Voice of the Dinosaur

Newsletter of the Kawartha Rock and Fossil Club

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LAST MEETING
April 10, 2012

The meeting was chaired by the President, Mark Stanley and began with the regular business meeting. Minutes of the March minutes had been distributed to members earlier so were accepted without being read at the meeting.

Committee reports were given as applicable and approved.

Feature Presentation - Making use of many older documents and visual aids, Steve Wesley gave an interesting presentation on the history of the Fission Mine near Wilberforce, ON and touched on some general mining history in Canada.

Tom Jenkins held one of his popular silent auctions.

NEXT MEETING
May 8, 2012

Place - Orientation Centre, Peterborough Zoo
Time - 7:00 pm.
Agenda - Regular May Meeting

Feature Presentation: To be announced.

We will have another of Tom's popular silent auctions.

For Fossil and Mineral of the evening - Bring in samples of fluorite, something that you would like identified, or that you have already collected this year.

NOTE: Just a reminder, Tom Jenkins would very much appreciate it if the members would save the clear milk bags, cut them open at the top, clean them, and give them to Tom. They are much tougher than regular sandwich bags and are great for wrapping samples for the Kids Auctions, etc.

THE FOSSIL CORNER
2012 Fossil Collecting - Trip 2
By Kevin Kidd

The next few months will detail my fossil collecting exploits for the 2012 season.

<u>Friday, March 23, 2012</u>

I met with fellow KRFC member David D'Andrea at the quarry for a few hours of collecting after work. With limited time before dark, we decided the most likely spot to find a trilobite was the crush pile. Along the way, David found and gave me a large *Fusispira nobilis* gastropod (Figure 1). It is somewhat crushed, but larger than any I had in my collection. It turns out this was to be the highlight of the trip. The pile was much easier to walk on than on the previous trip, but it still wasn't giving up any goodies. I picked up a few brachiopods and horn corals (uncommon for this site), but no trilobites. We made our way to the cars about 7:45 pm, amazed by how poor the collecting here has been so far this season.

Figure 1.
Gastropod - *Fusispira nobilis*

<u>Saturday, March 31, 2012</u>

After getting the necessary "hermission" to go collecting, I had to decide where to go – either back to the quarry for so-so hunting, to western New York or to Arkona/Hungry Hollow. Since one spot in New York doesn't open until May, and the others being creeks with potential high water covering the best spots, I decided on Arkona. On the positive side, this early in the season, it shouldn't be too picked over; on the negative, it will likely be muddy. I arrived about 9:15 am and finally remembered to get a pic of the plaque at the site (Figure 2). The first two paragraphs are about the history of the settlement, while the last one reads as follows:

Figure 2.

> **"The Ausable River is rich in middle Devonian fossils. The lowest formation exposed is the Arkona Shale at a depth of about 30 feet. Above that is the Hungry Hollow formation, about 5 feet thick. The area around the old Hungry Hollow bridge shows the best exposure of both formations. This area has been visited for many years by paleontologists who have collected and named the unknown specimens. Some of the types found in this area are crinoids; Dolatocrinus, Megistocrinus and Gilbertsocrinus (named for Kenneth Gilbert). Brachiopods and *Mucrospirifer arkonensis*, locally called "butterfly stones", are also found in the area along with many other types."**

To begin, I focused on the south pit. I was finding plenty of the usual pieces in the Arkona Formation, as I made my way to the far corner to the Hungry Hollow unit. I wound up getting several brachs and bivalves, some button corals, a few gastropods

including one that looks like a new species for my collection and at least 15 small *Tornoceras goniatites* (Figure 3).

Figure 3.
Common fossils of the Arkona Formation. The bivalves and goniatites are pyritized and will be a shiny, deep red/brown color after a quick rinse.

Figure 4.
Typical view of Hungry Hollow material. I don't know if you can see it clearly in the photo, but there are plenty of horn corals everywhere.

Climbing up to the Hungry Hollow material, my goal was to find a blastoid. For those who aren't familiar with blastoids, I'll be writing about them later in the year when we go back to fossil of the month format. The Hungry Hollow is packed with fossils, mostly several species of horn coral, but also trilobites, brachiopods, gastropods, blastoids, crinoid debris, bryozoans etc. (Figure 4). It is at ground level here and new material erodes out every year.

It wasn't long before my goal was met. Sitting there, plain as day, was a *Nucleocrinus* (Figure 5). That's four of that species now, and still none of the common *Heteroschisma* that I really want. The Heteroschismas look like small cones and don't get much longer than 1 cm. With small horn coral looking similar, and the amount of it lying around, the blastoids are tough to spot without really focussing on a specific area.

