Voice of the Dinosaur

Newsletter of the Kawartha Rock and Fossil Club Inc.

Member of the Central Canadian Federation of Mineralogical Societies (CCFMS)

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Next Meeting: Tuesday April 10th at the **Orientation Centre, Peterborough Zoo, 7:00 PM**

April 10 2007 Meeting Program

As you know Brad Wilson the owner/operator of Alpine Gems in Kinston, Ontario was unable to join us for our February meeting due to the poor weather conditions. Brad has been able to reschedule is coming to the April meeting to speak to us about Canadian Gemstones. For over 2 decades Brad has been exploring for coloured gemstones across Canada. As well as working for a variety of companies as a consultant on numerous gemstone exploration projects Brad has also given many presentations on Canadian gemstones and gemstone exploration and has written several articles on the subject. Brad is the sole Canadian member of "Coast to Coast Rare Stones International", a coloured gemstone dealership that specializes in rare, soft and collector gemstones.

There will also be a silent auction during the meeting so come early and check out the auction table.

MEETING SCHEDULE FOR 2007

Revision 1 – APRIL 2007

ng Date	Special Activity
Jan 9th 2007	Mark Stanley will be giving a presentation on Celestite Bring along any specimens of Celestite you may have to show us. 30th Anniversary Show Planning.
Feb 13th 2007	This is our 30th anniversary meeting. Brad Wilson will be at the meeting to talk to us about Canadian Gemstones. Brad is an experienced geologist and gemstone cutter.
Mar 12th 2007	This is "**Apatite Night**". We will be having a show and tell session about Apatite along with a couple of short presentations on Apatite. Bring along your specimens of Apatite from anywhere in the world and join in the show and tell.
April 9th 2007	**Canadian Gemstones.** Brad Wilson was unable to join us in February due to the weather. We are fortunate that Brad has been able to reschedule his plans and he will be at this meeting to talk to us about Canadian Gemstones. Brad is a well-known and experienced geologist and gemstone cutter. This is will be a great presentation.
May 8th 2007	**Crystal Twins & Crystal Scepters**. Come and meet the twins! Join us and explore the fascinating world of crystal twins and crystal scepters. Find out how they twin, why do they twin …….. twin, twin, twin (sixlings). Do you have twins in the family?? Also, bring your scepters and find out why crystals scepter. Join the group as we explore these fascinating aspects of the mineral world. Remember to bring along your crystal twins and scepters to the meeting.
June 12th 2007	**Fossil Night** – Trilobite, Crinoids, Brachiopods, Gastropods, Corals, Ferns, Leaves, Fish, Dinosaur bits and other dead stuff. Bring along your fossils and tell us a little about them – where you found them, when you found them etc. We can all learn a little from each other so come out and help make our night educational and fun.
July & Aug, 2007	Summer Break – Spend some time with Field Tripper Fred and Go Collecting. Bring your finds to the Fall and Winter meetings to show us all. Have a great Summer !!!
Sept 11th 2007	**Garnet Night**. We will be having a show and tell session about the Garnet family. Please bring along your specimens of various Garnet species from anywhere in the world and join in the show and tell. A short Power Point presentation on the Garnet family will be available.
Oct 9th 2007	**Nova Scotia and Newfoundland** - Mineral Collecting along Canada's East Coast.
Nov 13th 2007	TBA
Dec 11th 2007	**Year-end Show & Tell Night**. Bring along your best finds of the year – mineral or fossil. Tell us a little about them.

We need ideas for meeting topics. The more ideas we get the more we have to choose from and the more interesting our meetings will be.

FIELD TRIPPING WITH FRED

(Opening Very Soon !!!!)

What's in a Name?

by Beverly Fox

Ever since Aristotle, attempts had been made to give descriptive names to plants and animals resulting many times in long, unwieldy names that were only useful in a local area. Carl von Linne (**Linnaeus**), a well-known Swedish naturalist who lived from 1707 to 1778 decided to bring some order into a rather chaotic naming system. He reviewed all the pertinent literature dealing with nature up to his time and decided upon a system of classifying or ranking plants and animals. To do this he split plants and animals into smaller and smaller groupings based upon their similarities in structure or **morphology**. This **natural hierarchical system** consisted of Kingdom, Class, Order, Genus and Species. The Phylum and Family were added later. This system is the basis on which things that live or once lived (**organisms**) have been classified for many years.

