

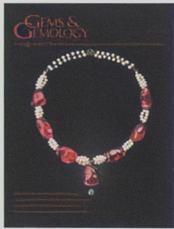
Taj Mahal: The Taj Mahal is a stunning mausoleum in the city of Agra in the northern Indian state of Uttar Pradesh. The Mughal leader Shah Jahan created it to honor his favorite wife, Mumtaz Mahal. Built in the 17th century, it is a gemological wonder. Upon closer examination, one realizes over 40 gem minerals have been intricately carved and set into the exterior and interior marble walls. Photo by Robert Weldon/GIA.

Historic gem sources and trade routes enabled Shah Jahan and the other Mughal leaders to amass spectacular mineral resources. Shah Jahan leveraged these magnificent treasures to build an architectural wonder and also created some of the most magnificent gem and jewelry collections ever accumulated. Gem merchants from around the world, attracted by this opulence, were driven to acquire what Indian sources produced as well as what flowed through India's trade centers. Indian trade followed ancient sea and land routes. The routes became more complex as brave travelers became more adventurous. Some of the key trade routes are shown on the global map of gem sources and key trading centers.

Emerald Locality: Emerald is the medium to intense green variety of beryl, a beryllium aluminum silicate ($Be_3Al_2Si_6O_{18}$). It is in the hexagonal crystal system. When the Spanish first saw emeralds in the Americas, they were astonished by the size and color. They ultimately recovered them, taking them from the indigenous people of the Chivor and Muzo mining areas of what is now Colombia. They shipped vast quantities of emeralds to India to be traded for the elusive Golconda diamonds.



Parchin Kari: The border on this marble carved panel is called parchin kari, a lapidary technique in which slivers of gem materials are fashioned into intricate patterns and inlaid into the marble. The lapidary artists used over 40 gems from around the globe. Photo by Robert Weldon/GIA.



Spinel Necklace: The Mughal emperors valued spinels and had large spinels engraved with their names and the dates of their reigns, using a diamond tool. This necklace contains seven inscribed spinels, numerous Bara pearls, and an emerald drop. From the Taj Mahal. Collection is sold at a Christie's auction for \$3,015,000 in 2019. A gemmological laboratory certified the origin of the spinels from Tajikistan's Kuh-i-Lal mine.

Spinel Locality: Spinel is a magnesium aluminum oxide ($MgAl_2O_4$) in the cubic crystal system. In Mughal times, the primary source was from Badakhshan, a region in what is now Afghanistan, Tajikistan, and China. These remarkable spinels, sometimes called "balas rubies," came from the remote area of the Pamir Mountains in Tajikistan in a mining area called Kuh-i-Lal.



Emerald: Emerald crystal in calcite from Tumurus mine, Colombia. Photo by Robert Weldon/GIA.



Facade: The eastern facade of the Taj Mahal is framed by exquisite parchin kari and an inscription in Urdu on the Koran. Photo by Robert Weldon/GIA.



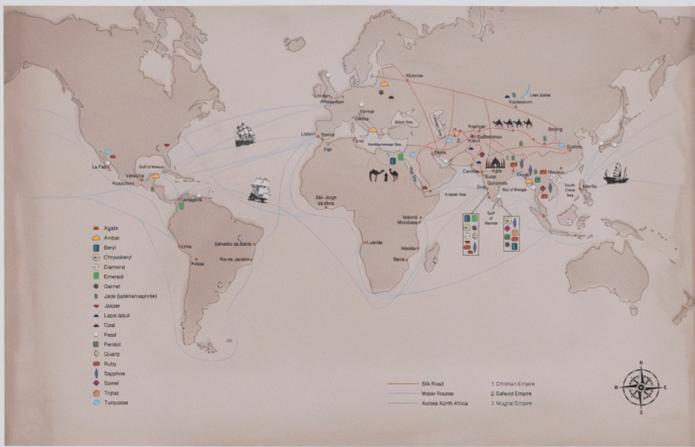
Emerald Horn Pendant: The Spanish introduced emeralds to Europe and India. They came from the Chivor and Muzo mines, which had been mined from Pre-Columbian times. The intricate trade routes across the Atlantic, Pacific, and Indian Oceans joined with land routes through extensive family trade networks. This 125 ct Colombian emerald is engraved in Arabic with inspiring words from the Koran. Photo by Robert Weldon/GIA. Courtesy of private collectors.



Emerald: Emerald crystal in calcite from Coscuez mine, Colombia. Photo by Robert Weldon/GIA.

Gem Mineral Localities at the Time of the Taj Mahal

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Global Map: Gem sources, trade routes, and key trading centers at the time of the Taj Mahal.

Gem merchants like Jean Baptiste Tavernier came to India in search of the finest gems to take to their royal leaders in Europe. Tavernier made six journeys to Turkey, Persia, and the East Indies, traveling over 120,000 miles. He documented the gems he saw and chronicled his adventures along the way. The most prized gem was the Golconda diamond. Tavernier traveled to Golconda and nine other diamond sites in India. At the Kollur mine, he obtained a 115.5 ct blue rough, which became known as the Tavernier Blue (a Type IIB diamond with remarkable red phosphorescence). Five years later, it was cut into the 68 ct French Blue and later recut into the famous 45.52 ct Hope Diamond, now a prized exhibit at the Gem Hall of the Smithsonian Institution.



