Voice of the Dinosaur

Newsletter of the Kawartha Rock and Fossil Club

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LAST MEETING
Feb. 14, 2012

The meeting was chaired by the President, Mark Stanley and began with the regular business meeting and committee reports given as applicable. Minutes had been distributed to members earlier via email and snail mail so were accepted without being read at the meeting.

1. Treasurer's Report - Report accepted as given.
2. Show Committee Report:
   a. Bob Beckett circulated a Club table list for members to sign for time at the Club table. Anyone not at the meeting, who is interested, can contact Bob.
   b. Members collected advertising signs to post before the Show.

Feature Presentation: Pete Midgley gave an interesting, informative and, many times, amusing talk on how he got into wire wrapping, the tools and equipment he finds useful and the procedure. He illustrated his talk with many examples of his beautiful work.

After the presentation, members tried their identification skills with the mineral samples Mark had laid out. A silent auction was also held.

NEXT MEETING - Mar. 13, 2012

Place - Orientation Centre, Peterborough Zoo
Time - 7:00 pm.
Agenda - Regular business meeting.
Presentation: George Thompson will speak on the Beekmantown Formation

Fossil of the evening - cystoids
Mineral of the evening - Skarn minerals (see article)

REMEMBER FOLKS, BRING YOUR 2012 SINGLE OR FAMILY MEMBERSHIP CARDS WITH YOU TO THE SHOW. AS MEMBERS, YOU HAVE FREE ENTRY!!

THE FOSSIL CORNER

Cystoids

By Kevin Kidd

Cystoids are animals that make up the class Cystoidea within the phylum Echinodermata, and as such, are related to starfish, sea urchins and crinoids. *Cystoid* comes from the Greek and means sack-like or bladder-like and refers to the shape of the animal. The entire class is extinct, having been restricted to the Paleozoic only; late Cambrian to late Devonian. There are several species to be found in the Ordovician and Silurian rocks of Ontario, but no Devonian forms that I'm aware of.

Cystoids were quite varied in form, so generalizations are limited. They are characterized by a mouth on the top surface, often surrounded by feeding arms with some looking quite like a crinoid (fig.1).

They were filter feeders who used their arms to draw plankton and other microscopic organisms toward the mouth.

Most cystoids had a stalk or stem which in some species served to anchor the animal to a hard surface permanently, or acted more like a tail in other species where it was believed to be used either for motion or wrapped around something to use as a temporary anchor.

NOTE: Figure 1- *Caryocrinites ornatus* from the Silurian Rochester Shale, Middleport, NY. This stunning example is complete, from the holdfast to the arms, 20 cm total length.

Figure 1.

The basic Echinoderm pattern of 5-fold symmetry is imperfectly developed, to say the least. The shape of the *theca* (body) varies between a sphere, egg shape, barrel shape and a flat spade-like shape, depending on species. The number of plates on the theca within a species can vary, as can plate ornamentation and overall shape. What the cystoids do all share in common is having pores in the plates of the theca that are believed to have lead to respiratory structures called *hydrospires*. There are two orders within the class Cystoidea - Rhombifera and Diploporida, and they are distinguished based on the shape of these pores.

The Rhombifera are characterized by rhombus shaped pores, called *rhombs* that circulated seawater through the body. All of the Ordovician cystoids (found) in Ontario are Rhombiferans, as are most of our Silurian species. This order is divided into three superfamilies: Glyptocystida, Hemicosmitida and Caryocystitida.

The Glyptocystitids comprise the bulk of the Rhombiferans, and are characterized by a large theca made up of 25-27 skeletal elements. Some plates had appendages called *brachioles* (fig 2).

They all had a short, flexible stem.

NOTE: Figure 2- *Glyptocystites multiporus* from the Ordovician Period, Bobcaygeon Formation, Brechin, Ontario. 2 cm tall theca

Figure 2.

