

## A STUDY ON THE ORIGIN OF EMERALDS IN MOGUL OBJECTS AT THE STATE HERMITAGE MUSEUM, ST. PETERSBURG

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**ABSTRACT.** In 1741 the Persian Nadir Shah presented 37 objects of Mogul treasures from his conquest of Delhi to Russia. Eighteen objects have remained in the collection of the State Hermitage Museum in St. Petersburg. A gemmological study of 3000 emeralds in 3 pitchers and a plate from the XVII c., carried out in September 2003 at the Hermitage Gold Room, revealed Colombia as the country of origin, due to a characteristic inclusion pattern caused by hydrothermal formation. The result confirmed gemmological testing done in 1984 by M. B. Chistyakova and is compared with emeralds from two other origins which were known since antiquity: Egypt and Habachtal in Austria. They were ruled out as possible Mogul sources, due to their different type of emerald formation and lack of regular production. The deposit of the Panshir Valley in Afghanistan, discovered in 1976, which may coincide with the emerald deposit of Baktria, written about by Theophrastus and visited by Alexander the Great, was also ruled out. There is no evidence of mining between the IV c. BC and the 1970s, and there is no further written evidence available so far. Moreover, the inclusion picture of Afghan emeralds differs.

### Introduction

In 1741, a number of Mogul objects were presented by the Persian Nadir Shah as a state gift to Russia. In March 1739, Nadir Shah (1688-1747) had conquered Delhi and the famous treasures of the Mogul Empire fell into his hands. In the same year he sent a delegation with fourteen elephants to St. Petersburg which arrived on October 2, 1741. The list of Nadir Shah's gifts (15 rings and 22 other objects), is still kept in the archives of the Russian Ministry of Foreign Affairs. Today only one ring and 17 other objects have remained in the collection of the Hermitage Museum in St. Petersburg, which together can be considered one of the world's best collections of Mogul jewellery objects (Ivanov et al., 1984; Piotrovsky, 2001).

Nine of the 17 objects preserved were originally given to Emperor Ioann Antonowich, and four each to the regentess Anna Leopoldowna and the future empress Elizabeth Petrovna, daughter of Peter the Great (Reineking von Bock, 1996). All objects are made of gold and are lavishly decorated both with enamel and with different precious stones. The refined decoration and workmanship and the materials provide a luxurious aspect unique in the history of jewellery making.

### Gemmological testing

Gemmological testing of all gemstones in the Mogul objects had been carried out in 1984 by Marianna B. Chistyakova of the Fersman Mineralogical Museum in Moscow, coming to the conclusion that the emeralds are of Colombian origin and the rubies and spinels of Burmese origin (Tschistjakowa, 1984). Emeralds from other similar Persian jewellery objects have also been considered as Colombian in origin (Meen, Tushingham, 1968).

In September 2003 the author conducted a study at the Gold Room of the Hermitage Museum. Several objects were examined: 3 pitchers and a plate, the Shah Jahan ring, 2 turban ornaments and a bracelet. The testing took all gemstones into account (diamonds, rubies, spinels, pearls and agates) but concentrated on the emeralds of the 3 pitchers and the plate. The purpose of the study was to determine their country of origin. The testing instruments used were a binocular microscope with 20x to 70x magnification and an ultraviolet lamp with both long and short wave ultra violet light (366 nm and 254 nm). The size and the bulkiness of the objects did not allow for other testing methods. Moreover, the objects could not be taken out of the Hermitage Museum.

### Testing of the emeralds

The emeralds were systematically tested one by one, moreover they were counted and measured. The 3 pitchers have a height of between 26 cm to 28 cm, they are set with about 2400, 270 and 260 emeralds each, the plate is set with about 112 emeralds. All emeralds show a simple type of cabochon cut, also called the Mogul cut, and a limited number is decorated with floral carvings. The general colour impression corresponds to an intense green, with a slightly bluish tinge. The transparency is in a middle range which means that eye-visible fractures and inclusions are present in nearly every stone.

### Inclusions observed with the optical microscope

Under the optical microscope nearly all emeralds show a pattern of thin liquid-filled inclusions with a jagged outline, the arrangement of which is characteristic of the hydrothermal type of origin of Colombian emeralds. Moreover, it is possible to detect three-phase inclusions and a number of different mineral inclusions of which both calcite and pyrite could be

identified. Remnants of a fracture-filling material, probably oil, could be detected in a number of emeralds.