Figure 5.
Blastoid - *Nucleocrinus sp.*

After finding a piece of fish bone in a limestone block (still there), (Figure 6, page 4), things slowed down for a bit. I found a heartbreaker of a *Phacops* trilobite, split in half lengthways. Not worth picking up, but enough to get the adrenaline going again. Not three feet from the split one, lying face up, was one that was worth picking up (Figure 7, page 4.). Not 100% sure, but it looks like the pygidium (tail) may be tucked under. Even if not, still a decent piece. I haven't found a prone *Phacops* yet, from Ontario, New York or Ohio. Not much else out of the ordinary up here (Figure 8, page 4) so I made the treacherous trek along the river edge to the west high banks.

Figure 6.
Fish bone - Not the greatest pic, but the bone is porous and a dark bluish gray colour when clean.

Figure 7.
Trilobite - Phacops sp.

Figure 8.
Common fossils from the Hungry Hollow Formation/Member (a debate I won't get into) brachiopods and gastropods. I don't bother with horn coral unless it is complete, a species I need for my collection or encrusted with something.

Figure 9.
The Hungry Hollow material in situ. You may be able to see several horn corals poking out. Due to being sandwiched between limestone slabs, this material erodes out much slower than the same layers in the south pit. Here, the Widder formation above is eroding.

Another of my goals this year, besides the *Heteroschisma*, was a *Greenops* trilobite, either from New York or Ontario, but preferably the latter. If one was to be found, this would be the best spot to do it, as evidenced by a friend who found a beauty in this same spot a few years ago. At this spot, the banks, you have the Arkona formation at the bottom, the Hungry Hollow is in situ (Figure 9) between thick limestone slabs, and the Widder Formation is above that. I noticed that there were more decent sized blocks of fallen Widder Formation than I had seen on previous trips, possibly meaning I was the first over there this season. I started splitting the soft rock and as expected, was finding just the usual heads and tails until....I split a piece and looked down to see a

really nice negative. I quickly located the positive, and it looks to be complete, although the right eye came off with the negative (Figure 10). I did a little happy dance, looked around for a few more minutes and called it a day. The piece survived the slippery walk back to the car and now I'm looking forward to seeing it cleaned up.

Until next month – Happy Hunting!

Figure 10.

THE MINERAL CORNER
FLUORITE
Compiled by Sue Kehoe

Nomenclature:

Called Myrrhine or murrhine by the Romans, referring to myrrh resin used to impregnate the fragile ware (cups and jugs) likely carved from fluorite. In the Middle ages it was known as ore flower or lode flower by British miners and spath by the Germans – all related to the Latin fluere meaning to flow. Fluorite was used as a flux in the smelting process allowing slag to move more easily .

Fluorite was mentioned in *Bermannus, sive de re metallica dialogus* in 1530 and *De Natura Fossilium* in 1546 by Georgius Agricola as "fluores" as a "fluxing stone." The term "fluorite" was coined in 1797 by Carlo Antonio Galeami Napione , and by Jean-Baptiste-Julien d'Omalius Halloy's 1833 *Introduction a la Geologie*.

Chemical Composition:

Calcium Fluoride - CaF_2

Each calcium ion (Figure 1) is surrounded by 8 fluorine ions and each fluorine ion is surrounded by four calcium ions in a cubic structure. The calcium ions occupy sites at the centres of each face, and the fluorine ions are situated at the centres of smaller cubes obtained by dividing each unit cell by eight.

Up to 20% of the calcium ions may be replaced by yttrium or cerium.

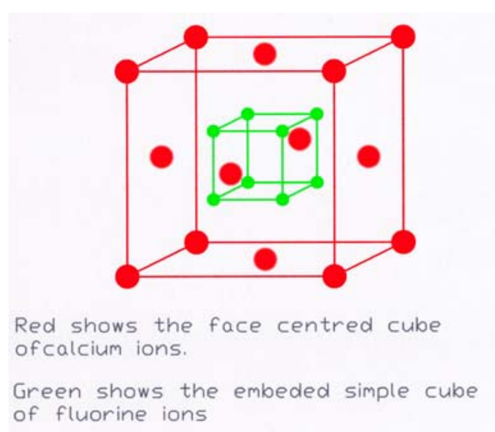

Figure 1.

