

VAIDŪRYA, MARAKATA AND OTHER BERYL FAMILY GEM MINERALS:
ETYMOLOGY AND TRADITIONS IN ANCIENT INDIA

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(Received 18 February 1993; after revision 18 May 1993)

An original hypothesis regarding the etymological roots of the words *marakata* - emerald is submitted for the scrutiny, and possible acceptance, by the world of scholars. The earlier views on the *vaidūrya* - beryl etymological nexus are critically reviewed and rationalised. This paper also records an account of the widespread use of the beryl-family gem minerals in the ancient world, particularly in India.

INTRODUCTION

This paper deals with the etymology of *vaidūrya* and *marakata*. Sanskrit terms for green beryl and emerald respectively, and primacy of the Indian tradition in the ancient world regarding the use of these two and related gem minerals. Before we approach the subject, it is necessary to introduce a bit of scientific information on the beryl family of gem minerals.

Most gem minerals are hard and coloured. Hardness is intrinsic to the structure but the colour is often not. Quartz (Moh's scale hardness 7), zircon ($7\frac{1}{2}$), beryl ($7\frac{3}{4}$) topaz (8), chrysoberyl ($8\frac{1}{2}$), corundum (9) etc. are all colourless when absolutely pure. Trace impurities make them coloured.

Beryl $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$ in which the oxygen atoms are the biggest species, which surround silicon atoms staying inside the tetrahedral structure, The negative charges of the silicate tetrahedra are neutralised by the beryllium and aluminium cations in beryl. The cyclosilicate structure provides hollow interstitial channels or pipes of approximately 1.5Å diameter. (Fig. 1).

Whereas pure beryl or goshenite is colourless, colour is caused by occasional impurities: transition metals in a ligand field¹. A small proportion of Cr^{3+} substituting Al converts colourless corundum into red ruby and colourless beryl is converted into intense - green emerald by 0.2 p.c. and above chromium content. Chrysoberyl BeAl_2O_4 is also rendered bluish green on account of Cr^{3+} . Aquamarine has the beryl structure like emerald, but its major impurity is iron. When iron substitutes aluminium in the

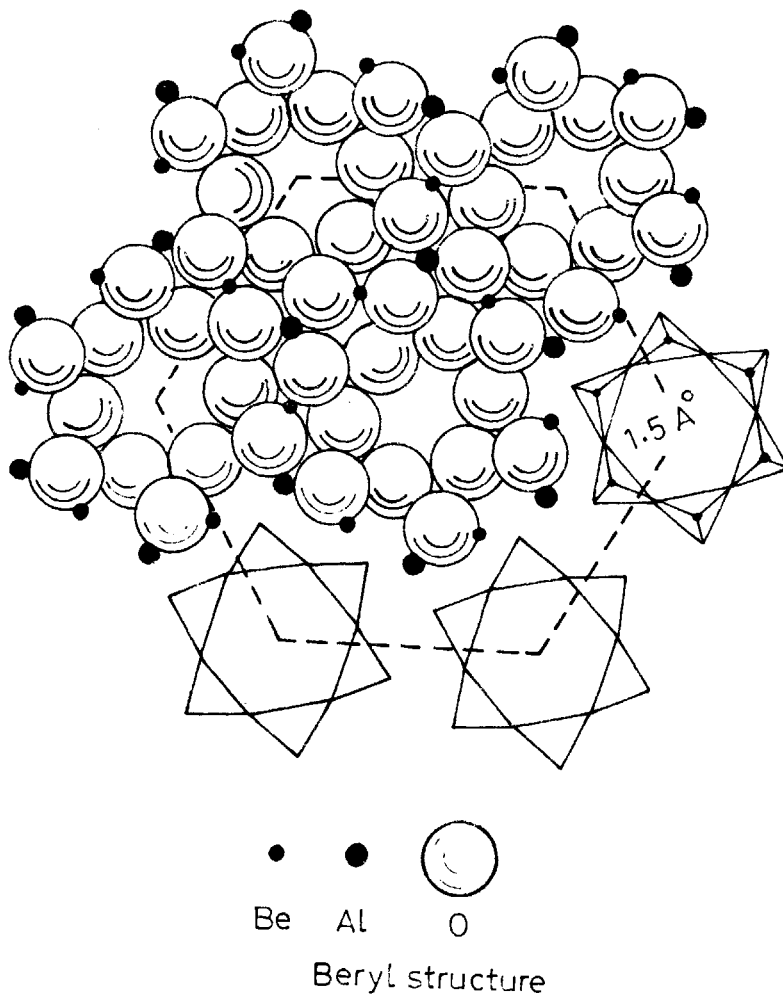


Fig. 1 Cyclo-Silicate : $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$

lattice, the colour becomes deep blue. Iron may also stay in the interstitial (channels) in which case Fe^{3+} iron provides yellow colour and Fe^{2+} ion no colour. The combination of blue and yellow makes aquamarine appear sea-green. On irradiation Fe^{2+} loses electron and becomes Fe^{3+} . Heating on the other hand, allows Fe^{3+} to recapture electron and be converted back to Fe^{2+} . Thus irradiation converts Fe^{2+} - containing colourless beryl to yellow or golden beryl or heliodor, and blue aquamarine to a sea-green gem, the greenness of which has evidently a cause different from that of the greenness in emerald^{1,2}.

Suitable combinations of iron in the lattice and the interstitial space or little vanadium render yellow-green or grass-green colour to beryl².

ETYMOLOGY OF VAIDŪRYA

The Western scholars admit ignorance about the etymology or the origin of the names 'beryl' and 'emerald'^{2,3} – but we can easily trace the ancestry back to 'vaidūrya' and 'marakata', two Sanskritic names, which in their turn can be etymologically explained.

