



Newsletter of the London Gem Mineral & Fossil Society London Ontario

# November 6<sup>th</sup> 2025 Club News

## Activities for this Meeting

### Membership:

All memberships are due at the meeting in September.

Club fees are as follows: Families \$30, Single \$20,

Student \$15. Those who have paid at the beginning of January until the September meeting will not have to pay until September 2026.

### Presentation by Dr. Philip McCausland:

### Director, Western Paleomagnetic & Petrophysical Laboratory (WPPL)

**"Canadian Fireballs and meteorites"** Featuring a variety of meteorites for all of us to look at.

### An Important Rare Earth Mineral (3 variations)

- Bastnaesite-(Ce), Bastnaesite-(La), Bastnaesite-(Y)

Rare Earth minerals are not really very rare. They are difficult to mine because of their low concentrations in ores, a very complex extraction process and environmental issues. The group was called REES for Rare Earth Elements.

Bastnaesite-Ce contains Cerium and is the most abundant.

It is a group of hexagonal fluorocarbonate minerals.

The mineral has a greasy luster and a colour ranging from wax-yellow to reddish-brown, or pale white, gray or pink, glassy or pearly

It is often found in various geological environments including granite, pegmatites, carbonatites and metamorphic deposits.

The general formula is  $M(\text{CO}_3)\text{X}$ . M is the REE, X is the fluorine (F) or hydroxyl (OH) group.  $\text{CeCO}_3\text{F}$ ,  $\text{CeCO}_3\text{OH}$  (hydroxyl)

- Why do we care about these minerals and elements as shown in the recent ASEAN Summit (Association of Asian Nations Southeast Summit)?

They are used to make strong magnets for electronic devices, mobile phone speakers and microphones. Other uses include automotive catalysts, glass & ceramic products, batteries, lasers & wind turbines. They are also used in weapons like missiles.

- Where are they found?
- Larger deposits are in the Baotou region of China, the Mountain Pass mine in California

**London Gem Mineral & Fossil Society**

**Meetings:** Usually, 1<sup>st</sup> Thursday of each month 7:00 – 8:30 pm (September to June but not in January)

**Meeting Place:** Earl Nichols Arena  
799 Homeview Place London Ontario

**Membership:** Single \$20, Family \$30, Student \$15

**President:** Tom Iannelli 519-641-0098

**Vice President:** Tim Jokela

**Secretary:** Vacant

**Membership:** Judie Perrin 226-663-0236

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LGMFS: [www.facebook.com/londongemmineralsociety](http://www.facebook.com/londongemmineralsociety)

and in parts of Greenland, Australia, Pakistan and Madagascar.

- Canada has several locations including the Mont Saint-Hilaire Mines in Quebec and Thor Lake deposits in the Northwest Territories. Hydrothermal sources have also been reported. **It has been reported that Canada has no operational mines** (typical).
- Can the mineral be cut into a gemstone? Gemstones can be cut but the relative softness makes it difficult



Bastnäsite crystal, Zagi Mountain, Federally Administered Tribal Areas, Pakistan. Size: 1.5×1.5×0.3 cm.

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An ugly mineral with the Bastnaesite hexagonal part on top.

Wikipedia: Rob Lavinsky, [iRocks.com](#) – CC-BY-SA-3.0

- Physical Properties in Detail
  - Transparent to Translucent, Steak: White.
  - Soft with a Mohs hardness of 4 to 4.5
  - Hexagonal with the Crystal habit in prismatic crystals, rosettes, or as massive granular formations.
  - Steak: White.
  - In addition to the more common Cerium, other types are with Lanthanum and Yttrium
  - Piezoelectric properties (see Quartz Watch article below).

## Quartz and Its Uses in Watches Because of its Piezoelectric properties

We have all seen the electrical charge due to mechanical stress by compressing or striking quartz. This is the piezoelectric effect.

If a slice of quartz is made into a specialized tuning fork, applying an electrical charge will cause it to vibrate. Using exact preparations, it can be made to vibrate at 2 to the power of 15 cycles per second ( $2^{15}$  or 32768 Hz). It was initially difficult to find available quartz minerals that were good enough to be fabricated into the fork, Advances in mineral manufacturing allowed the quartz to be made with consistent quality.

Since the tuning fork vibrates at this frequency (32768 Hz), the circuit chip will divide it by two, 15 times, thereby converting the frequency to 1 cycle per second to drive the ‘seconds’ watch hand.

**Seiko** introduced an industry-standard that shocked the watchmaking community, including Switzerland, where most brands, to survive, rapidly converted their business to quartz technology.

On **December 25, 1969**, Seiko introduced the **Quartz Astron 35SQ** model. 100 were sold in the first week at the price of a medium sized car.