Von Linne had two large groupings called the **Kingdom Plantae** for those organisms perceived to be plants and the **Kingdom Anamalia** for those organisms perceived to be animals. To simplify matters, we will deal only with the Kingdom of animals, **invertebrates** (animals without backbones) in particular.

The first level of grouping under Kingdom is **Phylum**. In **Phyla** (singular: **Phylum**), creatures are classified according to their common ancestry, exterior characteristics and internal body plans. For fossils it's not always easy to determine what was inside so reference must be made to as many existing fossilized body parts as possible and extrapolations made from similar (if possible) living creatures.

Members in Phyla are grouped into **Classes** (singular: **Class**) according to a significant variation in morphology, usually due to a special way of life.

Classes are further divided into smaller groups called **Orders** (singular: **Order**). Differences are still easily recognized between Orders.

An Order is further divided into **Families** (singular: **Family**). The structures serving as a basis for this division are likely to be ones that enable a member of one Family to live in a place that a member of another Family could not.

A Family is further divided into **Genera** (singular: **Genus**). Anatomical criteria are used to divide a Family into Genera, but differences are usually so small that most people would not notice them and they generally are considered to have less adaptive value for the creatures concerned.

A Genus is divided into a **Species**. "...for the vast majority of animals a species may be defined as a natural population of organisms which has a heredity distinct from that of any other group, and the members of which breed only with one another to produce fertile offspring."1

Von Linne devised his hierarchical system of classification a century before Charles Darwin (1809-1882) and had no concept of evolution. His grouping of organisms according to, primarily, morphological similarities gave results similar to ones that have been derived from **phylogenetic** (evolutionary) relationships. However, this can be attributed to the fact that morphological characters are products of evolution, so can tell us much about evolutionary relationships. The heirarchical system does not work well when dealing with cases of organisms not closely related, but similar in one or more characters because of independent adaptation to similar environmental conditions (**convergence**).

Morphology and **embryology** (early development) are now augmented with studies of DNA and RNA of organisms. This, coupled with the finding of organisms unknown to von Linne, has resulted in some additions and changes to the hierarchical system which I will not discuss at this time.

In von Linne's day, scientific writings were in Latin or Greek, so he chose to Latinize the names of genus and species, and thus established the practice of giving only two (**binomial**) names to a particular organism. The genus name must be capitalized, the species name is not. Both names are customarily written in italics, or underlined if handwritten or typed.

Created in 1895, the International Commission on Zoological Nomenclature (ICZN) has created, published and, periodically revised the International Code of Zoological Nomenclature. The commission also considers and rules on specific case of nomenclatural uncertainty. These rulings are published as 'Opinions' in the *Bulletin of Zoological Nomenclature.* To view the Code, go to: http://www.iczn.org/iczn/index.jsp

Successive articles will continue the discussion on classification and naming using some of our more common invertebrate fossils as examples.

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1. Animals without Backbones, Ralph Buchsbaum, The University of Chicago Press, 1972

2007 Peterborough Gem, Mineral & Fossil Show

CCFMS Awards

Ann Sabina Award, Advanced	**Ken Meikle**
CCFMS Advanced Mineral Case	**Ken Meikle**
CCFMS Advanced Fossil Case	**Fred Hall**
Kawartha Club Educational Case	**George Thompson**
Best Personally Collected Mineral in last 30 Years	**Bob Beckett** **Apatite, Canoe Lake**
Best Personally Collected Fossil in last 30 years	**Fred Hall** **Euryptid**

The Peterborough Gem and Mineral Show was another success. The results are not officially tallied but it seems the show attendance was up yet again this year. Mother Nature cooperated by scheduling that snowstorm a day earlier so it had minimal effect on the show.

As a dealer at the show, I had a great show. It is a time to renew friendships, discuss the coming collecting season; brag about last year's collecting exploits, and make some sales to support that mineral collecting habit.

