The gem quality rose quartz from Oliva de Plasencia, Cáceres, Spain.

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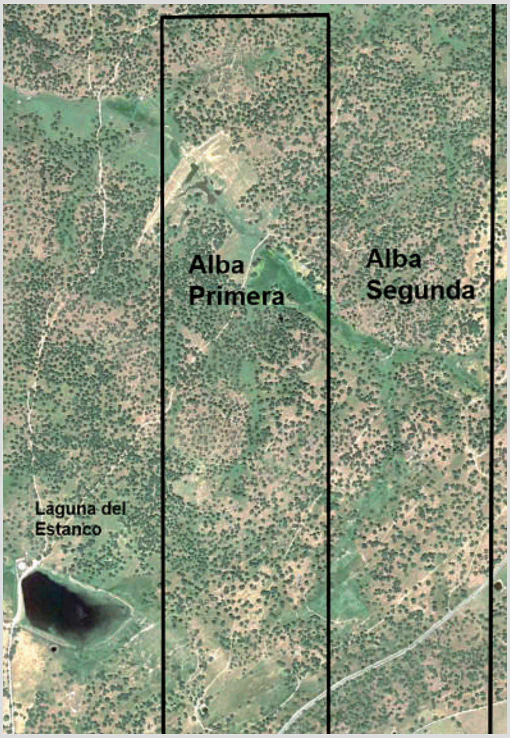
Introduction

Rose quartz is one of the less common color varieties of quartz. Furthermore, although they share the color, massive rose quartz and the type that occurs as well-defined crystals should really be considered to be two distinct varieties, since the origen of the color is different, and they appear in different geological environments and different conditions of formation. Crystals of rose quartz are only of small size and, although they make spectacular collection specimens, are of little value as gem material. The opposite is the case with massive rose quartz, as it is mined in many places in the world as a raw material for production of decorative objects and, in the case of the highest quality material, also for cutting as gemstones.

Brazil is one of the principal producers of rose quartz, with classic localities being the pegmatites of Parelhas, Currais Novos and Oliveira de Brejinhos, in the Borborema pegmatite field. In recent times, two of the most intensely exploited rose quartz deposits in Brazil have been the Taboa pegmatite in Rio Grande do Norte, and the Alto do Feio pegmatite in Pedra Lavrada, in the state of Paraiba (Scholz et al., 2012). Good quality rose quartz exists in Namibia too, especially in the Rossing mountains, Swakopmund. India, Madagascar and Sri Lanka also produce some rose quartz, generally from informal workings. And the specimens of rose quartz with notable asterism from the workings in the Varandalo mountains, southeast of Antsirabé, in Madagascar, must be mentioned as well.

Situación de las labores de explotación en la zona N de la antigua concesión «Alba 1a.». Actualmente, toda el área forma parte del permiso de investigación «Nerva».



Cuarzo rosa de Oliva de Plasencia. Este tipo corresponde a la mejor calidad obtenida en cuanto a color y transparencia. Altura del ejemplar, 7 centímetros.

No rose quartz in the form of crystals has been found in Spain yet, but massive rose quartz does appear in various localities. The most important deposit, both for the quality of its material as well as for its quantity, is the Alba mine group, located some 2 km north of Oliva de Plasencia, in Cáceres. The second most important is probably the one at monte de A Curota, in the municipality of A Pobra do Caramiñal, La Coruña. There have also been occasional finds of rose quartz in Martínez in Ávila, and in other places (Calvo, 2016), but the quality of these is far inferior to that from Oliva de Plasencia. Other european localities yielding massive rose quartz include the Poschingerhütte quarry, in Arnbruck, Germany; the Grønøya mica mine in Meløy, Norway; and the Mata da Galinheira pegmatite in Vila Chã, Portugal.

Origin of the color

Since the end of the 19th century various hypotheses have been proposed about the origen of the color in rose quartz, including the presence of carbonaceous compounds, various cations and structural color centers, as well as inclusions of fibrous minerals (Dennen and Puckett, 1971). The cause of the color in rose quartz differs between the free-growing crystals and the massive material. Rose quartz crystals in pegmatite cavities owe their color to the presence of color centers with a peculiar structure, an O- ion situated between atoms of phosphorus and aluminium, present as traces in the quartz. These color centers form through the action of radiation. The color in rose quartz crystals is sensitive to heat, and also pales under the action of light (Maschmeyer and Lehmann, 1983).