In the *Aṣṭādhyāyī* (4.3.84), Pāṇini, who flourished around 500 B.C., mentioned that the mineral came from the city of Vidūra and hence was named Vaidūrya: 'Vidūrāt syah'. Later it was stated by Patañjali (Bhāṣya, 2.313) that Vidūra was only the gem-cutting centre, whereas the mines were in the mountain Vālavāya.

S.R. Sharma has written⁴ that the Vidūra - Vaidūrya nexus 'is a fiction invented by the grammarians', but Buddhabhaṭṭa's account (Ratnaparīkṣā, 199) of early 6th century A.D. is clear enough : mine of beryl existed in that mountain not far from Vidūra, Kongavālikasīmanta, which Finot indentifies⁵ as the borderland between the Koṅga and Cola kingdoms i.e. modern Salem district. Patañjali's Vālavāya mountain is Buddhabhaṭṭa's Vālika. It is well-known that Koṅga kingdom once governed beryl mines of Coimbatore (the name Koṅga is embedded in Koṅgavālika) of the Salem district from which beryl gems were supplied to the Romans. (Fig. 2).

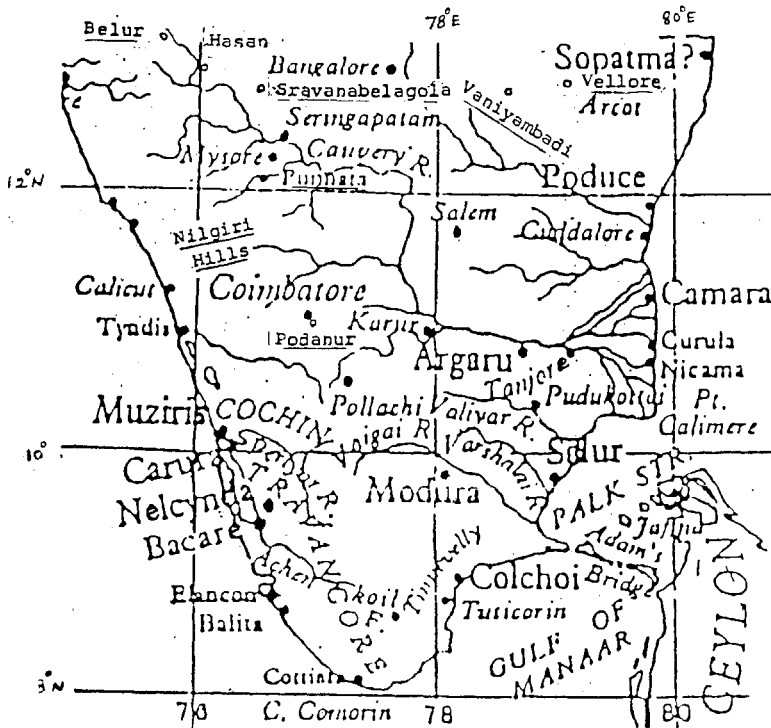


Fig. 2 Ancient beryl mining and processing sites in South India

Alfred Master has suggested⁶ that *veluriya*, the Pali *equivalent* for beryl, was actually a Dravidian word (preceding Pāṇini's *vaidūrya*) and the adjectival form of *vēḷur* which means, in the Dravidian languages, white (*vēḷ*) town (*ur*). In Telugu there is further distinction between *Rāya vēḷur* (white crystal stone Velur) and *Uppu Vēḷur* (salt Velur). Evidently Velur was the beryl capital city in South India during the Nanda and Maurya era and even later, and known as *Vidūra* ('the far away city') to Pāṇini living near Taxila in North India. The 500 A.D. inscription of the Ganga king *Durvinīta* mentions both Velur as well as the Punnata kingdom described by Ptolemy as '*Punnāṭa* in which is the beryl'. It appears that there might have been several Velur's or beryl - processing centres e.g. modern towns of Vellore (in Tamilnadu), Belur (in Karnataka), Vellalur (near Coimbatore) etc. Belur is near Sravanabelagola, the town where Candragupta Maurya breathed his last. (Fig. 2).

It may therefore be proposed that the South Indian word *veluriya* which originally stood for white crystals of quartz and beryl, and later coloured beryl (blue and green), was retained in Pali and converted to *vaidūrya* in Sanskrit. The Greeks (Septuagint. 274 B.C.) named it as *beryllos*. In Arabic and Persian the original meaning of white crystal was retained in *billaur* which meant quartz as well (Hindi : *beloāri*)*.

The Latin word *beryllus* (close to Greek *beryllos*) gave rise to the English words beryl and element beryllium and middle high German *brille* standing for eye-glasses as it did during Pliny's time². Emperor Nero used to wear a pair of glasses made of green beryl. The Benedictine monks considered green beryl as a symbol of purity and through which luminaries could see into the future².

BERYL IN INDIAN ANTIQUITY

During the historical period of sixteen *mahājanapadas*, the Northern India established firm contact with the South, and beryl from the mines around Velur became popular in the north. Buddhist relic caskets of beryl and rock crystal have been found from the stūpas of Bhattiprolu and Piprahwa, the latter corresponding to the Maurya period.

Beryl gem must have been a popular item of luxury during Buddha's time; *Mahāvagga* (5.8.3) and *Cullavagga* (5.9.1) forbade devotees to use footwears and vessels respectively, if beryl gems were set in them. *Sōpheites* or *Saubhūtu*, the Indian king near Jhelum, surrendered his spectre 'made of gold and set with beryls' to Alexander. As *Kauṭilya* mentioned in his *Arthaśāstra* (2.13.33) *kāñcanakāru*, to bind or set gems like beryl in gold and silver was a popular technical craft in India and the ancient world in pre-Christian era. *Mahābhārata* (1.191.15) mentioned vessels and jewelleryes in which beryl and diamond were set; this epic also referred to beryl from

* Wheeler, Ghosh and Krishna Deva's report on Ist Century A.D. Arikamedu site near Pondicherry (Ancient India, 2, 1946, pp. 17-124; note in pp. 122-123) indicates widespread use of chalcidonic and crystalline quartz, which were available in the rocks near Tanjore and the estuaries of Krishna and Godavari. Ancient South Indians might have referred to quartz also as *veluriya* coming from *Rāya Vēḷūr* (Telugu) (Fig. 3).

