



MYSTERIES OF THE WORLD'S RAREST GEMS.



Taaffeite and Musgravite... two rare and valuable gemstone varieties that were initially thought to be Spinel.

“We think we have solved the mystery of creation. Maybe we should patent the universe and charge everyone royalties for their existence.”

Stephen Hawking

These gemstones made the Forbes (2015) list of the rarest and most expensive gems in the world. They are as uncommon as meteorites from Mars, but unlike rocks from the sky, they are not black and can be dazzling in the pink, purple and lavender shades in which they occur.

Ironically, Spinel is known as the great imposter of gemstone history and some of the most famous rubies in crown jewels around the world are not rubies, but actually spinel. Yet here, we have these two gem varieties that were originally recognized as Spinel but turned out to be something else.

In appearance and refractive index both musgravite and taaffeite are nearly the same as spinel, but they are doubly refractive. Since most of these stones are water worn in the rough, the only way to identify them is by refractive index, Raman spectroscopy, or X-ray diffraction techniques. The polariscope will help to determine whether the stones are singly or doubly refractive, but the Raman spectroscope is the easiest way to find conclusive proof if the database and instrumentation are properly calibrated and in order.

ANOTHER MAN'S TREASURE

Taaffeite, was first discovered in 1945 by Count Taaffe, a Dublin gemologist who found a pale mauve stone in a jewelers junk box that resembled spinel in appearance and properties but showed distinct double refraction. The stone was sent to the British museum

for testing where they determined it to be an unknown mineral. It was later named after the Count who found the first sample.

Taaffeite is the only gemstone to have been initially identified from a faceted stone. Despite diligent search, it was not until 1949 that another stone was found in a parcel of stones from Sri Lanka. A third stone was found in 1957 by Robert Crowningshield of GIA and a fourth stone some 10 years later. Since then, more gemologists have been aware of Taaffeite and stones continue to be unearthed intermittently.



Exceptionally beautiful and brilliant Taaffeite oval weighing 3.44 carat, from the Tunduru District, Ruvuma Region, Tanzania, East Africa.

LONG LOST RELATIVE

Musgravite is close relative of Taaffeite. It was discovered in 1967 and named after the name-place discovery in the Musgrave Range of South Australia.

Facet quality Musgravite was not reported until 1993 and as of 2005, there were only eight Musgravite specimens, three of which were identified by Murray Burford, a Canadian gemologist. Since then more stones were reported, some from Sri Lanka, and some from the Tunduru area of Tanzania. In total, probably not more than 30 or 40 stones have ever found. The largest known gemmy Musgravite weighed 5.74 carats and was sold by Multicolour.com in 2014.

Musgravite is or should be at the top of every gemstone collector's list. Often confused with taaffeite because of the near identical gemological properties, our observations from the studies of the alluvial deposits in Tunduru Tanzania show that only 5 or 10% of the stones we originally thought were taaffeites are actually musgravite. Again, Raman spectroscopy is the easiest way to separate these gems.

Whether musgravites are a part of the taaffeite family is debatable but mineralogists suggested the names magnesiotaafeite-2N'2S for spinel and magnesiotaafeite-6N'3S for musgravite.

Unsurprisingly, those names didn't really stick and gemologists still refer to them as taaffeite and musgravite.



Musgravite is not only one of the rarest gemstone varieties in the world, but also sometimes very bright, and exceptionally clean. This 1.41 carat oval is from the Tunduru District, Ruvuma Region, Tanzania, East Africa.

SPOT THE DIFFERENCE



Taaffeites, Spinel and Musgravite from Tunduru in Southern Tanzania. The colors are similar and there's no way to distinguish them without gemological testing. Chemically, they are clearly related with magnesium (Mg) and aluminium (Al) as the primary constituents. However, in terms of crystallography, Spinel is cubic while Taaffeite and Musgravite are hexagonal. Overlap in Taaffeite and Musgravite properties make these species impossible to distinguish with standard gemological tests and the most convenient way to differentiate them is with Raman spectroscopy or X-ray diffraction techniques.

ELUSIVE & EXCLUSIVE

The rarest gemstone lists and designations are always subjective and transitory because important gemstone discoveries can be depleted in weeks or conversely become available in large quantities. To know the extent of an in situ deposit, the area needs to be mapped but for widespread alluvial deposits, mapping could take years and still miss some of the best stones. The gemstones below have never been available in large enough quantities to support any serious marketing.



CHONDRODITE

THE MOST DISTINCTIVE

Chondrodite can be rich in color with durability good enough for jewelry use. Cutting poses no great difficulties. Unfortunately, facet quality cutting rough is hard to find so faceted stones are almost unknown. In Russia, gem quality material comes from the Olkhonskoye and Pribaikalia deposits as well as from Karelia. Chondrodite is also found in Finland, Sweden, Italy, South Africa and Canada. Transparent crystals available for faceting are rarely more than 3-carats in weight.