The rhombs had elongate slits with little differentiation between incurrent and excurrent sides (Figure 3). There were both sessile and mobile species within this family.

Figure 3.

All of the local Ordovician cystoids are Glyptocystitids, and the type a collector would be most likely to find is *Pleurocystites squamosus* (Figures 4 and 5).

Figure 4.
Several *Pleurocystites squamosus* (cystoids) + *Isotomtcrinus tenuis* (crinoid) Ordovician Period, Bobcageon Formation, Brechin, ON.

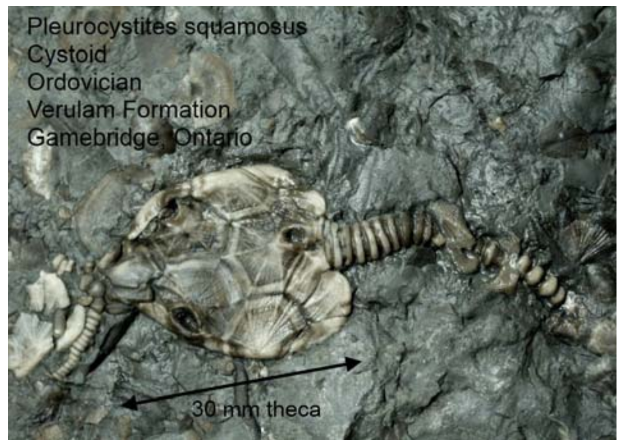

Figure 5.
***Pleurocystites squamosus*, Ordovician Period, Verulam Formation, Gamebridge, ON.**

NOTE: Figure 4- Probably my best find to date. It sat in my garage for a couple of years, as I believed the three or four cystoids showing were incomplete. Was I ever wrong! After prepping, there were seven more or less complete examples including one ventral positioned, one almost complete and one partial as well as a small crinoid that I had no idea was there.

A complete example of this flat cystoid will have three rhombs that are each divided between two adjoining plates. There are two brachioles that are at least as long as the theca. The stem tapers to a rounded end. Often, this genus is found with dark staining on the theca and this is believed to be the gut contents. There are a few species of *Pleurocystites* in the area, and they can be tough to tell apart. Most are found preserved in the dorsal position, with the rhombs up. The ventral side helps to ID the species when it is seen.

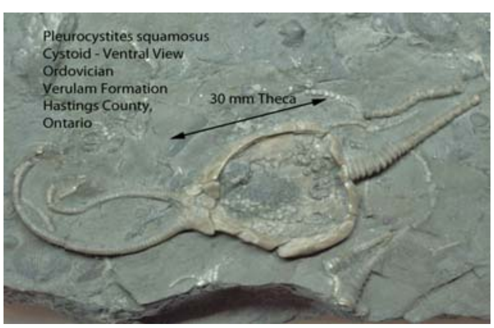

Figure 6.
***P. squamosus*, ventral view, Ordovician Period, Verulam Formation, Hastings Co., ON.**

P. squamosus examples have hundreds of small hexagonal plates on the ventral side (Figure 6.) while *P. filitextus* has between 40-70 larger plates (not shown).

The anal pyramid, consisting of several triangular plates, is also on the ventral side and always in the lower right.

Another genus, ***Amecystis***, **looks very similar to** ***Pleurocystites*** **except that it lacks the rhombs (fig 7).**

Figure 7- ***Amecystis laevis*** **from the Bobcaygeon Formation, Brechin, Ontario. Left example has 3 cm tall theca.**

Figure 7.
Amecystis

Hemicosmitids also had a large theca made up of about 36 skeletal elements and had stout arms covered in brachioles. They had a long, stout stem which lacked an enlarged upper end as in the Glyptocystitids. The rhombs had small clusters of incurrent pores and larger, spout-like excurrent pores.

Caryocystitids had an irregularly elongate to globular theca formed from numerous skeletal elements, with a few stout feeding brachioles. The rhombs of Caryocystitids were fully internal and were used to circulate body fluids instead of seawater.