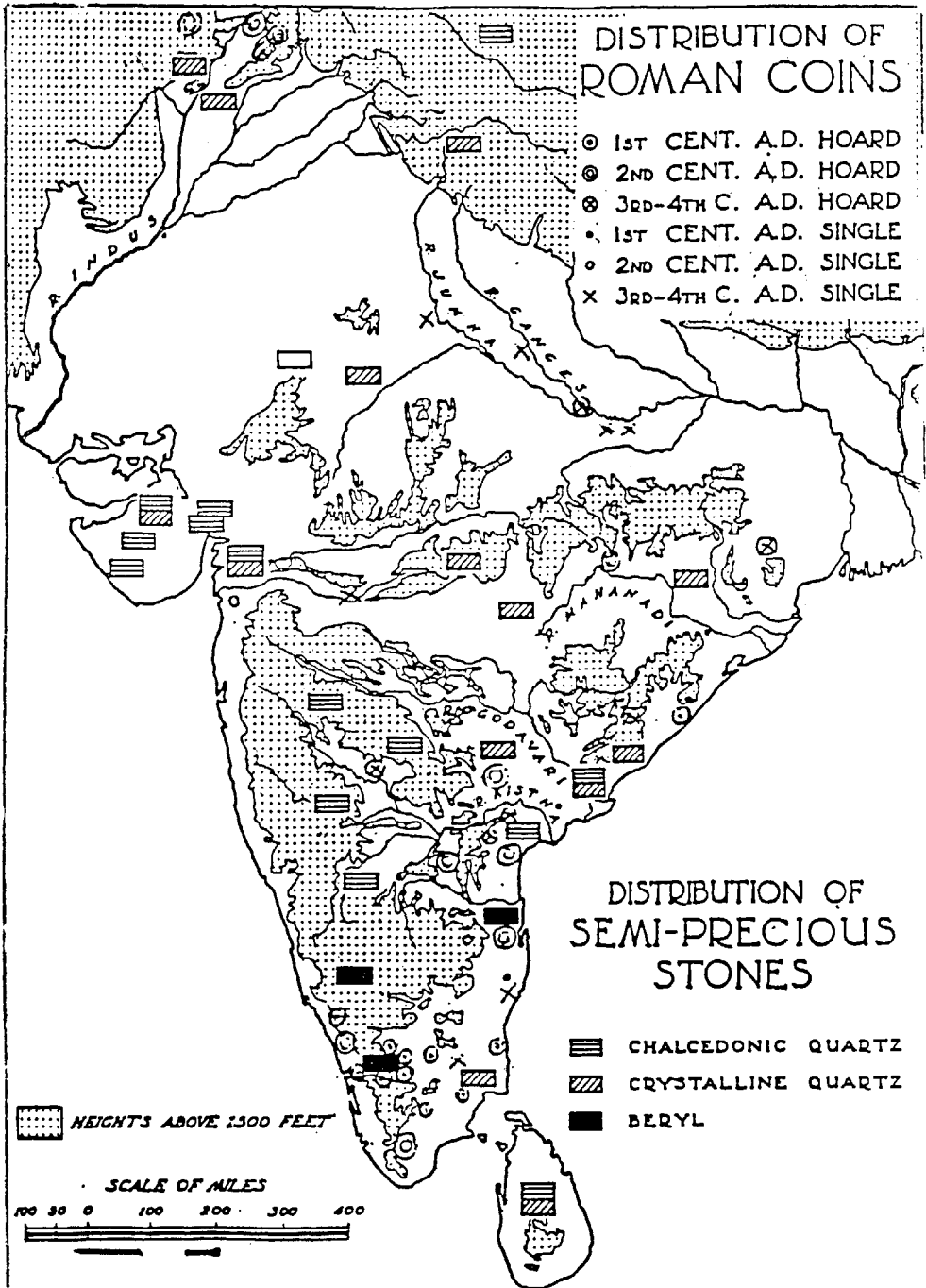


Fig. 3 Distribution of semi-precious stones and Roman Coins during the Era of Indo-Roman Trade (Taken from Wheeler et al., ref. no. 10)

Mount Nīla (6.7.3) which also produced nīla or blue aquamarine. Vaidūrya or beryl is mentioned under several contexts in Rāmāyaṇa (Araṇyakāṇḍa, 42.16 19; Kiṣkindhākāṇḍa 1.1, Uttarakāṇḍa, 40.25), often bracketed with diamond.

At the turn of the Christian era, beryl became popular in the West mainly through the Indo-Roman trade. In the first century A.D., Pliny wrote in his *Naturalis Historia* (37.5) that beryls were seldom found elsewhere than in India, and that Indians had discovered how to make counterfeit beryls by staining crystals⁷. Pliny further commented (37.20): "The lapidaries cut beryls of a hexagonal form, when the colour is heightened by the reflection from the anglesThe most esteemed beryls are those which in colour resemble the pure green of the sea. The people of India are marvelously fond of beryls of an elongated form".

Pliny did not know that the lapidaries did not cut the gems in hexagonal form, beryl naturally occurred in that form. As regards the popularity of sea-green beryl and its elongated form his observation was accurate. Mahābhārata (5.118.8) compared beryl crystal with elongated grass needles and Kālidāsa mentioned *ratnaśalākā* or the long columnal grass-green crystals of vaidūrya (Kumārasambhava, 1.24). Mṛchchhakatika, an early Sanskrit play described jewellers' shops handling beryl and other gems.