Tavernier's Travels: This map shows Tavernier's travels along the Silk Road to the famous Golconda diamond mine as well as nine other Indian diamond localities.



Colomian Emeralds and Golconda Diamonds: This necklace was obtained from descendants of the Nizam of Hyderabad. This magnificent necklace and matching earrings are set with approximately 150 carats of Golconda diamonds and 47 Colombian emerald beads. Together, they are strong symbols of the power and wealth in one of the richest ruling families of India. Photo by Robert Weldon/GIA. Courtesy of private collectors.



Jean Baptiste Tavernier: This colorized etching of the French traveler and merchant extraordinaire, Jean Baptiste Tavernier, illustrates a 1712 edition copy of *Les Six Voyages de Jean Baptiste Tavernier*, chronicling his travels. In India, he sought the finest gems to bring back to royal leaders in Europe. Few Europeans had as much knowledge of the life and times of the Mughals during the mid-1600s. Tavernier documented the gems he saw and described his adventures during multiple journeys to Turkey, Persia, and the East Indies. Colorized by Robert Weldon/GIA.



Golconda Diamonds: The 45.52 ct Hope Diamond (right) and the 31.04 ct Wittelsbach-Graff Diamond. Photo by Robert Weldon/GIA. Courtesy of the Smithsonian Institution.



Becoming the Hope Diamond: This is a sketch of what would later become the Hope Diamond brought back from India by Jean Baptiste Tavernier. Tavernier sold the diamond to King Louis XIV of France in 1668. He later wrote a book titled *The Six Voyages of Jean Baptiste Tavernier*. This sketch comes from a scan of the first English edition of that book, published in 1678.



Dancing Shiva Pendant: In this gold pendant, a host of gemstones form a mosaic of the god Shiva. Lord Shiva's face is carved out of blue sapphire. Above his head is the "face of glory" carved in emerald. This jewel contains ruby, emerald, diamond, blue sapphire and cat's-eye chrysoberyl. Photo by Robert Weldon/GIA. Courtesy of private collectors.



Sapphire Crystals: Doubly terminated from Sri Lanka. Photo by Robert Weldon/GIA. Courtesy of Sri Lanka International.

Sapphire Locality: Sapphire is the gem variety of corundum, an aluminum silicate (Al_2O_3), occurring in all colors except red. These doubly terminated crystals in the hexagonal crystal system are from the island of Sri Lanka, a key source for sapphire during Mughal times. The island, below the southern tip of India, was known as Ceylon. It has been called the "Jewel Box of the Indian Ocean." People have recovered sapphires, ruby, topaz, beryl, amethyst, chrysoberyl, peridot, and garnet from the gem gravels and colluvium.



Ruby: Ruby in a calcite crystal from Mogok, Myanmar. Photo by Robert Weldon/GIA. Courtesy of Pala International.

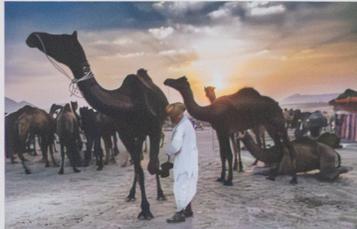
Ruby Locality: The two gem varieties of the corundum mineral aluminum silicate (Al_2O_3) are called ruby when red, and all other colors are known as sapphire. The Mughal's favorite source of rubies was in the remote area of Pegu in what is now Mogok in Myanmar (Burma).



Navarata Nephrite Pendant: This intricately carved nephrite pendant with twelve gems in the Jali style of the marble in the Taj Mahal contains nine gems. The powerful combination of gems was worn for protection and to improve one's astrological fortunes. The nine gems are diamond, pearl, blue sapphire, moon, coral, red garnet, yellow sapphire, green sapphire, and red garnet. Photo by Robert Weldon/GIA. Courtesy of private collectors.



Jade Turban Ornament: Reserved for the wealthiest and most powerful, this gem ornament, designed to be tucked into the folds at the front of the turban, is one of the real white jade, also known as "mutton fat" jade, was believed to ward off heart disease and high blood pressure. The light often leaves the form of a loach (kajagi). Jade (nephrite), diamond, sapphire and emerald. Photo by Robert Weldon/GIA. Courtesy of private collectors.



Travel in the Indian region was overland and using camels. Robert Weldon's photograph of a recent scene of a camel market in Pushkar, Rajasthan, India, shows that little has changed since the Mughal time. Photo by Robert Weldon/GIA.

The Silk Road remained the most enduring network of trade routes for over 1500 years. A sequence of caravan trails, the Silk Road was named for the prized Chinese silk along with jade, tea, spices, gold, and silver that were traded along its many paths. The Taj Mahal lies on the banks of the Yamuna River, which aided travel and trade along the Silk Road into India.

Nephrite Locality: Nephrite is one of two rocks commonly called jade. It is a calcium magnesium silicate ($Ca_2(Mg,Fe)_3Si_8O_{22}(OH)_2$) in the monoclinic crystal system. The Mughals sought nephrite for decorative items such as bowls, dagger handles, and in the parchin kari of the Taj Mahal. The sources were Myanmar (Burma), Tibet, Kashgar, and China. For eight thousand years, the Chinese have treasured jade. The most valuable is the white or mutton fat nephrite found near the Hetian (Khotan) Prefecture.

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