catching banners that Ann Lembcke has been working on for several months. This one is posted on the fence right outside our venue at the fair grounds. Excellent work Ann!

With one week to go before the show, everything is coming together. I predict a very successful show for 2013! It's all about the volunteers who have done a tremendous amount of prep work. Without our dedicated members, there would be no show!

Many will join us in staffing the show next weekend - I hope you'll be one of them! Please participate! We need you, it's fun and you'll get to know your fellow members!

Happy Birthday!

Duane Lembcke~~~~~~5/5
Jackie Lorensen~~~~~5/6
Veda Kropp~~~~~~~~~5/12
Ron Dick~~~~~~~~~~~5/29
Norman Ellig~~~~~~~~5/30

HAPPY ANNIVERSARY!

Mark & Karri Erikstrup~~~~5/9

Please submit birthdays, anniversaries, requests for notes of cheer or other information to our Sunshine Lady Phyllis Wagoner at hpwagy@centurylink.net or mail to: 36776 304th Lane, Aitkin, Mn 56431

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Rockhounds

There are hounds, you know, that hunt the fox.
Now, we are the hounds that hunt the rock.
We have rocks in the car; rocks in the shed;
Some even say we have rocks in the head! But we love to hunt them on river and hill
And to cut one in two is always a thrill.
Although you may travel far from your home
You'll find nothing as grand as a good agate stone.
God hid them in his mysterious way
That they may be found in our time and day
So we might dig and hunt and hike.
Each one is different, no two are alike.
To be out there in your walking shoes
Is always the cure for the worst of the blues
So come with us, have a good look around.
And you may become an avid rock hound.

Paul Graupner

(Thanks to Harry Wagoner for sending this in!)

Sharon Smith-Editor
Cuyuna, Rock, Gem & Mineral Club
P.O. Box 151
Crosby, MN 56441

FIRST CLASS MAIL

The Agate Explorer

May 2013

Official Publication of the

CUYUNA, ROCK, GEM & MINERAL SOCIETY

Members of AFMS & MWFS

Brainerd, MN
2000 SE 13th Street
Crow Wing County Fairgrounds

10:00 - 4:00
Sunday - May 5

9:00 - 5:00
Saturday - May 4

(Don't forget to buy something
pretty for Mom at the
SHOW!)

Happy Mother's Day!