The Roman accounts of the first few centuries of the Christian era indicate the existence of three contesting empires of South India : (a) the *Cera* dominating the sea-coast from Calicut to Cape Comorin with ports at Muziris (Cranganore) and Nelcynda (Kottayam) (b) the *Pāṇḍya* kingdom around the districts of Madura and Tinnevely and (c) the *Cola* kingdom dominating the eastern sea-coast of South India. The meeting place of the three kingdoms was near the modern Karur or Karuvur in Coimbatore which was incidentally the heart of beryl mining area, a cause of conflict amongst the three empires⁸. Punnata (Seringapatam or near Kittur on the river Kabbani) south - west of modern Mysore, was known to produce beryls. Padiyur or Podanur was the second mining area, both controlled by the Chera kingdom. Beryl was processed around Coimbatore, and exported through Muziris. We have records of a third mining area in Vaniyambadi, near modern Vellore, which was owned by the Chola empire⁸⁻¹⁰ (Fig. 2.). Along with the real stones, imitation beryls (green glass gems) used to be exported for the Roman market⁷.

Warmington wrote⁹: "Beryl was highly favoured by the Romans; the sea-green aquamarines were valued more than the blue, and were more preferred than gold of the large quantities of Roman coins found in the Coimbatore district, where splendid six-sided beryl-prisms are found, many were possibly given in exchange for beryls". The stones were often polished in their original shape and worn by ladies as 'cylindri' in their ears. The Roman even decorated bowl with them, and they seem to have been

* Wheeler et al (Ancient India, 2, 1946, pp. 116-117 and 122-123) had earlier emphasized this point viz., largest hoard of the Roman coins and the beryl mining area in the Coimbatore district (Fig. 3).

even more widely used among the ancient Indians¹¹. At Rome, beryl became suddenly popular, at the beginning of the Empire, and 'beryllus' occurred as a name."

BERYL FAMILY GEM MINERALS

We have indicated in the introduction that pure beryl or goshenite is colourless, and could have been confused with quartz, both being indicated by the term 'veluriya' (vel = white). Quartz was known as 'billaur' in Arabic and Persian.

Warmington mentioned⁹ that Isidore had been aware of nine kinds of beryl, and Pliny mentioned seven kinds 'rarely found outside India' of which 'sea-green aquamarine was valued more than the blue'. Pliny's 'oriental emeralds were probably sea-green aquamarine type beryl.

Blue aquamarine or beryl was well-known and adored in India as '*nīl vaidūrya*' (coming from Nilgiri mountains). Mahābhārata mentioned (3.39.17; 6.7.3; 12.326.5 etc.) *nīla vaidūrya*, distinguishing it in the third reference, from *indranīla* or sapphire, another blue gem of a different family (that of corundum). Buddhahatṭa referred to a wide range of colour for *vaidūrya*: the conventional green (Ratnaparīkṣā, RP 203), blue as well as golden red (RP 202 and 208); the last one could have been beryl with Fe³⁺ in the interstitial channel (hence yellow) or manganese - containing pink beryl of morganite variety, as explained in the introduction.

Buddhabhatṭa described (RP 200) one variety of *vaidūrya* as '*sphuliṅgāni bahā*' exhibiting chatoyancy like cat's eye. The phenomenon of chatoyancy is due to existence, in immense number, of microscopically small cavities arranged in a particular direction or a bundle of microscopic channels running parallel to a single direction. When viewed at right angles to this direction, a band of light is visible running across this bundle. The net appearance of chatoyant mineral is milky white or 'cat's eye with horripilations'. Following Buddhahatṭa, Māgha equated (Śiṣupālavadhā, 3.45) *vaidūrya* with *bidāleṣana* or chatoyancy of cat's eye, and recently Finot has supported this notion⁵. Sarma suggested⁴ that at one time *vaidūrya* could have been a generic name implying cat's eye as well.

However, the above equation seems to be wrong because the modern literature does not indicate that chatoyancy is observed in any beryl sample. Buddhahatṭa and some other ancient scholars might have erroneously termed green chatoyant chrysoberyl, a beryllium aluminium oxide mineral, as beryl which is a silicate; they were misled on account of similar colour of the two minerals. We would mention later how green chrysoprase, nickel-containing compact quartz, was wrongly taken as *pannā* or emerald, a beryl-group mineral.

It is thus obvious that the ancient scholars of India understood that *vaidūrya* meant white, sea-green and sometimes blue beryl and nothing else⁶. Kauṭilya clearly characterised (Arthaśāstra or AS 2.11.30) beryl having 'the colour of the blue lotus,

of the śirīṣā-flower, of the colour of water, of the colour of green bamboo and parrot's wing', distinctly setting it apart from cat's eye or *mārjārākṣaka* (AS 2.11.39).

Buddhabhaṭṭa himself described the principal colour of beryl (RP 203) as resembling the blue neck of the peacock or green bamboo. *Agastīya Ratnaparīkṣā* (78) and *Garuḍa Purāṇa* (1.73.6-7) compared beryl with the back of glow-worm in colour.

It is significant that intense green marakata or emerald does not appear in Rāmāyaṇa, Kauṭilya's Arthaśāstra or any Indian literature of the pre-Christian era. Its copious mentioning in Mahābhārata may be safely interpreted in terms of late interpolations of the relevant passages in the epic. Marakata was imported from Egypt only during the Greco-Roman trade contact with India. Mahabharata specifically mentions Rome and the land of Yavanas (2.28.49), betraying late interpolation of the said passage.

As we have already said, only those beryls coloured by the presence of minor amounts (0.2 per cent and above) of chromium are described as emeralds. Small amounts of iron can also cause beryl to be moderately green (Pliny called some Indian beryls as 'oriental emerald'), but the characteristic colour nuance (intense green) of *marakata* or emerald is never produced by iron².