I think that the display competition remains one of the show highlights. It keeps getting better every year and sets our show apart from most others. It was great to see all of the available cases full of really nice minerals and fossils. Congratulations to all who participated!!

Apatite… A few Facts

By George Thompson

The name apatite does not refer to a specific mineral but rather, a mineral group. The apatite group consists of hexagonal, or monoclinic, or pseudohexagonal arsenates, phosphates, and vanadanates with the general formula $A_5(XO_4)_3(F,CL,CH)$; where A can be Ba, Ca, Ce, K, Na, Pb, Sr; X can be As^{+5}, P^{+3}, Si^{+4}, $V^{+5.}$ (CO_3) may partially replace (PO_4)

Some of the more well known members of the group include fluorapatite, chlorapatite, vanadinite, pyromorphite, mimetite, carbonate-fluorapatite, carbonate-hydroxylapatite, and hydroxylapatite. The most familiar member of this group is fluorapatite which is widespread throughout the Bancroft area.

Here is a brief overview of the properties of Fluorapatite.

Fluorapatite	$Ca_5(PO_4)_3F$ F > Cl or OH
Cleavage	poor on {0001}
Fracture	Conchoidal to uneven
Tenacity	brittle
Hardness	5
Density	3.1 – 3.25
Optical Properties	transparent – translucent
Colour	green, blue, purple, yellow, pink, brown colourless, white
Streak	white
Lustre	Vitreous – subresinous
Association	diopside, calcite, magnetite, amphibole, forsterite, philogopite, and scapolite

The other similar members of this group, hydroxylapatite, chlorapatite, carbonate-fluoraptite are difficult to distinguish by sight because they have very similar physical properties. However, almost all of the apatite we encounter in the Bancroft area is fluorapatite. There is a locality for Chlorapatite near Bobs Lake, north of Kingston.

BEAMSVILLE & DUNDAS TRIPS

The Beamsville (Nelson Aggregates) and Dundas (Lafarge Quarry) field trips have been **confirmed**.

Plan to meet Saturday May 12th, 2007 at the Nelson Aggregate's gate for tag in and safety talk by 8:30 AM and Moxley Road for the Dundas Quarry by 8:30 AM Sunday May 13th, 2007 for sign in and safety talk.

Entry to the Quarries as a group, so **PLEASE NO LATE ARRIVALS** at either quarry.

There is a **tag in and tag out policy at Beamsville Quarry and a sign in sign out policy** at Dundas Quarry (Lafarge).

Orange reflective vest, long pants, safety shoes and hard hats are mandatory at both quarries. Safety glasses should be also be used at all times.

Please note these field trips are open to persons **16 years** and over and **members** of CCFMS Member Clubs. You will need to have your Membership Card with you.

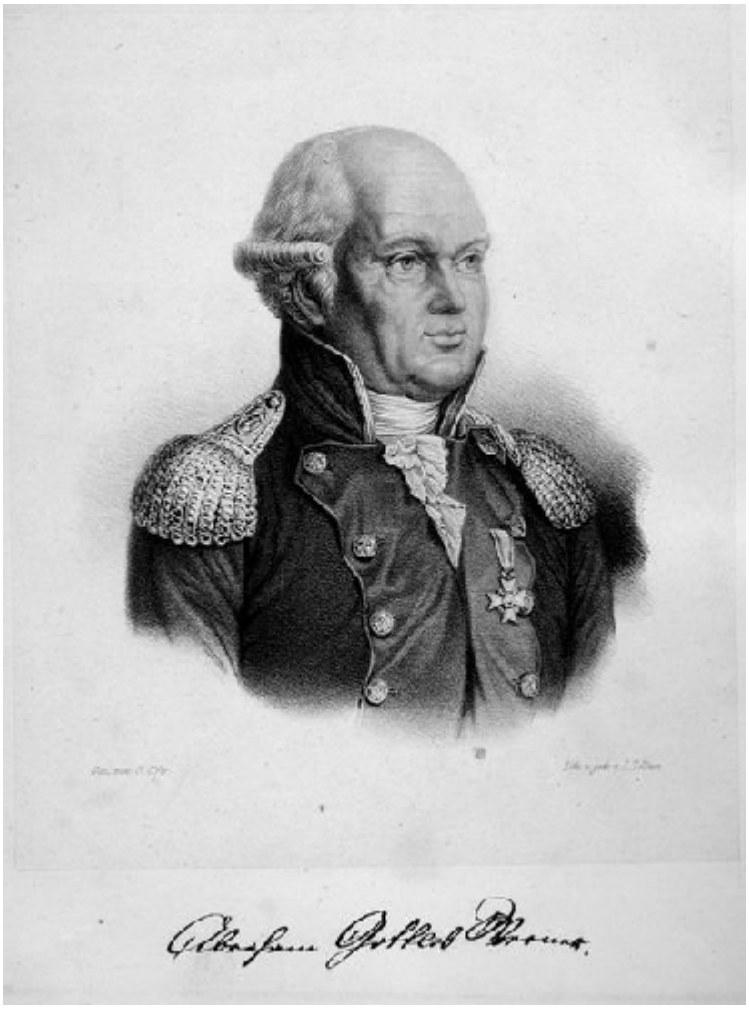
Guests are permitted to come to one **or** the other days. **Membership** to the CCFMS is our insurance for these field trips and strongly advised.