SHEELITE

THE MOST BRILLIANT

Despite its low hardness (4.5–5.0), Scheelite has been faceted as a gemstone for collectors. Its high refractive index and adamantine luster assure bright and surprisingly attractive gemstones. Scheelite was named for the discoverer of tungsten, K. W. Scheele, the Swedish chemist who proved the existence of tungsten in the mineral. Prospectors for scheelite have made good use of scheelite's typically bright blue fluorescence by searching for scheelite deposits at night with ultraviolet lamps.



KORNERUPINE

THE MOST ATTRACTIVE

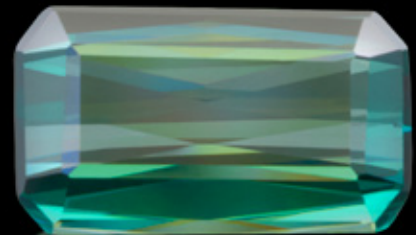
A rare magnesium iron borosilicate, Kornerupine has been faceted as a gem but its interest is mainly for gemologists and collectors. The mineral was discovered in Greenland in 1884 as a pale green to sage green material with a radiating columnar habit in translucent to transparent pieces. It was named in honor of the Danish geologist, Andreas Nikolaus Kornerup. With a hardness of 7 and no significant cleavage, Kornerupine is hard enough to be used in most kinds of jewelry but it will never be popular due to its rarity. Kornerupine is usually brownish or greenish and sometimes chatoyant. Highly saturated greenish blue stones are available on occasion and command high prices for the intensity of their color.



PEZZOTTAITE

THE MOST UNEXPECTED

Pezzottaite was first uncovered in Madagascar around the turn of the millennium. The pinkish red stones were sourced just northeast of Fianarantsoa and some 200 km south of the capital in Antananarivo. Due to its intensive color and illusory hexagonal crystallization, initial speculation suggested a new form of Bixbite. The mood was exuberant as bixbite is the most rare and valuable crystallization of beryl. It was initially marketed as bixbite by unknowing or unscrupulous sellers and also under the name raspberyl or raspberry beryl. In September 2003 it was formally identified and recognized by the IMA as mineral species and named after a well known Italian geologist and mineralogist Federico Pezzotta.



GRANDIDIERITE

THE MOST EXQUISITE

Grandidierite was initially unearthed on the southern coast of Madagascar in an area known as Cape Andrahomana. It was named after Alfred Grandidier, a French explorer and a specialist in the geography and natural history of Madagascar at the turn of the 20th century. Grandidierite is itself not that reclusive, but clean stones are extremely rare. Although this gemstone has been around for more than 100 years it was only recently that any clean stones began to appear.

RELICS & RARITIES

The name Topazolite is somewhat of a misnomer and a great example of naming gone wrong. Why name a very rare gemstone after something as common as Topaz? From a seller's prospective it's like death by naming!

Technically, when Andradite (garnet) is green, it is known as Demantoid, but when it is brownish, or golden yellow, it is referred to as Topazolite. Although the name is derived from its golden yellow color which is similar to Topaz's, Topazolites and Topazes are unrelated in any other way and have nothing beyond color in common.



The yellowish hues of Topazolite are attributed to the presence of ferric ions but are also modified by the existence of titanium or manganese. Conversely, Demantoid is colored by chromium but may also grade into yellow when the concentrations of chromium are insufficient to produce green.

Andradite garnets are found at several localities around the world, but Topazolite is fairly rare. They are also reportedly being heated to green in Russia to fetch the higher Demantoid prices and this makes their availability even less. A well cut topazolite is a beautiful gemstone in its own right and with a unique color, an adamantine luster, and high dispersion.

PROSPECTOR'S CORNER



A highly sought after mineral by collectors and museums worldwide, jeremejevite is found in small crystals that may be colorless, pale yellow or light blue. Crystals can easily be mistaken for aquamarine because of their similarity in habit. The only important sources for jeremejevite are in Namibia and Madagascar but few stones are ever available.

This large Jeremejevite crystal is from Madagascar. The color appears to be very slightly yellowish, but from our experience, most of these stones look white after faceting. This piece weighs 54.91cts and measures 24.1 x 21.6 x 14.9mm.

It will probably yield a 16 carat plus stone if handled by an experienced cutter. Large near clean crystals like this are quite unusual and some labs were unwilling to commit to the identification of this one. A window was polished to aid in identification by refractive index and also to help the lapidary with orientation.



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