There is no report of any emerald mine in ancient India. The samples were certainly imported from Egypt, in small quantities after Alexander's contact with India and in substantial amounts during Indo-Roman trade. Though the occurrence of emerald in Ethiopia had been known to the ancients, the locality became completely forgotten. The earliest known emerald locality is in upper Egypt. Cleopatra's emerald mines, located a little south of latitude 25°N, were close to the coast of the Red Sea as well as to the desert area (Fig. 4) and known as such by the Indian traders¹². These ancient mines, once forgotten and discovered by Cailliaud in 1819 A.D., have been archaeologically dated as early as 1650 B.C.; this means that mining operations had been started at least fifteen centuries before Greek miners worked there during Cleopatra's time. Cailliaud found ropes, baskets, lamps, levers, tools and utensils of various kinds, lying about all over the place.

During Alexander's invasion of India the Greek observers were surprised at the Indians' fascination for sea-green or faintly green beryl, presumably because they had known intensely green emerald in Cleopatra's mine, the material which was not easily available in India, though known as *masāraka* or the Egyptian gem.

Etymology of Marakata and Emerald

To the best of our knowledge there has been no satisfactory explanation regarding the origin of the names of this gem mineral in different languages. Warmington wondered: "Was the word *marakata* borrowed from the West (Greek *smaragdōs*)?"¹³ We intend to argue in our tentative but original (without any precedence) hypothesis



Beautifully formed Crystals of Emerald, Aquamarine, Heliodor & Morganite



Blue-green Aquamarine, Beryl and golden Beryl



Morganite Pink Beryl: 24 x 28 mm Utah, USA



Emerald in Dagger Istanbul Palace Museum



Emerald Crystals in Limestone



Emerald 23 x 35 mm Colombia



Weight for Floor Covering, Mughal, circa 1700.
alabaster with gemstone inlay, 9.5 x 8.5 cm.



The Taj Mahal Emerald, Mughal, circa 1630-50.
Colombian emerald, 4 x 5 cm.
weight: 141.13 carats.



Patricia Emerald, Colombia, 2½" x 1" 632 Carats

that it is the other way round. Indians imported emerald but developed and exported the etymology.

The Sanskrit word *marakata* bears the imprint of *maru* (desert) and *kata* (= *saikata*, sandy sea-coast, the English word 'coast' itself being not too remote etymologically). The Cleopatra's mines are situated close to the desert area as well as in a depression of long range of mountains bordering the west coast of the Red Sea. The emerald mines are in two groups, one being known as the Jebel (= mountain) Sikait (also called Sacketto, clearly derived from Sanskrit *saikata*), and the other ten miles to the north, as the Jebel Sabara¹² (or Zabara or *Varvara* in Sanskrit meaning the Auxamites or Ethiopia/North-East African people).

In the justification of our hypothesis regarding the origin of the word *marakata*, we cite Buddhahatta of the 5th century A.D. mentioning (Ratnaparīkṣā 150) *marakata* mine (*ākara*) past the sea-coast (*tīradeśe*), mount *Varvara* and near the desert (*maroḥ samīpe*). *Agastimata* (287) and *Ratnasāṅgraha* (13) provide similar topographical descriptions.

We have indicated the *kata-saikata-sea-coast* etymological nexus. Few more relevant words or names (of places) may be mentioned in their connection. Pliny's *Coptos* (Keft) was the most important trading town for emerald. The place was not very far from the sea-coast and the name *Coptos* resembles Sanskrit *kata*. From *Coptos*, emerald and other materials used to be sent on caravan routes to the sea-ports of *Myos Hormos* and (at a later date) *Berenice*¹⁴. Across the Arab land there were the land-routes of trade between *Petra* and *Charax* (near *Basra*) and *Gerrha* (near *Qatar*)¹⁴. The word *Qatar* reminds one of the Sanskrit *maru-kāntāra*, meaning desert-wilderness (Fig. 4).

The Romans preferred the sea-coast route (Stage I and then direct route across the mid-Indian Ocean discovered by *Hippalos*). The rise of the *Parthians* led to the closure of the land-route and avoiding as much of the Red Sea as possible. *Berenice* and *Adulis* gained more importance. *Cosmas* reported in the 6th Century A.D. (XI.339 and 449B) that merchants transacting emerald, coral etc. passed through *Coptos* on the way to *Ethiopia* and *India*¹⁵, and probably brought back by the same route, goods such as *Indian beryl*, *pearl*, *pepper* etc. *Buddhahatta's* description '*varvarālayam aṭīya maroḥ samīpe... payonidhiṭīre deśe...marakata ākaratām*' (RP 150) graphically corroborates the Roman description of *Cosmas*.

The *Mahābhārata* has used *marakata* as well as other names for emerald such as *masāragalu* (12.46.33). and *masāraka*. *Monnier - Williams* explains in his Sanskrit dictionary that *Egypt* was named as *Mīśra* (a place of mixed races - *European*, *Asian* and *African*), *Mīśar* or *Misar*, and *galu* means a gem. Adjectival *masāra* means *Egyptian*. Therefore, *masāragalu* or *masāraka* may be interpreted as the gem form *Egypt*, and this is consistent with our original hypothesis, suggested for the first time, regarding the etymological origin of the word *marakata*.