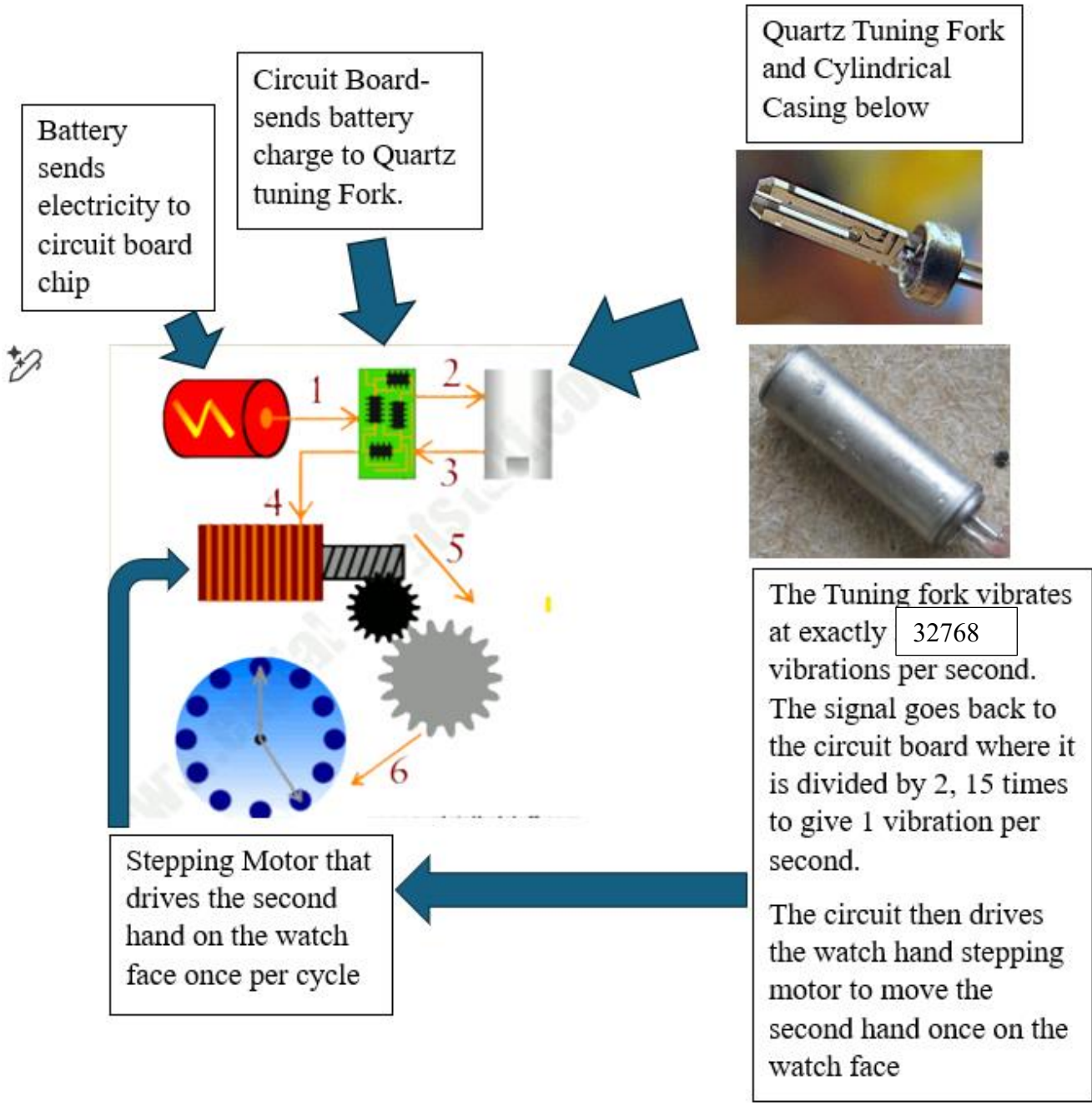


**The Gold Quartz  
Astron 35SQ**

(Source: Seiko. Photo credit: courtesy of Seiko Watches)

[Astron \(wristwatch\) - Wikipedia](#). This first version ran at a lower frequency.

- The figure below shows the steps involved when the watch is running.
- (note: the figure below was inserted as a graphics file, with a frequency error. A correct text box was inserted to fix this.



**The 10 Rarest Minerals**

- **Kyawthuite**: This was already covered in a previous Chippings. It is often cited as the rarest mineral, only a single specimen has been discovered in Myanmar.

**Taaffeite: (followed by the other 8 minerals that are the rarest. There is some disagreement based on the information sources)**

One of the rarest gemstones, with fewer than 50 known samples, and was initially mistaken for spinel.

An extremely rare mineral named after its discoverer, Richard Taaffe, who found the first known specimen in 1945 in a Dublin jeweler's shop (we should all be so lucky!). The mineral is a beryllium magnesium aluminum oxide,  $BeMg_3Al_8O_{16}$ , (*BeMg3Al8O16*).

Initially misidentified as spinel due to their similar appearance. It is known for its beautiful lilac to mauve color but can also be found in pink, red, blue, green, or colorless varieties.

