GEM COLLECTION

The new gem collection was begun in 2003 and currently contains 180 specimens, of which 160 are on display. Although the collection includes some precious gemstones (ruby, sapphire, emerald and aquamarine), most of them are collector's pieces; stones that are not often used in jewellery due to their low or medium hardness. There are 14 replicas of famous and historic specimens on display, as well as a collection of old cut gemstones and examples of the different stages involved in producing the brilliant cut, the most widely used technique with diamonds.

CASE 283 PRECIOUS OPAL

Opal is the most important gemstone within the silica group. The precious variety of opal is the most highly appreciated. It can be transparent, translucent or even opaque, and presents an optical effect termed a “play of colour”” (not to be confused with opalescence, the milky effect seen in the common opal). On a microscopic level, precious opals are composed of spheres of cristobalite and tridymite arranged in a lattice. The play of colour is produced by diffraction of incident light passing through the layers of microscopic spheres and the empty spaces between them. Scientifically, a gemstone quality opal is called an opal CT. There are five varieties of precious opal: the white, black, water, fire and matrix opal. The oval cabochon displayed in this case is a white opal with a very delicate play of colour throughout the specimen.

$SiO_2.nH_2O$
Welo (Ethiopia).
Weight: 11,69 carats.
Dimensions: 26.80 x 15.40 x 5.60 mm.

CASE 283 AQUAMARINE

Aquamarine is a blue gemstone variety of beryl. Its blue colour is due to small amounts of iron (Fe2+) that replace the beryllium in the crystalline structure. However, when some of the iron is present as Fe3+, a golden-yellow hue is produced, rendering the aquamarine greenish-blue. This specimen, cut into a faceted oval, contains hollow inclusions and fine parallel tubes filled with fluid that recall the rain. Aquamarines are considered the fifth most valuable gemstones. Many good quality aquamarines are produced by heating greenish-yellow or brown beryls to 400-500ºC, which converts ferric iron to ferrous iron, changing the colour to blue. There are no known synthetic aquamarines, but glass and synthetic spinel imitations are available on the market.

$Be_3Al_2(Si_6O_{18})$.
Minas Gerais (Brazil).
Weight: 47,12 carats.
Dimensions: 29.10 x 19.00 x 14.40 mm.

CASE 283 BLUE TOPAZ

Cut into a faceted pear shape, this specimen is a natural, untreated light blue colour. Unlike yellow, orange, brown, reddish or pink topazes, which contain many OH groups, the main group in this specimen is fluoride. Generally, reddish or pink topazes owe their colour to heat treatment, while brown or deep blue specimens are obtained by irradiation. Due to its appearance and colour, although not its price, blue topaz can often be confused with aquamarine. However, it is easily identified by examining its physical properties. Topaz must be treated with great care since despite its high hardness (8 on the Mohs scale), it has a tendency to fracture along the plane of the crystal due to its pronounced basal cleavage. This means that any impact could crack it or break it in two.

$Al_2(SIO_4)(F,OH)_2$
Brazil.
Weight: 150,01 carats.
Dimensions:42.30x29.90x17.70 mm.

CASE 283 SCAPOLITE

The scapolite group forms an isomorph series whose endmembers are marialite (sodium endmember) and meionite (calcium endmember). The analyses carried out on this brownish-yellow scapolite indicate a composition close to marialite. The raw crystals show a prismatic habit terminating in bipyramids with heavy striations along the prism faces (see case 18 in the Systematic Mineral Collection). It presents refractive indices of 1.548 and 1.560 and a density of 2.64 g/cm3. This gem has been given a faceted round fancy cut. Its main feature is its size, and it is probably one of the largest faceted scapolites in the world.

$Na_4Al_3Si_9O_{24}Cl$ / $Ca_4Al_6Si_6O_{24}Co_3$
Malema (Nampula, Mozambique).
Weight: 115,00 carats.
Dimensions: 30.60 x 23.65 mm.

CASE 283 TRAPICHE EMERALD

Emerald is a green gemstone variety of beryl. The green colour is mainly due to small amounts of chromium, although traces of iron Fe^{3+} and vanadium also play an important role. This magnificent specimen, cut into an oval cabochon, is unusual because of its large size. It consists of a central hexagonal prismatic crystal surrounded by six other prismatic crystals. The hexagonal prisms are separated by black carbonaceous matter. This rare variety of emerald is only found in Colombian mines and is highly prized by collectors. The name “trapiche” is of Spanish origin, and refers to the stone's resemblance to the mill machinery used to grind sugar cane.