Class: **Halides**

Crystal Structure, Form and Habit:

		Miller Index	Number of Faces
Fluorite is isometric, most commonly cubic		{100}	6
but can also be:	dodecahedron	{110}	12
	octahedron	{111}	8
	tetrahexahedron	{hkk0}	24
	trapezohedron	{hkk}h>k	24
	trisoctahedron	{hhk}h>k	24
	hexoctahedron	{hkl}	48

Fluorite crystals are frequently twinned, commonly known as "spinel-law twins" or reflection images of one another across a mirror plane parallel to one of the octahedron faces {111}, (equivalent of rotating one crystal 180 degrees on an axis perpendicular to one of the octahedron faces). These often occur as penetration twins (Figures 2 and 3). Contact twins can also form but are much rarer. They have a flattened, hexagonal appearance.

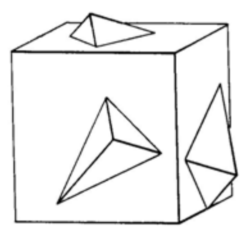

Figure 2.

Figure 3.
Interpenetration twins

Fluorite crystals can have a change in habit as they grow as there is a discrepancy in growth rates along different faces. The corners tend to grow faster than the cube sides resulting over time in the crystal changing from an octahedron to a cube and this shows in the presence of interior phantoms evident as earlier growth areas (Figure 4).

Figure 4.
Interior phantoms

Computer modelling of botryoidal (grape cluster shape) fluorite balls (Figure 5) shows amazing complexity. Some of the balls, found in European specimens are single crystals with multiple facets of 200-300 faces. Quite different structures are found in fluorite balls found in the Deccan plateau area of India, where there is a central core or growth centre with multiple crystals radiating outward as an aggregate.

Figure 5.
Botryoidal fluorite

Physical Characteristics:

Hardness:	**Mohs scale 4.0. Relatively easily scratched with a knife, Absolute hardness of 5.0. Brittle.**
Cleavage:	**Perfect along {111}.**
Density:	**Pure CaF_2 = 3.28 g/cm^3 Ce-bearing = 3.3-3.6 g/cm^3**
Specific Gravity:	**3.0 – 3.3**
Luster:	**Vitreous to glassy**
Fracture:	**Conchoidal to uneven**
Melting Point:	**1360 degrees C., 2480 degrees F.**
Colour:	**Colour in fluorite can be due to several causes and can be quite complex and variable. It can occur as purple, violet, blue, green, yellow, orange, brown, pink and, rarely, red. Specimens can be zoned in several colours running parallel to the cube or octahedron faces. Pure calcium fluorite made of calcium and fluorine is transparent and colourless. Trace elements can substitute for a fluorine if a fluorine atom gets bumped out of it's position creating a fluorine vacancy. Depending upon the element that substitutes, 2 electrons are trapped and undergo transitions that lead to colour change. There is the "Blue John" variety of blue and yellow, specific to several mines in England.**

The very deep violets and purples often occur in association with uranium deposits where radiation reduces Ca^{2+} ions to calcium colloids. These scatter light in a Tyndall effect

resulting in the depth of colour. Calcium colloids may be responsible for producing intense blue fluorite.

Lighter blues are thought to be associated with nearby yttrium (Y^{2+}) that is substituting for Calcium. O^{2-} and OH^{-} can release electrons to create light blue Frenkel defects. The light blue fluorite often lightens further with exposure to sunlight.

Green fluorite can be caused by Samarium (Sm^{3+}) substituting for Ca^{2+}. This in itself does not impart colour but radiation reduces Sm^{3+} to Sm^{2+} which does impart green colour. An F center associated with ferric iron (Fe^{3+}) is another source of green that is heat stable.

The pinks of Alpine Mont Blanc specimens are due to a complex colour center (YO_2) ytterium oxide with a Y^{3+} and O $_{23-}$ ion. Yellow – the O^{2-} ion replaces two F^{-} ions in fluorine.

Colour zones are from differences in trace element chemistry due to the environment and mineralizing fluids over different phases of the crystal's development as it grows.

Streak: White

Transparency: Transparent to translucent

Refractive Index: 1.433-1.435

Dispersion: 0.007

Fluorescence: Fluorite will fluoresce under either long or short wave ultraviolet light showing a wide range of colours such as violet, blue, green, yellow, orange, red, yellow-white to white, blue-white, brown, tan, pink and purple. This is due to the large number of cations that can substitute for calcium in the fluorite structure, that can serve as activators of fluorescence, e.g. divalent manganese or hexavalent uranium and also include crystal defects, and organic inclusions such as oil and water.