After examination by an expert, it was classified as a new mineral species.

The gemstone was initially identified from a faceted stone.

Properties and characteristics

**Chemical composition:** Beryllium magnesium aluminum oxide

The mineral group's accepted name is [Magnesiotaaffeite-2N'2S](#).

**Appearance:** Transparent to translucent with a vitreous luster.

**Optical properties:** It is doubly refractive (birefringence), which distinguishes it from singly refractive spinel.

**Rarity:** Taaffeite is one of the rarest gemstones in the world, even rarer than diamonds.

**Hardness:** It ranks high on the [Mohs hardness scale](#), similar to beryl, 8-8.5

**Crystals:** Forms in prismatic crystals, but is often found as small, rounded pebbles.

**Origins:** Sri Lanka, Myanmar Burma, Tanzania, China, and Madagascar

**Crystal structure:** Hexagonal

**Luster:** Vitreous (glassy)

**Refractive index:** 1.717-1.730

**Density:** 3.60-3.62; Zincian taaffeite - 3.71.

**Cleavage:** Imperfect/fair (one source stated (001)).

**Fracture:** Conchoidal (**break or fracture of a brittle material** that does not follow any natural planes of separation).

**Streak:** White

**Luminescence:** Fluorescence and X-ray colors present in green

**Pleochroism:** Weak or absent

**Birefringence:** 0.004-0.009, usually read by a refractometer

**Dispersion:** 0.019, when white light passes through a mineral or gemstone, it disperses into different colours from the different wavelengths that make up the white light. With the intensity and spread between the wavelengths, the dispersion graph can look like bell curves.

**The Other 8 Rarest Minerals \* Other sources have slightly different lists**

Painite, Grandidierite, Red Beryl, Tanzanite, Alexandrite, Benitoite, Poudretteite, Black Opal.



The cut gemstone and an example mineral.

**Silver Wire Specimen from Kongsberg, Norway Was Sold at the 2025 Denver Show for 10 Million USD (info from Tim Jokela).**

The large Silver specimen below was sold for \$10 Million USD at the September 2025 Hard Rock Summit in Denver. It is the highest documented price ever paid for a mineral specimen at a show. The length is 22cm with a weight of 1896 grams. Copy and paste the link to see the detailed history.

The link is <https://earthwonders.com/blog/newsletter-issue-19>.



## Mineral Classifications Over Many Years

People have been collecting and identifying Minerals, Gemstones and Metals throughout history. There were many different classifications in ancient Europe and Asia which expanded with improving technology like microscopes for crystallography. An example of Ancient Mineral Natural History was written by the Roman, 'Pliny the Elder' in 77AD. He was from the early Roman Empire, and a friend of the emperor Vespasian. In addition to many other duties, Pliny wrote the encyclopedic *Naturalis Historia (Natural History)*, which was a comprehensive thirty-seven-volume series covering many topics including existing current knowledge and the natural world. He disliked sleep and thought it was a waste of time "To be alive you must be awake".

I first learned about classifications from the 23<sup>rd</sup> Edition of *The Manual of Mineral Science*, copyright 2007, John Wiley and Sons Inc. It was reprinted in 2017 in India. It was new including the instructional Mineralogy Tutorials on a CD by Cornelis Klein. It was an excellent way to learn with many graphical illustrations and information. There were also 'hot' buttons to click open to see detailed text information and photos.

The book was written by Cornelis Klein (deceased), The University of New Mexico Albuquerque, and Barbara Dutrow, from the Louisiana State University. **Professor Dutrow is working on a 24<sup>th</sup> Edition.**

In the mid-19th century, James Dwight Dana created a system based first on chemical composition and second on atomic structure, a system that is still a basis for modern classification.

The Strunz-Mindat 2025 Edition is recognized as a good source. This may not have come out yet.

Mindat classifies minerals primarily using a hierarchical system based on chemical composition, most notably the [Strunz classification system](#) which organizes minerals into ten main groups: Elements, Sulfides and Sulfosalts, Halides, Oxides, Carbonates and Nitrates, Borates, Sulfates, Phosphates/Arsenates/Vanadates, Silicates, and Organic Compounds. These are further divided into subclasses and groups based on their chemical makeup, with silicates being the largest class and making up over 90% of the Earth's crust.

The 8th Dana Mineral Classification system posted on Mindat.org has 78 groups.

The International Mineralogical Association, as of May 2025, officially recognizes 6,145 mineral species.

If the different ways that minerals are formed are included, it is claimed that there could be 10,000+ mineral types (e.g. it is claimed that diamonds can be formed in 9 different ways. I did not check this out, but it adds to more detailed classifications.

The following link has a huge list of minerals in an alphabetical order with first letter separation. **Amethyst Galleries**. There are more technical versions like this.

<https://galleries.com/minerals/byname.htm> (note: Information from the internet can have viruses or other threats. Anything I submit has been checked/scanned by the complete AVAST protection suite). We all still have to be careful.