Maps to these quarries can be found at: **<http://ccfms.ca/News_Events/field_trips.html>** or see Bob Beckett at the April or May Club meeting at the Club Meetings to get a copy.

APATITE

"Apatite" is the general name given to the widely distributed series of Anhydrous Phosphates that commonly forms six sided prismatic crystals. Typical crystals are hexagonal prisms with hexagonal pyramid or a pinacoid or both as terminations. Granular, compact and colloform masses are also quite commonly found.

When found in large masses Apatite can be of considerable economic value as a source of Phosphate used in fertilizers.



Apatite was quite often mistaken for other mineral species such as Beryl, Quartz, Tourmaline, Nepheline, Olivine and Peridot. It was not until the late 18th century when the German geologist A. G. Werner recognized Apatite as a new mineral naming it in 1786 after the Greek word, APATAO or APATOS meaning, "I am misleading or to deceive" in reference to the mineral being commonly mistaken for other species.

Abraham Gottlob Werner, September 25th 1750 (or 1749) - June 30th 1817

Born in Wehrau, a city in Prussian Silesia, southwestern Germany and educated in Freiberg and Leipzig, Abraham Gottlob Werner was a geologist who set out a very controversial theory about the stratification of the Earth's formation founding the now obsolete theory of Neptunism. Although Werner did not have a degree he studied at the Freiburg Academy of Mines about 1771, under K. E. Pabst von Ohain and C. H. Lommer. In 1775 he was appointed as Inspector and Teacher of Mining and Mineralogy at the Freiberg Mining Academy, which through his considerable efforts became one of the leading schools in Germany. During his long career Werner published very little. However, his fame as a teacher, brilliant lecturer and personal charm spread throughout Europe, attracting students who became virtual disciples and spread his teachings throughout their homelands, including Robert Jameson (b1774 - d1854) who became a professor at Edinburgh and Andres Manuel del Rio (b1764 - d1854) who discovered Vanadium.

In the later part of the 18th century Werner was the most noted figure in the investigation of rocks and minerals; he called this science geognosy (knowledge of the Earth) and defined it as the study of the layers of mineral matter. In 1774 he published a book on descriptive mineralogy attempting and succeeding admirably, in standardizing the terms and methods used to describe minerals on the basis of outward appearance. This publication was so well written that if you consult the 1962 translation by Albert V. Carozzi you will see many of the terms we use today were first described by Werner.

In opposition to the Plutonists, or Vulcanists, who argued that granite and many other rocks were of igneous origin, he founded the Neptunism School. The basic concepts of Wernerian geology (Neptunism) was the belief in an all encompassing earth covering ocean that gradually receded to its present location while precipitating or depositing virtually all the rocks and minerals in the Earth's crust. The emphasis on this initially universal ocean spawned the term Neptunism and the concept became virtually synonymous with Wernerian teaching, although Jean-Etienne Guettard (b1715 - d1786) in France actually originated the view. While many of Werners students eventually discarded his theories they would not renounce them while Werner lived.