Uses: “Fluorspar” with lime and oxygen has been used for hundreds if not thousands of years to speed up smelting procedures and is still used in the manufacture of steel. It is used as the main source for the production of hydrofluoric acid. It is used as a catalyst in the production of high octane fuels. It has been used in the manufacture of artificial cryolite in the refining process for aluminum, lead and antimony. Fluorite has been used in the manufacturing of opalescent glass, and in iron and steel enamelware. Gem quality fluorite

has been used for the manufacturing of microscope and other optical lenses and to eliminate the distortion of colour. Fluorite is the source of fluorine for the fluoridation of water and toothpaste. It is also part of the non-stick part of Teflon. It has been used in part of the process for making weapons-grade uranium, and occurs in a wide range of commercial products such as herbicides and Freon. Although a rather soft stone, it can be used faceted for jewellery but does not wear well.

Occurrence: **Fluorite is a very common mineral and is found world-wide in a large number of different environments and localities. It is found in regional and contact metamorphosed rocks, in hydrothermal veins traversing many rock types, sedimentary rocks, igneous rocks, pegmatite cavities, and hot spring areas. It is stable over a wide range of temperatures and pressures.**

It can be found in Alpine fissures – cracks in the rock walls forming during Alpine orogenesis that filled with hydrothermal solutions from regional metamorphism forming deep in the earth at around 400 degree C, leaching quartz, biotite, etc from the walls affecting the chemical composition and subsequent mineralization. Found in Spain, Switzerland, France, Germany, Britain, China, South Africa, Namibia, Russia, Mexico, North America (Canada and U.S.A.) just to name a few.

Associated minerals: **Galena, quartz, calcite, sphalerite, barite, pyrite, chalcopyrite, marcasite, siderite. Often found in association with old silver and lead mines.**

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Figure 1 adapted from Holden and Singer by Ken Fox
Figure 2 adapted from Sinkankas by Ken Fox
Figures 3 and 5 photos by Sue Kehoe from her collection
Figure 4 from: http://stores.ebay.com/Globe-Minerals-and-Crystals/Phantom-crystals-/_i.html?_fsub=17465214

EDITOR'S CORNER

Thanks are due to Ken Fox, Sue Kehoe and Kevin Kidd for making this issue possible. Kevin's articles are always interesting and Sue has taken on the responsibility of writing articles on minerals. For someone who has had limited experience in this area,

I'm sure you all will agree that she has produced an excellent article. We look forward to her future articles. As always, if you would like to read an article on a particular geology or rockhound related subject, let me know.

You will notice that I have used a larger type for most of this month's newsletter as some members did not find the smaller type "reader friendly." I always appreciate all comments from the readers.

COMING EVENTS

For a year's list of events, visit the CCFMS Website: www.ccfms.ca

May 4-6 — **Canadian Micro Mineral Association 49th Annual Symposium**
Brock University, St. Catharines, Ontario.
Speakers: Dr. Julian Gran and Andre Lalonde
Contact: Bill Lechner at 416-438-8908 or bill.lechner@rogers.com
*** Registration form available by request to the above. ***
Website: http://www.canadianmicrominerals.ca

May 4-6 — **Robert Hall Originals – Annual Spring Open House & Demonstration**
Weekend 10:00 am to 5 pm each day
Rocks, minerals, gems, beads, lapidary demonstrations & more!
Demo Pewter Tour 1:00 each day - Free, Wire Art - Free Demo
Explore Outdoor Rock Piles
Free Coffee & Treats!
138 Sugar Maple Road, St. George, Ontario N0E 1N0
Phone: 519-488-1236, 1-8000-360-2813
Website: http://www.roberthalloriginals.com
Email: robert@roberthalloriginals.com

May 5 — **The Kitchener-Waterloo Gem and Mineral Show**
Location: Waterloo Community Arts Centre (aka the "button factory")
25 Regina St. S., Waterloo, 10 AM - 4 PM.
Rocks, minerals, gemstones, jewelry, fossils, meteorites.
Free admission. Free rocks for kids.
Contact: kwgemandmineralclub@hotmail.com
Website: www.calaverite.com/kwgmc

May 8 — **Regular KRFC May Meeting**
7:00 pm at the Orientation Centre, Peterborough Zoo
Feature Presentation: To be announced.

May 12 — **CCFMS Field trip - Beamsville, ON - Nelson Aggregate Quarry**
Contact: Jim Glen jrglen@sympatico.ca
See CCFMS Website for more info: www.ccfms.ca
An up-to-date- Club membership card and full safety gear are required.

May 16 — **Mineral Identification Night at the ROM**
4:00 pm to 5:30 pm.
President's Choice Entrance on Queen's Park, doors nearest Museum subway stop.
Website: www.rom.on.ca/programs/id_clinics.php