Module B. Colour from the Cosmos

Lessons 13 - Introduction to Beryls

Introduction

Most people know the gemstones emerald and aquamarine. What many people don’t know is that these two magnificent gems are varieties of the same mineral, beryl. Both gemstones have been sought out and coveted for their beauty and properties throughout history. The gem mineral beryl is colourful, hard, often transparent, resistant to many acids, and has the ability to form large crystals - all great ingredients for a gemstone.

Additionally, the beryl crystal structure requires the rare element beryllium (Be, atomic number 4) which only concentrates in very specific geological environments. Thus, this mineral inspires much in mineralogists and geoscientists. There has always been a steady demand for these stones, which also translates into a steady stream of research on the geology of gem-beryl deposits. The focus of the following lessons includes the gemology, mineralogy, geology, and geography of the two most common gem varieties of the mineral beryl, emerald and aquamarine.

Emerald is the vibrant green variety of beryl and is one of the most valuable gemstones available, ranked in price with fine sapphires, rubies, and diamond. Its intensely vivid colour has been appreciated for millennia, as far back as ~1500 B.C. in the land that would become Egypt (they called emeralds "mafek-en-ma"). Emeralds are also known to have been coveted in ancient Greece (known as "smaragdos") with mention in Pliny's "[Naturalis Historia](http://en.wikipedia.org/wiki/Naturalis_Historia" \t "_blank)", and have also been important facets of the Bible. In fact, it has been said the very first emerald belonged to Lucifer. Exquisite emeralds are also well-known in ancient India and in more relatively recent times, South America. Colombia in South America is home to the most magnificent emerald. Ancient Aztecs used emeralds in much of their jewelry and some of their ceremonial items.

The Mogul Emerald (217.80 carats) - Front (left) and back (right). Image from [Christie's Fine Art Auctions](http://www.christies.com/).

The English version of the word "emerald" has its ultimate roots in the Sanskrit word "marakata". The Latin "smaragdos" morphed to a Middle English "esmeralde", eventually to a Spanish "esmeralda" and French "emeraude", and finally to today’s modern English form, "emerald". In ancient times, these various names were used for stones other than the current mineralogical definition of emerald, and included other green stones such as peridot and malachite. With the advent of more objective tests, the mineral beryl became host to the official name of vibrant green emerald.

In recent times, with the ease of access to non-destructive chemical and physical tests, the strict definition of emerald has again come under scrutiny. Specifically, many experts feel that green beryl with significant concentrations of the elements Cr and vanadium (V), but ***not***Fe, should be called emerald. This narrow definition is still in debate as these definitive non-destructive techniques are commonly used in research and academia, but not accessible by the common gemologist or jeweller, and certainly not to the general public.

Aquamarine is the light to dark blue variety of beryl, and often has a delicate green tone, hence its name that alludes to the colour of the sea. However, the most coveted colouration of aquamarine is an intense deep blue, which is considerably rarer than the sky blue or "sea foam" colour that most people are familiar with. Aquamarine is also entwined with ancient history. Reference to these blue stones is made in ancient Egypt as well as in ancient Greece. However, compared to its flashy cousin, the emerald, it has not received the same volume of attention. It has been suggested that the large clean stones we are familiar with today were likely quite rare through history. Consequently, the absence of large magnificent aquamarine crystals diminishes its space in ancient history and lore.

The faceted and carved Dom Predo Aquamarine (10,363 carats) measures 14 inches tall and 4 inches wide at the base. Photos show (at left) the original ~60-lbs crystal being investigated by Agenor Tavares, (middle) the final carved product executed by Munsteiner family, and (right) the image of the carved gemstone superimposed on the image of the original crystal. Images from [Smithsonian Institute](http://mineralsciences.si.edu/collections/dom-pedro/index.htm).

**Required readings and topics for this lesson in your textbook**

|  |  |
| --- | --- |
| **Topic** | **Pages** |
| Cyclosilicates | 286 |
| Beryl | 290 - 291 |
| Emerald | 292 - 293 |

**Optional readings for this lesson in your textbook**

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| --- | --- |
| **Topic** | **Pages** |
| Igneous Rocks, Granite and Pegmatite | 32 - 36 |
| Placer Mining | 107 |
| Shale | 61 |
| Black slate | 82 |

**Required Readings Outside the Textbook**

Download and read this article from the UBC Library:

Ringsrud, R. (2008). "Gota De Aceite: Nomenclature for the Finest Colombian Emeralds". *Gems and Gemology*, Vol. 44, No. 3, p242-245.

Be sure to use the [guide provided here](https://connect.ubc.ca/bbcswebdav/pid-2559744-dt-content-rid-10494291_1/courses/SIS.UBC.EOSC.118.99C.2014WC.44220/Course_Files/moduleB/lesson14/download/Gota-de-Aciete-Guide.pdf), to help you through the article.

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