Abraham Gottlob Werner was certainly the most influential geologist of the later part of the 18th century and early part of the 19th century. His extraordinary abilities as a lecturer attracted students from all over Europe, who then returned to their homelands and applied his teachings and concepts. Those applications immediately caused debate and controversy, particularly over the origins of basalt (Neptunist-Plutonist controversy), which was the focal point of much geological activity throughout the end of the 18th century and well into the 19th century.

Throughout his life Werner was plagued by frail health and passed a quiet life in the immediate environs of Freiberg. An avid mineral collector in his youth, he abandoned field collecting in his later life altogether. There is no evidence that he ever traveled beyond Saxony in his entire adult life. While Werner was a great teacher, mineralogist and classifier of minerals, his attempts to explain all geology on the basis of a small area in Germany actually retarded geological advances for many years.

The variety of Scapolite known as Wernerite was named in his honor.

As noted earlier the name Apatite comes from the Greek word, APATAO or APATOS meaning, “I am misleading or to deceive” in reference to the mineral being commonly mistaken for other, and in many cases, more valuable mineral species.

The primary use for Apatite is as a source of Phosphate for use in fertilizers and in the chemical industry for salts of phosphoric acid and phosphorus, although good quality crystal specimens are highly prized by collectors and gem cutters. The softness of Apatite does present some difficulty when using it as a gemstone and does deter from its acceptance as a commonly used gemstone in jewellery. Fluorapatite, when of sufficient quality and clarity, is the variety most commonly cut into gemstones for collectors. The colour of Apatite is often caused by the presence of rare earth elements or by natural radiation.

Apatite is widely distributed in all rock types: igneous, sedimentary and metamorphic, but is usually found in small grains and cryptocrystalline fragments. Large well-formed crystals can be commonly found in certain metamorphic contact zones, especially in crystalline limestone’s where it is associated with titanite, zircon, pyroxene, amphibole, spinel, vesuvianite and phlogopite. Also extensive marine deposits are known. The fluorine containing types occur in almost all igneous rocks as an early-formed accessory mineral, usually as microscopic crystals.

The name Apatite is typically used to describe three related mineral types which differ only in predominance of trace elements: Fluorapatite, Chlorapatite, Hydroxylapatite. The rarer Carbonate-Apatite is not usually of interest to collectors and is listed here for reference only. The three related types can freely substitute within the crystal lattice structure in varying percentages, sometimes being close to 100% in one or the other. All three types can be difficult to distinguish from one another in hand specimens using ordinary methods.

The name Collophane is sometimes used as a generic term to describe massive cryptocrystalline types of Apatite that constitute the bulk of phosphate in rock and bone. The physical appearance of Collophane is often opaline or horn-like, with a dense, layered or colloform structure or can be nodular or spherulitic.

“Apatite”	$Ca_5(F,Cl,OH)(PO_4)_3$	Anhydrous Calcium Phosphate
Fluorapatite	$[Ca_5(PO_4)_3F]$	Calcium Phosphate Fluoride
Chlorapatite	$[Ca_5(PO_4)_3Cl]$	Calcium Phosphate Chloride
Hyrodroxylapatite	$[Ca_5(PO_4)_3(OH)]$	Calcium Phosphate Hydroxide
Carbonate-Apatite	$[\sim Ca_{10}(PO_4)_6(CO_3)\cdot H_2O]$	Calcium Carbonate Phosphate

The vast majority of all green and blue Apatite crystals found in Ontario, particularly those from the Haliburton, Wilberforce, Bancroft, Gooderham and Verona areas as well as many areas in Quebec are all Fluorapatite.