The second order, Diploporida, is characterized by having pores that are arranged in pairs. There is a single species of Diploporid that occurs in Ontario: Gomphocystites from the Silurian Anabel formation. Figure 8, while not from Ontario, is the only Diploporid in my collection. The pores are too tiny to photograph.

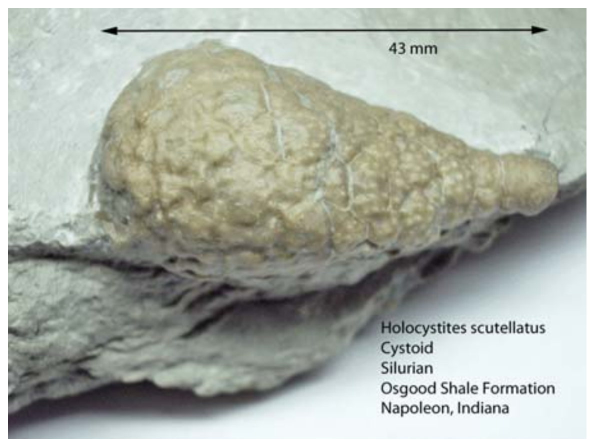

Figure 8.
Holocystites scutellatus**, Silurian Period, Osgood Shale Formation, Napoleon, IN.**

Cystoids are never a common find, but are quite attractive when they are found complete. With that being said, as I brought up at the December meeting, this will be the last fossil of the month article for a while. This mild winter is leading to an early start on fossil hunting season, so for the next several months, I will write about the trips I make and the goodies I find. If anyone has any ideas for future Fossil of the Month articles, please let either me or Bev know. I have a few in mind, but not many.

Happy collecting everyone!

Photo credits- Figures 1, 2, and 7 - friend's collection at crinus.info
All others - personal collection

FROM THE NEWS

Regeneration of 30,000 Year Old Plant
by Bev Fox

Russians scientists at the Institute of Cell Biophysics and Physicochemical and Biological Problems, Russian Academy of Sciences, Pushchino, Russia, have successfully raised several *Silene stenophylla* Ledeb plants, from 30,000 year old plant material excavated from fossil squirrel burrows buried at a depth of 38 m. in "undisturbed and never thawed Late Pleistocene permafrost sediments with a temperature of -7°C."[1] Using accelerator mass spectrometry (AMS) radiocarbon dating, the tissue was dated to 31,800 ± 300 yrs old.

Excavated mature seeds were no longer viable, but the scientists used tissue taken from plant placenta (the region where seeds attach to the inner fruit wall), grew the tissue in lab dishes to produce plants which were then grown in regular plant pots. These plants grew to maturity, flowered and produced seeds which were planted and produced first generation plants. These plants developed normally and had the same form as the parent plants.

Studies comparing the regenerated plants to those grown from seeds of modern plants showed the regenerated plants and their offspring had narrower, more spread out petals than the modern ones.

The scientists attribute the preservation of the plant material to the natural sugars present in the tissues and the condition of the soil, which strongly suggested there had been no thawing of the material since its initial freezing.

The suggestion is made that the "natural cryopreservation of plant tissue over many thousands of years demonstrates a role for permafrost as a depository for an ancient gene pool...)"[1]

There might yet be more interesting plants to be retrieved from the permafrost.

References:
1. http://www.pnas.org/content/early/2012/02/17/1118386109
Photo: http://www.bbc.co.uk/news/science-environment-17100574

THE MINERAL CORNER

Skarns and Skarn Deposits
by Ken Fox

Some of our better field trips are to the skarn zone in the Bancroft area. The word "skarn" is derived from the Swedish language and refers to "waste" or "trash". One might guess that in medieval mining operations there would be deposits of minerals near or around the ore being mined which had no value but had to be removed to get at the ore, and thus were called waste or "skarn".