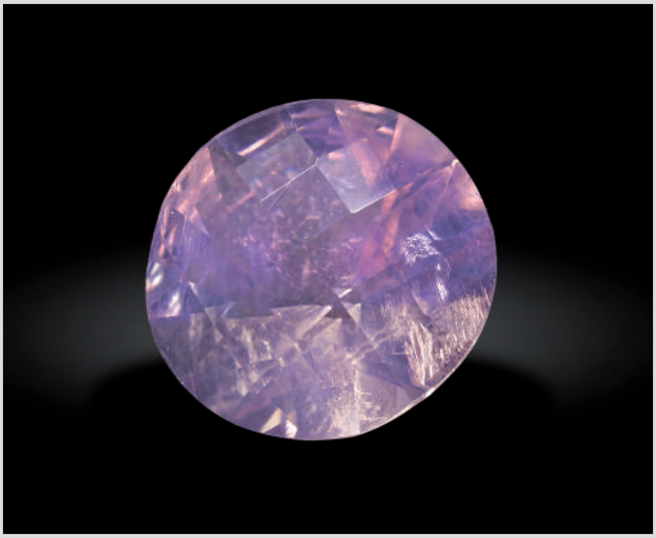
Massive rose quartz occurs as the nucleus of zoned pegmatites, having formed at a high temperature, from 400 to 700ºC, in pneumatolytic conditions.

There are no known deposits in the world of free-growing rose quartz crystals associated with massive rose quartz. Massive rose quartz is never absolutely transparent, but rather exhibits a more or less opaline or cloudy appearance. Because of this, it had already been hypothesised many years ago that the presence of some fibrous mineral could be responsible for the turbidity, generating the color by means of the Tyndall effect, with rutile being specifically mentioned, albeit without solid proof (Dennen and Puckett, 1971).

In order to determine the nature of the inclusions, Applin and Hicks (1987) dissolved rose quartz from the Ruby Range, Montana, with hydrofluoric acid, recovering in all cases a mass of extremely fine fibers, pink in color, of a mineral whose properties were similar to those of dumortierite. Later, Goreva *et al*. (2001) studied samples of rose quartz from 29 different localities, finding the same fibrous mineral similar to dumortierite in all of them. This mineral has its own characteristic pink color, and appears in the quartz as extremely fine fibers, between 0.1 and 0.5 microns thick, but probably more than a millimeter in length. It probably formed by exsolution. As already mentioned, it is similar to dumortierite, but sufficiently different to be considered a distinct species.

The extreme thinness of the fibers make structural studies difficult, so it has not yet been possible to adequately characterize it, although the name "dididumortierite" has been informally proposed for it (Nadin, 2007).

Cuarzo rosa de Oliva de Plasencia, facetado en dos tipos distintos de talla. El ejemplar de la izquierda tiene un diámetro de 1,8 centímetros y el de la derecha de 1,5 centímetros. Resulta evidente la presencia de inclusiones y defectos internos, inevitables en este material.



The study by Goreva *et al*. (2001) did not include rose quartz from Oliva de Plasencia, although a later work (Kibar *et al*., 2007) demonstrated that it too contained the same fibrous mineral similar to dumortierite.
Rose quartz displays a rather distinct pleochroism with two pink tones, very pale and darker pink. This indicates that the inclusions are not randomly distributed, but rather oriented along crystallographic planes. The rose quartz loses its color when subjected to intense heat treatment around 500ºC, which also happens (much more rapidly) when the fibrous mineral extracted from it is heated. The loss of color is not due to destruction of color centers, but rather to the oxidation of traces of Fe^{2+} present in the "dumortierite", which give a pink color by charge transfer with the traces of titanium that are also present. This oxidation is reversible by heating the fibers in a reducing atmosphere, recovering the pink color (Goreva *et al*., 2001). The effect of light on massive rose quartz has been a topic of discussion too. Although it has been claimed that rose quartz left on the dumps of old workings turns white in time, it appears that this is due to solar heating causing expansion of gaseous inclusions, creating microfractures (Goreva *et al*., 2001). In practical terms, like the use of massive rose quartz in decorative objects or as a gem, the color can be considered totally stable.
Rose quartz from some deposits (in recent years especially specimens from Madagascar) sometimes exhibits the phenomenon of asterism, with six-rayed stars and, very rarely, twelve rays. This effect is due to the presence of oriented inclusions, whose characteristics show that they are probably different from those responsible for the color (Schmetzer and Krzemnicki, 2006).

The rose quartz from Oliva de Plasencia

To the N and NW of Oliva de Plasencia there are a series of pegmatite veins, striking approximately NE – SW, with large quartz nuclei, enclosed in a two-mica granite. It is possible that these veins were known already since ancient times, since in November 1554 Diego de Ayala mentioned "crystal stone quarries" within the borders of Plasencia (Gonzalez, 1832).

Cuarzo rosa de Oliva de Plasencia, de color intenso pero con bandas de color blanco. Altura del ejemplar 12 centímetros.

Sección de cristales de mica moscovita de la pegmatita con cuarzo rosa de la concesión «Alba 1ª». Oliva de Plasencia. Altura del ejemplar 8 centímetros.