Physical Properties

Class:	Phosphate
Crystal System:	Hexagonal
Crystal Habit:	Commonly as prismatic crystals terminated by first order pyramids or pinacoids. Can also be granular and compact masses.
Twinning:	Very rare
Specific Gravity:	3.15 - 3.20
Index of Refraction:	1.63 -1.64
Hardness:	5 brittle (Mohs Scale)
Colour:	Various shades of white, green, yellow, red, blue, violet, brown, rarely colourless. Shades may vary from very pale to very dark.
Luster:	Vitreous to sub-resinous, on some specimens distinctly oily. Occasionally a chatoyant effect can be visible.
Transparency:	Transparent to translucent rarely opaque
Cleavage:	Poor on {0001} & {1010}
Fracture:	Conchoidal to uneven, brittle
Streak:	White to yellow-gray
Luminescence:	Yellow, yellowish-orange, pink, light green blue and white.
Thermoluminescent:	Rarely
Molecular weight:	509.12gm

Distinctive Features and Tests

- Crystal shape
- Hardness
- Specific Gravity
- Luster
- Melted appearance of crystal surfaces.
- Fuses with difficulty at $5\text{-}5^{1}/_{2}$
- Slowly dissolves in hydrochloric acid, crystal surfaces will turn white and porous on removal from the acid.

Metaphysical Properties

Apatite is said to enhance one's insight, learning abilities and creativity, and to give increased self-confidence. It also is said to help achieve deeper states of meditation. Using apatite is said to facilitate the desired results when working with other minerals.

Apatite is also said to be useful to help improve one's coordination and to strengthen muscles. Also to suppress hunger and ease hypertension.

The astrological sign for apatite is Gemini.

Occurrences

Apatite occurs as a common and wide spread accessory mineral in many types of igneous, metamorphic and sedimentary rocks, particularly in pegmatites, hydrothermal and Alpine-type veins, in calcite veins and marine deposits. Some of the largest Apatite deposits are associated with alkaline rocks. The Phosphates found in bones and teeth are members of the Apatite group.

Among the most common and widely distributed of all minerals the Apatite group is by far the most abundant of the phosphorous containing minerals. Fluorapatite, Fluorian hydroxylapatite and the carbonatian varieties are the important members of the group. Pure Chlorapatite, Carbonate-apatite and Hydroxylapatite are rare and limited in occurrence. The fluorine-containing types are found in almost all igneous rocks as a microscopic early-formed accessory mineral.

To list all occurrences from which Apatite can be recovered would be impossible. However, some of the most notable and prolific localities which have produced high quality crystals and / or crystals of record size certainly include:

Canada, Ontario - Many areas near Eganville, Sebastopol Township, Renfrew County, in particular Turner's Island in Lake Clear, and the near by Smart and Meany mines. Sabina (1965) reports a 320kg crystal from Turners Island. The Liscombe occurrence near Wilberforce has produced excellent collector specimens and fine gem-quality crystals; faceted Apatite from this locality was marketed under the trade name "Trilliumite". From the Perth area, Lanark County; Bedford Township, Frontenac County and many localities in the areas around Bancroft, Faraday Township, Hastings County and Cardiff Township, Haliburton County. The Silver Crater Mine near Cardiff, the Smith-Lacey mine near Sydenham, the Taggart mine near Crow Lake, the Gibson Road occurrence near Tory Hill, the Bear Lake Diggings occurrence near Gooderham and the Richardson mine near Wilberforce have all produced spectacular specimens. Localities near Canoe Lake and Desert Lake Road, Bedford Township have produced dark blue Fluorapatite crystals resembling those from Lake Baikal in the former Soviet Union. Chalky white Chlorapatite crystals rivaling those from Snarum have been reportedly found at a locality near Bob's Lake, Oso Township. Many Canadian Apatites, particularly those from Ontario are severely checked and cracked, with many breaking on removal from matrix, thus making undamaged crystals for collectors fairly rare despite the abundance of crystals found in situ. Canadian Apatites are easily recognized by their rounded appearance of prism faces and terminations.

Canada, Quebec - Yates Uranium Mine, Huddersfield Township, near Otter Lake; Calumet area; Wakefield area; Seybold Mine, Moore Mine, Deziel Mine and others in the St-Pierre-de-Wakefield area.

Canada, Yukon - Sceptre Claims, Emerald Lake; Rapid Creek and Big Fish River areas.

USA - Deep blue anhedral crystals two feet or more in diameter and several feet in length have been found at the Hugo mine Keystone, South Dakota; and as fabulous crystals in Androscoggin County Maine, Pelham Massachusetts, Mount Apatite New England, New York, New Hampshire, Connecticut, beautiful pink crystals from the Himalaya Mine, Mesa Grande, San Diego County, California.