Skarn normally refers to the metamorphosed material surrounding an intrusion of granite or related material. The granite can have a variable composition with several types of feldspar, mica and always with quartz. To form a skarn, the background material into which the intrusion penetrates will be limestone or dolomite. Thus there is a wide scope for formation of various minerals incorporating chemical elements from the granite and from the limestone or dolomite. A prerequisite for skarn formation is a mechanism for transporting minerals from the granite into the limestone, or for removing minerals from the limestone. This is usually

water or other fluids which may be intrinsic in the liquid magma intrusion or, in shallow formations may be ground water from the surface. One thing the liquid is not is molten components of the magma. This metamorphosis by water is referred to in the textbooks as "metasomatic" metamorphosis.

One must keep in mind that the water is at high pressure and temperature and so will have much different properties than we are use to. As an example, if the action is 1000 feet down from the surface and the rock is fractured enough that the pressure is set by the hydrostatic head of the water the pressure will be about 433 psi. At this pressure the boiling point temperature of the water will be about 452 degrees fahrenheit so it will exist as a liquid if the magma is relatively cool (as magmas go). At this temperature and pressure the solubility of various minerals will be substantially greater than we know them and when the water migrates a short distance into the limestone away from the magma it will cool and deposit its mineral load thus producing a fairly narrow skarn zone. If the magma temperature is high it will either produce a geyser such as "Old Faithful" in Yellowstone park or if the water is sealed in its pressure will rise and conditions will be as described in the next paragraph.

If, however the pressure is substantially higher, say 3500 psi corresponding to about 8000 ft depth the water will not boil no matter what the temperature so the temperature will be completely dictated by the magma and could be very high. The "water" at this temperature and pressure will be a different material than we know and will probably dissolve many minerals which we consider insoluble (such as quartz). This water can migrate some distance from the magma into the cooler host rock dissolving limestone or dolomite as it goes. As it cools it will deposit its load of dissolved minerals (hopefully, from the mineral collector's point of view) as crystals. These conditions will give a wide skarn zone, possibly many tens of metres wide. A somewhat similar process is happening at the mid oceanic ridges in which deep sea vents are releasing water at high temperature and pressure which immediately cools and deposits minerals, chalcopyrite in the one example I read about in which a sample was recovered. This should be enough musings on the process of skarn production so we can look at a few examples.

Much of the following information has been taken from the informative book "Minerals" by George W. Robinson and Jeffrey A. Scovil.

At high temperatures near the intruding magma the limestone typically recrystallizes into coarse grained marble, while iron, aluminum, silicon, sodium, potassium and water supplied by the magma react with the limestone to make silicate minerals containing those elements. The resulting skarn may host a wide variety of mineral species. Some skarns contain economically recoverable ore minerals such as magnetite, cassiterite, scheelite, sphalerite or chalcopyrite. Other skarns are not economically significant but may contain crystals such as the ilmenite from Arendal Norway or Bancroft Ontario which are large and well formed and are of value to scientists and collectors.

The minerals that form in a skarn depend on the temperature and pressure, as well as on the compositions of both the magmatic fluid and the original limestone with which it reacts. The heat transferred to the limestone from the magma may increase the temperature in the contact zone to nearly that of the magmas itself. Therefore it is not unusual to find feldspars, garnets, pyroxenes, or olivines in a contact aureole, since these minerals are also stable in high temperature magmatic environments. The concentrations of water, carbon dioxide, fluorine, and other volatile compounds have a great influence on the total pressure and regulation of possible reactions between the various minerals present. The fewer the chemical constituents available the fewer and simpler the minerals that can form. The simplest of these are anhydrous minerals, such as magnetite or wollastonite, that contain only one or two metal cations. Vesuvianite and uvite tourmaline are examples of chemically more complex species found in skarns.