At that time, “Plasencia” was one of the townships in which the present province of Cáceres was divided, with its territory being far larger than the current municipality, including Oliva de Plasencia as well. The presence of rose quartz in this zone was known at least since the beginning of the 1950s, because Sos (1962) indicates that in the year 1952 he received a specimen of rose quartz from this locality. In 1967, the geologist Jesús Balmaseda Guerrero, during studies made for elaborating a highway plan, observed the existence of rose quartz in some of these veins, and he solicited permission for a study. In the 1970s, some extractive work was carried out, and in June of 1985 mining claims were applied for, for exploiting the Alba 1ª and Alba 2ª concessions, which were granted in July 1986, and were later aggregated to create the “Alba mining group”. One of the veins, the one situated approximately 1 km NNE of the so-called Laguna del Estanco, a bit more than 2 km north of Oliva de Plasencia, within the Alba 1ª concession, was intermittently exploited by the company Minera Balmaseda (MIBA). Industrial scale workings began in 1994. That year, according to the «Panorama Minero» published by the IGME, 44 tons of rose quartz were extracted, using both manual and mechanical methods, without utilization of explosives, mostly destined for export, with 20 tons sold internally in Spain, processed as decorative objects at a workshop located in Móstoles. In 1995 and 1996 none of the mineral was extracted anymore.

After the expiration of the mining concessions in July 2010 the land was declared open for being claimed again. Covering the zone in which the rose quartz deposit is found, in September the company Cosentino Ltd. applied for permission to prospect the Nerva claim, which was granted in February 2012 and which is still in force.

This deposit still holds substantial reserves of high quality mineral. In the vecinity of this pegmatite are other lesser ones, with a nucleus of white quartz and occasionally with some zones of pink color, although generally pale and of bad quality. One of these is situated some 400 meters south of the main workings, still within the Alba 1ª concession. Some 400 meters SW of the Laguna del Estanco, and 100 meters to the west, other veins are found. In the second of these some work was carried out to extract feldspar (predominantly albite, accompanied by microcline and sanidine), and relatively large muscovite books appeared too.

The pegmatite dyke exploited in the Alba 1ª mine is subvertical, with lenticular morphology, with a strike of about 150 meters, and the quartz nucleus being up to 20 meters thick in its central part, being enclosed in a coarse-grained granite porphyry. Apart from rose quartz, milky quartz and smoky quartz appear too. The exterior zone of the pegmatite is basically formed of feldspar and mica of very coarse grain size. In the feldspar, which is often partially kaolinized, albite predominates, with perthitic structure.

Cuarzo rosa de Oliva de Plasencia, transparente con bandas paralelas turbias, debido a la presencia de inclusiones. Altura del ejemplar, 6 centímetros.

The muscovite mica is also relatively abundant, being found as crystal sections that can reach sizes of more than 10 centimeters, mainly associated with quartz. Occasionally, there have also been found rough crystals of beryl of yellow color in centimeter sizes, transparent crystalline masses of greenish to violet fluorite, along with chlorites, biotite, iron oxides, manganese oxides, and secondary uranium minerals.

The quality of rose quartz is determined by two parameters: intensity of color, and transparency.

In this deposit, the color is very irregularly distributed in the quartz, although it tends to be more intense in the central zone and at depth (ADARO, 1993).

The apparent color, and especially the transparency, depend on the presence of fractures and inclusions too. The importance of mechanical defects on the color can best be appreciated by wetting the material, which makes the color “seem” to be more intense. It is very common for masses of rose quartz, quite independent of the intensity of their color or their overall transparency, to be traversed by internal sheets of white color, formed by groups of microscopic inclusions. These sheets probably follow crystallographic planes in the quartz, and it is normal to encounter zones with several parallel ones.

The quality of the material obtained is, logically, very variable. A major part is pale pink, with the color distributed very irregularly, with lots of inclusions, internal fractures and opaque white zones. This material can be used in the form of blocks in decorative masonry, as for example in the fountain located in the Parque de San Antón, in Plasencia, next to the acueduct which gave its name to the park. Material with attractive color, even when totally opaque, gives good results for elaborating decorative objects like boxes, obelisks, spheres, etc., and makes for interesting specimens for collections too.

The best quality, with homogenous color, can be utilized for making jewelry, like beads for necklaces, cabouchons or pendants. Pieces exhibiting asterism, which appear only very rarely in this locality can be cut and polished with curved surfaces oriented to take advantage of this phenomenon.

Occasionally some fragments are sufficiently transparent so that gems up to 10 carats can be faceted, although it is almost impossible to cut one that does not exhibit at least a few inclusions or fractures visible to the naked eye, and their color is quite pale.

The low index of refraction of quartz mean that faceted stones have little internal luster, so that generally their appearance is better when used for complex or fantasy cuts rather than using a conventional cut with a proportionally large table. On the other hand the opalescence that is invariably present distinguishes these pieces and gives them a peculiar attractiveness.

The Alba mine is the only gem deposit with real possibilities of exploitation in Spain. Most of the extracted material has been exported as rough, so the potential value added and jobs that would be created by local processing are lost. One can hope that this situation will change in future.

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