International - Fine specimens have also been found in Durango, Mexico; and in Bolivia, Brazil, Burma, Spain, Germany, Czechoslovakia, Switzerland, Austria, Italy, France, England, USSR, Sweden, Burma, Japan and Panasqueira, Portugal.

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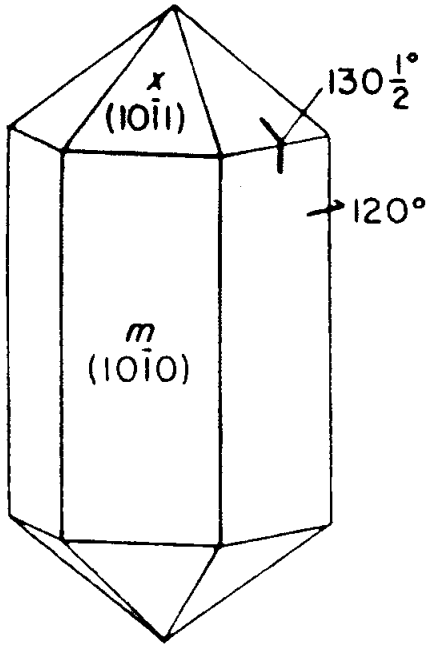
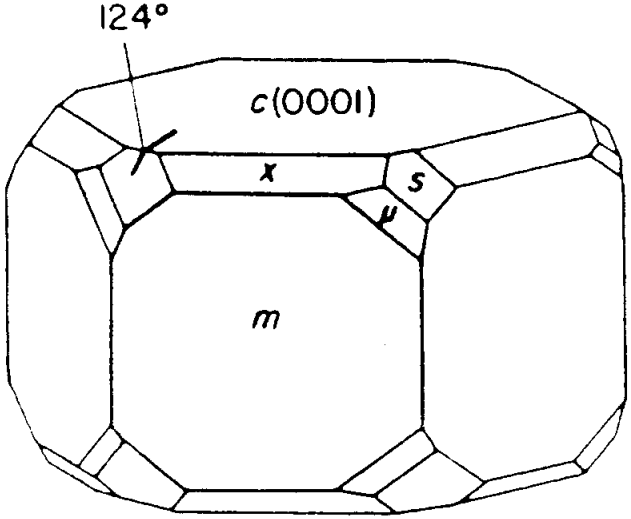
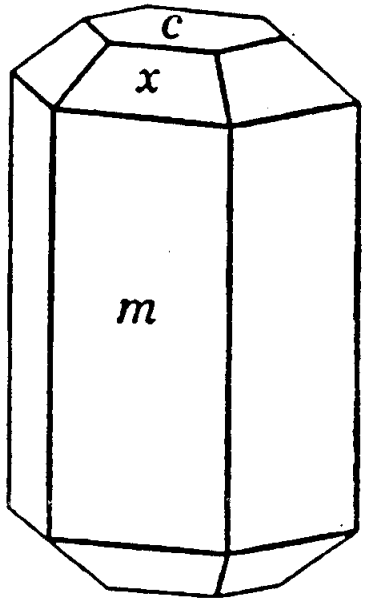
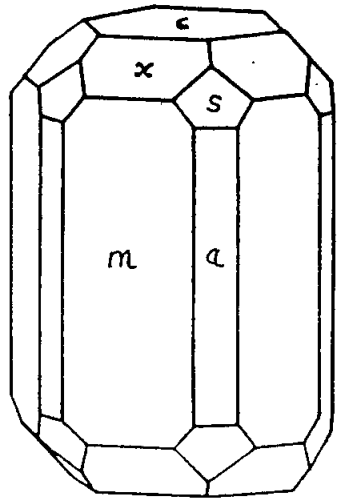
Beckett. R. H. March 2007

APATITE









FIRST ORDER PRISM *m*, FIRST ORDER DIPYRAMID *x*, SECOND ORDER DIPYRAMID *s*/11$\bar{2}$1/, THIRD ORDER DIPYRAMID *μ*/21$\bar{3}$1/ (*mu*), PINACOID *c*.