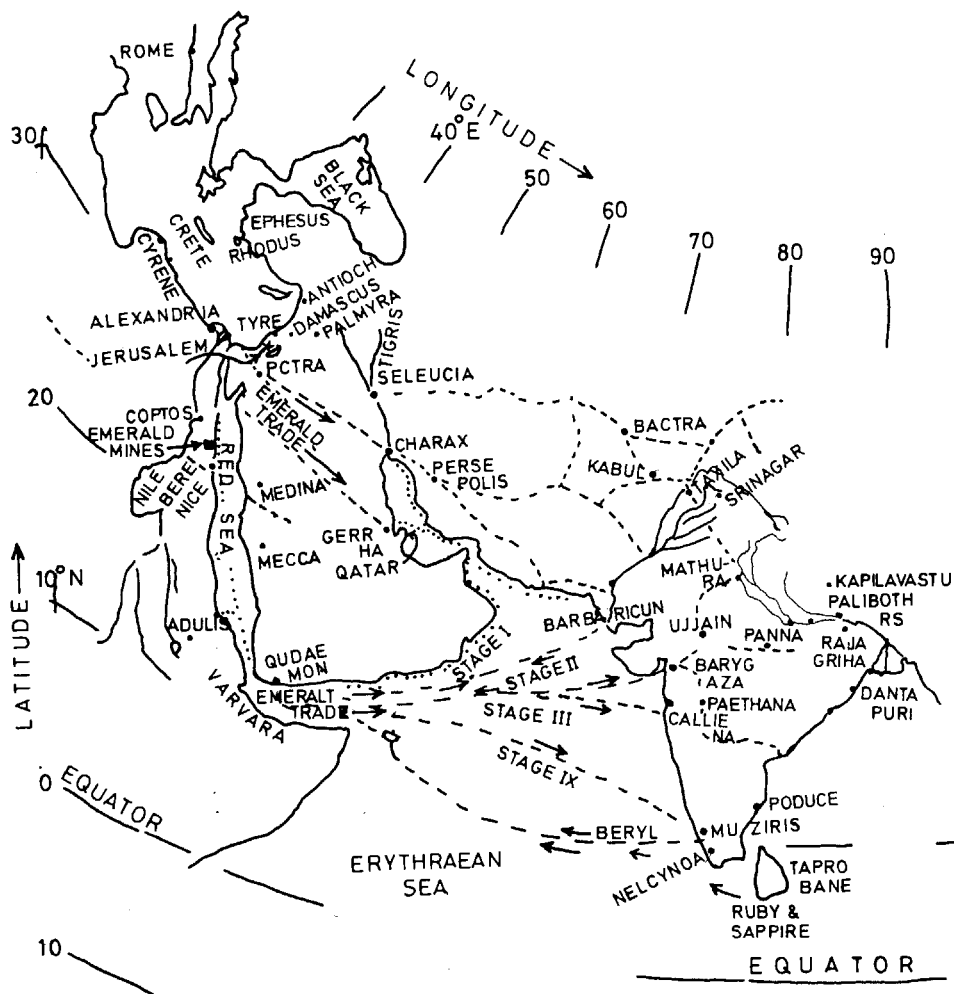


Fig. 4 Ancient world during the early Christian Era and the gem trade routes

Medenbach and Wilk² came very close to the solution of the etymological problem by suggesting: "The original meaning of the Greek word *smargados* is unknown; it is thought to be a word borrowed from the Sanskrit *samāraka*". We propose that the Sanskrit word *masāraka* (not *samaraka*) was known during the Greek era, and distorted by the Greeks as *smaragdos*, just as *marakata* and *masāragallu* became *maragata* and *masārakalla* in the *Prākṛt* text *Āṅgavijjā* (58.20). Eventually, Greek *smaragdos* became

smaragdus in Latin and *smaragd* in German; it was converted to *zumarrud* or *zamarrad* in Persian, *zamarut* in Arabic, *esmeralda* in Spanish and lastly *emerald* in English. The presented original hypothesis regarding the etymological link across marakata - masāraka - smaragdus - emerald is now open for scrutiny, and possible acceptance, by the world of scholars.

Emerald has few more name - equivalents in Sanskrit: *Harinmaṇi* (green gem), *Garuḍogāra*, *Gārutmata*, *Pannā* etc. The last three may be briefly explained.

The gemmology texts propounded the mythical theory that gems had been derived from the body of demon Bala, slain by Lord Viṣṇu's bird Garuḍa. Diamond arose from Bala, slain by Lord Viṣṇu's bird Garuḍa. Diamond arose from Bala's bones, ruby from the blood, sapphire from the eyes and the emerald from his bile. Ratnaparīkṣā (RP 150) described that Garuḍa had taken the *green* bile of the demon in its mouth and then vomitted it (hence the names *Gārutmata* and *Garuḍogāra* for emerald) 'on a mountain on the sea-coast near a desert beyond Varvara country' (RP 150). The Mahābhārata (3.213.13) compared *marakata* with *pitta* (green bile).

Agastimata (285) mentioned Garuḍa as the king of the serpent-demon: *pannagādhipa*. The word *panna* means an object fallen or dropped also creeping snake; *pannaga* means belonging to snakes (Monnier-Williams). Thus, 'the dropped bile of the serpent-demon' or emerald gem might have been known as *Pannā* also.

We surmise that the site of the famous diamond mine in Bundelkhand was named 'Pānnā' because south-west of the site is a cone-shaped depression filled with green mud resembling pānnā or emerald. Actually the material there is chrysoprase or hydrated nickel silicate-containing compact quartz. Apple-green chrysoprase beads were found at Chanhu-daro; this mineral was also known as iaspis, prase and plasma ('mother of emerald').

The association of the emerald gem with the Garuḍa myth is also indicated by the use of the name *tārḷṣya* (Garuḍa was the son of Tṛḷṣa) for emerald (Rasa-Ratna-Samuccaya 4.5)*.

EMERALD IN THE ANCIENT WORLD

Just as the tradition of beryl started in South India, the tradition of emerald began with the 1500 B.C. mine in Egypt. *Sacro Catino* or the celebrated emerald dish presented by the Queen of Sheba to King Solomon in Palestine could have been made of green glass or minā, but tradition suggests very early use of emerald. Herodotus

* For this suggestion, we are indebted to the reviewer who also opined that *Pannā* came from Sanskrit *Parṇa* or *Prākṛt Paṇṇa*, thus indicating a particular gem having the greenness of leaf. The latter suggestion however misses the Garuḍa-snake mythological story. In our opinion, *Pānnā* is more in concordance with *pānnaga*, *pannagādhipaḥ*, *Garuḍogār* etc. In any case, the greenness (whether of the serpent's bile or of the leaf is the common factor.

mentioned emerald in Polycrates' ring, as one of the gems used by Darius, and the so-called 'emerald column in the temple of Hercules in Tyre, which emitted a splendid light in night'¹⁶. Thirteen alchemical precepts were engraved in Phoenician characters, on an emerald table known as *Tabula Smaragdina*. This table was recovered by Alexander the Great from the tomb of the celebrated Hermes Trismegistor, the thrice great alchemist Hermes.