Garnets form at relatively high temperatures and include species rich in calcium, aluminum and iron, all elements common in skarns; thus one would expect to find garnets in skarns. Indeed, the calcium rich garnets grossular, andradite and uvarovite all occur in skarns. Like garnets, the pyroxenes, amphiboles and micas most often encountered in skarns are rich in calcium, iron and magnesium. Examples include the pyroxenes hedenbergite and diopside, the amphiboles tremolite, actinolite and edenite, the micas biotite and phlogopite. The minerals epidote and vesuvianite also are common in some skarns.

Potassium and plagioclase feldspars and

scapolite, all occur in skarns because the combination of an impure limestone and a magmatic fluid rich in silica provide all the ingredients necessary to make these minerals. Large, well formed crystals of scapolite have been found in hundreds of localities.

Because they result from recrystallization, chemical alteration and replacement occurring simultaneously, skarns are among the most complex deposits known.

One other possible occurrence of skarns would be very interesting if it can be shown to have occurred. There is some indication that scapolite is present on Mars because some areas have infrared spectra which closely resemble those of scapolite. Assuming that scapolite is indeed present on Mars, this could imply the presence of skarns which in turn would have major implications in our understanding of the geological history of that planet.

THE EDITOR'S CORNER

Thanks once again to Kevin Kidd for his interesting and well illustrated article on cystoids and to Ken Fox for stepping in and giving us a very interesting article on Skarns and their minerals.

If you have a fossil related topic, or a mineral related topic that you would like to see covered, contact me.

Our Show is coming up on March 3 and 4. If you enjoy belonging to the Club and have an hour to spare, spend the time at the Club table telling others about the Club. Contact Bob Beckett and he will put your name on the schedule.

Volunteers are also needed to assist at the sandbox making sure plenty of items are buried for the youngsters to find. If you have any good samples, fossil or mineral, that you do not want to keep, donate them to the box.

Don't forget the Best collected Mineral and Fossil for 2011 Competitions. These are open to all members.

Our displays of mineral and fossil collections and items related to mining etc., always draw interest at the Show. If you would like to set up a display, or just have an item or two that you believe would be worth displaying, contact Bob Beckett.

Hope you all can make it to the Show. Have fun!
Bev

COMING EVENTS

Mar. 3 & 4

19th Annual Peterborough Gem, Mineral, and Fossil Show.
Sat. 10-5, Sun. 10-5.
The Evinrude Centre, 911 Monaghan Road, Peterborough, Ontario.
Admission: $3.00 for adults, children 12 or under are free & must be accompanied by an adult.
Directions: From Highway 115 at Peterborough, take the Parkway to Lansdowne St., then East 4 blocks to Monaghan Rd., then North 1 block. Or travel West on Highway 7 (Lansdowne St.), into Peterborough, turn right at the 6th traffic light onto Monaghan Rd., then North 1 block.
Contact: Robert Beckett at 705 740 4530 or rbeckett@cogeco.ca
Website: http://www.rockandfossil.com/

Mar. 13

KRFC Regular Meeting
7:00 pm, Orientation Centre, Peterborough Zoo
Presentation: George will speak on the Beekmantown Formation.

Mar. 21 **ROM ID Clinic - Free to the Public**

Wednesday - 4:00 pm to 5:30 pm. Use President's Choice Entrance on Queen's Park, doors nearest Museum subway stop.

Rocks, fossils, minerals, gems, or suspected meteorites can be identified by ROM experts. CANNOT ID STONE ARTIFACTS, NO APPRAISALS.

For more info: call 416-586-5549 or
website: http://www.rom.on.ca/programs/id_clinics.php

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Mar 31 & Apr 1 **40th Annual Brantford Lapidary & Mineral Society Show**

Sat. 10-5, Sun. 10-5.; Paris Fairgrounds, 139 Silver Street, Paris, ON.

Features: One of Canada's Largest Gem & Mineral Shows! Gem, Mineral, Fossil & Stone Dealers Lapidary Equipment, Supplies
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