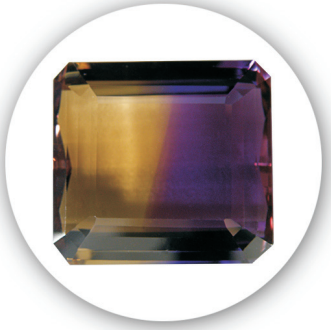
$Be_3Al_2(Si_6O_{18})$
La Peña, Muzo (Colombia).
Weight: 29,21 carats.
Dimensions: 23.29 x 20.35 x 8.72 mm.

GEM COLLECTION

CASE 284
SMOKY QUARTZ

This variety of quartz ranges from yellowish-brown to almost black in colour. The darker variety is called morion, while the yellowish-brown variety has been called cairngorm, after the Scottish mountain where it was found in the 19th century. This specimen, cut into a faceted oval in Jaipur (India), is valuable because of its large size and natural colour. The colour is due to structural changes caused by natural radioactivity and also the presence of aluminium, which partly replaces the silicon. The intensity of the colour depends on the amount of radioactivity the stone has received. The colour of much of the material on the market is obtained by artificial irradiation. Better quality gems may come from hydrothermal deposits in the Swiss Alps; however, most gems nowadays come from Brazilian pegmatites.

SiO_2
Brazil.
Weight: 1.781,00 carats.
Dimensions: 98.20 x 66.50 x 47.60 mm.



CASE 284
AMETRINE QUARTZ

This is a variety of bicolour quartz incorporating purple amethyst and yellow citrine, hence the composite name of ametrine. As it is only mined in one place, the Anahi mine in German Busch, Santa Cruz (Bolivia), very close to the border between Brazil and Uruguay, it is also known by the trade name *bolivianite*. Legend tells that this stone has been known since the time of the Spanish conquistadors (17th century), but there is no reliable information about it until the 20th century. Mass mining of the deposit (illegal and without studies or planning) began at the end of the 1970s. However, the first systematic studies began in 1989, and the national mining company Minas y Metales del Oriente started to develop mining technology in the area. Specimen in an octagonal emerald cut.

SiO_2
German Busch, Santa Cruz (Bolivia).
Weight: 59,04 carats.
Dimensions: 25.74 x 23.87 x 11.95 mm.

CASE 284
LEMON QUARTZ

Lemon quartz obtains its colour through an artificial gamma-ray irradiation process followed by a mild heat treatment. Not all quartz can be treated this way to obtain lemon quartz. The most commonly used type is milky quartz from a very specific area in Brazil, Sao José de Zafira y Cristalina. This specimen is notable for its large size and the quality of its fancy oval cut. The gem was cut using a novel technique in which the facets are concave rather than flat. Although the distribution is the same as in a traditional cut, concave facets produce much more brilliance than classic cuts.

SiO_2
Brazil.
Weight: 229,65 carats.
Dimensions: 50.50x38.30x23.70 mm.

CASE 284
YELLOW ORTHOCLASE

Orthose or orthoclase is a feldspar mineral, and is a common constituent of many rocks, but has little value as a gem. However, some transparent varieties can be used as gemstones. Recently, it has been found that the specimens obtained in Madagascar are actually sanidine, a type of sodium-potassium feldspar, although in the trade these gems are still called yellow orthoclase. This transparent, pale yellow variety owes its colour to traces of ferric iron, and comes from the pegmatites of Itrongay, Madagascar. The specimen presents a very strong trichroism (deep orange-yellow-orange) and inclusions in the form of short needles. It has a faceted round fancy cut.

$K(AlSi_3O_8)$
Itrongay, (Madagascar, Africa).
Weight: 48,60 carats.
Dimensions: 24.69x24.95x15.64 mm.

CASE 284
GREEN FLUORITE

Fluorite is a very beautiful mineral due to its colour and transparency. However, it is unsuitable for use in jewellery because of its low hardness (4 on the Mohs scale) and is only used as a collection piece. Fluorite comes in a wide range of colours: colourless, yellow, brown, green, blue, violet or red, and some specimens even change colour according to the light. From a gemmological viewpoint, the most attractive varieties for faceting are those presenting an emerald green colour. It is difficult to obtain large faceted stones because this mineral presents perfect cleavage according to the faces of the octahedron. This fluorite specimen has been cut into a pear shape using a technique that produces concave facets (similar to that used for the lemon quartz).

CaF
China.
Weight: 64,94 carats.
Dimensions: 30.80x22.70x16.00 mm.