Plato and Aristotle mentioned emerald. Aristotle's disciple Theophrastus wrote in one of his books: "*Smaragdus* assimilates the color of water, into which it is thrown, to its own colour". The Museum of Fine Arts, Boston gem collection includes several Greek artefacts of the period 4th-2nd century B.C. such as golden earrings, bangles, bracelets, snake rings etc., in which emeralds had been set. Caesar and Cleopatra met in a hall of tortoise-shell, studded with emerald and topaz gems, Egypt having mines for both. Many ornaments made of emerald have been found in Egyptian mummies, ancient Rome, Pompeii, Herculaneum etc¹⁶.

We have mentioned the tradition of *Sarco Catino*, the so-called 'emerald dish' of Solomon which was given to the Jewish temple, and from which Jesus Christ was supposed to have eaten. The Biblical literature compared the 'doubting (Saint) Thomas' with 'indefinite beryl' and 'the pure and gentle (saint) John' with emerald. It is ironic that Emperor Nero, against whom St. John's Gospel is full of diatribes, also liked emerald, so much so that for a long time emerald was called *neronianus*. Nero used to see the feats of the gladiators, through an eye-glass of emerald¹⁶. We have indicated earlier the nexus between beryl and the middle high German equivalent *brille*² standing also for eye-glasses. Pliny praised the optical brilliances of emerald in his *Historia Naturalis*:

"We enjoy the green colour of herbs and other plants, but that of the emerald is generally regarded as the most beautiful of all. Moreover it is perhaps the *only* precious gemstone that satisfies the eye without satiating, and when the eye becomes weakened by other observations, it is strengthened again by the viewing of emerald".

The wonderful effects ascribed to emerald are numerous. It was considered to be the stone of peace, harmony, and friendship. It was said to bring constancy and fidelity in love². Isidorus, Bishop of Seville (630 A.D.) spoke of emerald gem:

"It surpasses in greenness all green stones and the leaves of plants, and that it imparts to the air around it a green shimmer; that its colour is most soothing to the eyes of those engaged in cutting and polishing the stone".

EMERALD IN ANCIENT INDIA

It is proposed that the *Indians* were aware of emerald as *masāraka* or *masāragalu*, the Egyptian gem, even during the Greek era, and from the Sanskrit word emerged the Greek word *smaragdus*. The widespread use of this particular gem in India however

started with the Indo-Roman trade. The words *marakata* and *masāragalu* were found not in any pre-Christian era text such as the Arthaśāstra of Kauṭilya but in the late interpolations of Mahābhārata and in the post-Christian era gemmology texts.

The Ratnaśāstra texts compared emerald with the peacock's tail, the wing of the parrot, moss, fresh grass, glow-worm's back and so on. Buddhahatta wrote (RP 158-160): "When sun's rays fall on emerald, it shoots light-rays all around...infused light makes it appear like a green meadow". Agastimata (299) also referred to this important property of emerald 'spreading its green colour all around (*pārśvarañjana*) when viewed against light'. Maṇimālā recorded statements about emerald which when exposed to the sun 'illumines a place with the splendour that looks like the lightning's play among fresh grass, and the sight of which instills the liveliest pleasure into the mind'.¹⁷ Similar statements have been made in Garuḍa Purāṇa (1.71.12-15 and 29) which provides descriptions on intense green *marakata*, light green *vaidūrya* and bluish green *pannā*. The term *pāribhadra* has been used for transparent water-green aquamarine¹⁸. Perfect emerald gems were known to be rare and the expression 'an emerald without flaw' became proverbial. An emerald 'endowed with virtues' was known to 'fetch more price than a ruby of equal weight'. As a corollary, in case of defects, the depreciation in the value of an emerald has to be more than that of ruby (RP 173-174; GP 1.71.28-29).

Skanda Purāṇa (23.135) categorised emerald under several nomenclatures : *ullasita* or the small ones, *gāḍa* resembling green grass, *peśala* like *petals* on the top of a bud, *pittam* reflecting the feather of a parrot, *mugdha* like the leaf of *tulasī* plant and *prthuka* resembling lotus etc.

While *vaidūrya* or sea-green beryl was frequently mentioned in the Indian literatures, compiled before the era of Indo-Roman trade began, *marakata* or emerald took over in popularity as is evident from its widespread references in the post-Christian era literatures.

Lord Krishna of dark green complexion clad in yellow dress was frequently compared with emerald or beryl set in gold (Mahābhārata 5.92.52; 12.45.14; 12.46.33 etc.). The Goddess on the lion was described in the famous *Śrī Caṇḍī* as *marakataprakhyā* or one having the lustre of emerald. The famous Śaṅkarācārya referred to emerald and its green lustre several times while describing the Divine Mother and Her temple in his composition *Tripurasundarī Mānasapūjāstotram* (8, 9 and 57).

AMIR KHUSRAU'S ACCOUNT

Hazrat Amir Khusrau accompanied Malik Naib, Alauddin Khilji's army general in 1310-1312 A.D. military expedition to South India and described the colossal treasure of gold, emerald and other gems, plundered from different sources which had been the collections of the earlier period of Ancient India. When the fort of Warangal

was attacked, Rai Laddar Deo had to give up his treasures and jewels. Khusrau described:

“The boxes carried by the elephants were full of valuables and gems, the excellence of which drove the onlookers mad. Every emerald (*zabarzad*) sparkled in the light of the sun, or rather the sun reflected back the light of the emerald...The emeralds had a fineness of water that could eclipse the lawn of paradise”¹⁹

When the city of Barmatpur was plundered, Khusrau described its golden temple:

“Roofs and walls of the temple were inlaid with sparkling rubies and emeralds. After gazing at them red and yellow spots came before the spectator's eye (principle of complementary colour-author). The green colour of the emerald would have given prestige to a kingly crown; for it looked like a young parrot flown from its egg in the moon. ---The emeralds were of a water so fine, that if the blue sky broke itself into fragments, none of its fragments would equal them”²⁰.