### Ultraviolet fluorescence

Testing with an ultraviolet lamp revealed a yellow fluorescence of fracture fillings, similar to a fluorescence behaviour normally observed with oiled emeralds.

### Discussion about the origin of the emeralds

The objects in the collection of the Hermitage Museum were probably produced during the time of Shah Jahan, in the first half of the XVII century. The emeralds used show a uniformity in their colour and texture which suggests that they might have come from the same source, and this source must have been able to deliver a regular supply.

### Colombia

Colombian emeralds have a hydrothermal origin and in this differ from other known emerald occurrences. The deposits on the Eastern slopes of the Andes became known to the Spanish conquerors in 1537. The Spanish empire had at the time strong trade connections with India. Emeralds from Colombia reached Spain by way over the Atlantic Ocean, and from Spain they were sold to the European capitals and to trade centres in the Middle East and India. Emeralds from Colombia did probably also reach India by way of Manila, the Spanish trading post in Southeast Asia.

### Egypt and Austria (Habachtal)

There were only two other emerald deposits known in the 1600s. They belong to another type of deposit, formed by pneumatolytic contact metamorphism. Characteristic inclusions consist of mica and amphiboles, negative crystals with two-phase inclusions and liquid inclusions which differ in their appearance from Colombian emeralds. The deposit in Upper Egypt near Kosseir, mentioned by Plinius (24-79 AD) in his "Historia Naturalis" has without doubt delivered the emeralds of antiquity, and it is considered to be known since about 1500 BC (Plinius the Elder, 1987). It was probably exhausted after the Roman time and was rather forgotten until it was rediscovered in 1817 by a Frenchman. The emerald deposit in the Habachtal in the Austrian Alps has never been exploited commercially although it was apparently known to the celts.

### Other countries

The deposits inside the Indian state of Rajasthan were only discovered in 1943, those of Pakistan in 1958. All African emerald sources were discovered after World War II, the Brazilian ones in 1913. The discovery of the present Uralian deposits in Russia took place in 1830 (Sinkankas, 1981).

### Bactria/Afghanistan

The question remains if the emeralds reported from Bactria as early as in 314 BC by Theophrastus have really existed and if the deposit is identical with the one rediscovered in the Panshir Valley in 1976 by the Soviet occupation. It is a historical fact that Alexander the Great passed through the Panshir valley in 329 BC. Theophrastus wrote his treatise on mineralogy nine years after the death of Alexander, and he had stayed himself at the Macedonian court when Aristoteles was a teacher there (Giard, 1998). Plinius mentions Scythian emeralds with which he may have referred to Bactria, an area

where the Scythians have also dwelled (Plinius the Elder, 1987).

Jean-Baptiste Tavernier writes in his memoirs in 1676 that there is no emerald deposit in the east and that he considers the ancients as being mistaken. Tavernier's own life time (1605-1688) coincides with the high time of the Mogul empire, during which the objects examined were probably produced. Tavernier writes of his visits to the Mogul courts and of the treasures shown to him. He does not ever mention emeralds from the Ural mountains (Tavernier, 1981).

### Conclusion

The general inclusion picture observed with the 3000 emeralds tested in September 2003 can be interpreted as a strong evidence of their Colombian origin. Moreover did the emeralds show a striking similarity and consistency in the type of their inclusion patterns.

The only two other emerald deposits which were known with certainty in the first half of the XVII c. are Egypt and the Habachtal (Austria). They can be excluded due to their limited productivity and the fact that they belong to a different genetic type with a different inclusion picture. All other emerald deposits known today can also be ruled out as they were discovered after the year 1800. It cannot be excluded that the deposit mentioned in Bactria by Theophrastus in the IV c. BC may have been known up to the Mogul time. There are however no further written sources available and there is no evidence of mining between the IV c. BC and the 1970s.

Three-phase-inclusions have been reported from Afghanian emeralds of the last 30 years, as hydrothermal formation does occur. The general inclusion picture is however different from Colombia: the three-phase inclusions are more tabular and often contain a multitude of mineral phases.

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