Khusrau was evidently referring to emerald as well as aquamarine beryl samples. When Malik Naib returned to Delhi (1312 A.D.) with his huge loot of gold and ‘many chests of jewels and pearls’, the old men of the city remarked: “No one remembers such treasures and spoils brought ever to Delhi”²¹.

Those chests testified Ancient India's tradition and collection of gem minerals such as diamond, pearls, ruby, beryl and emerald.

CONCLUDING REMARKS

India has played a pioneering role in the mining and processing of beryl including beryl-family gems such as aquamarine and emerald. The etymological links of *veluriya-vaidurya-beryl* and *marakata- masaraka- smaragdos - esmeralda - emerald* indicate the power and primacy of the Sanskrit language. Ancient Indian traditions on the use of beryl, aquamarine, emerald etc. are vividly testified in the Indian literatures and the factual account of Amir Khusrau.

The Indian tradition on beryl and emerald has been sustained in the medieval²² and modern²³ periods. This author has attempted to compile comprehensive accounts of Ancient India's traditions in gem and non-gem minerals and presented them elsewhere²⁴.

NOTES AND REFERENCES

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3. Mitchell, R.S., *Mineral Names - What Do They Mean ?* Van Nostrand, New York, 1979.
4. Sarma, S.R., Thakkura Pheru's Rayanaparikkhā, Viveka Publications, Aligarh, 1984, pp 67-68
5. Finot, Louis, *Les Lapidaires Indiens*, Paris, 1896
6. Master, Alfred, Indo-Aryan and Dravidian, *Bulletin of the School of Oriental and African Studies*, Vol. XI, 1943-46, pp. 297-307
7. This had allusion to green glass gems which were so common in Taxila (John Marshall's report on Sirkap beads from Taxila) and sold by Kaviripaddinam vendors as 'beryl'.
8. Warmington, E.H., *The Commerce Between the Roman Empire and India*, Vikas Publishing House, Delhi, Second Edition, 1974, pp. 10, 113-114.
9. *Ibid*, pp. 250-251
10. For Indian sources of semi-precious stones and beryl, see Wheeler et al. *Ancient India*, 2. 1946, pp. 121-124.
11. This tradition was evidently borrowed from the Indian tradition mentioned in Cullavagga (5.9.1): '*na veluriyamaya paṭṭho*' - forbidding the luxury of using vessels in which beryls were set.
12. Bauer, Max, *Precious Stones*, Two Volumes, Dover Publications, New York, 1968, pp. 310-311.
13. Warmington, E.H., Ref. No. 8, p. 382
14. *Ibid*, pp. 6-9, 30-31
15. *Ibid*, pp. 104-105, 271 and 293.
16. Tagore, Sourindo Mohun, *Maṇimālā - A Treatise on Gems*, Calcutta, 1879, Two Parts, part I, pp. 73-76 and 402-418
17. *Ibid*, Part I, p. 389.
18. *Ibid*, Part II, p. 509
19. *The Campaigns of Alauddin Khilji : Khazainul Futuh or Treasures of Victory* - of Hazrat Amir Khusrāu, Translated by Muhammad Habib, D.B. Taraporewala and Sons, 1937, pp. 76-77.
20. *Ibid*, pp. 102-107
21. *Ibid*, p. 117
22. Medieval India continued to import emerald, first from Turkey (Maṇimālā 357) and later from South American sources - Colombia and Peru through the Portuguese. Shah Jahan put emerald and aquamarine samples on the Taj Mahal and the Peacock Throne; the latter along with the huge collection of gems including emerald were looted from Delhi by the Persian conqueror Nadir Shah in 1739. These chests 'filled with gold, silver, diamonds, pearls and emeralds from the Great Mogul's treasury' are now in the Teheran Museum (basement of the Central Bank). Eight years before the 1979 Iranian Revolution, which deposed Shah of Iran, the then Curator of the Mineral Sciences at the Smithsonian Institution (George S. Switzer) examined the collection and characterised it as 'perhaps the greatest jewel treasury of all'.
23. Emperor Jehangir's 1¼ x 1 1/8 " inch finger-ring, cut out of a solid piece of emerald was presented

by Shah Suja to the East India Company and was later purchased by Lord Auckland. Ranjeet Singh used a bracelet made of one of the finest emeralds. Duleep Singh's collection of 3" x 2" x ½" inch emerald sample was displayed in the London Exhibition of 1851. A large emerald, of the size of a medium sized hen's egg, was presented to the Queen Victoria by the King of Oudh.

The above details as well as the information on the emerald samples owned by the Tagores (Kali Kumar, Jatindra Mohan and Prasanna Kumar) were provided by *Manimālā's* author Sourindro Mohun Tagore (Vide reference no. 16, pages 405, 410 and 417-418)

Tagore also got a typical sample of emerald analysed by one Mr. Lewy : 68.5 p.c. silica, 15.75 alumina, 12.50 glucina (modern terminology is beryllium oxide), 0.3 oxide of chrome. Lewy wrongly suggested that the greenness was due to occluded chlorophyll - like organic matter rather than chromium! (Reference 16, pp. 402-404).

Tagore's compilation of Lewy's objective data and subjective opinion regarding emerald is very relevant in the history of science. This was matched by the poetic subjectivity of another Tagore, Nobel-Laureate Rabindra Nath, who wrote in his poem *Āmi* (I or Myself) : 'Pannā' (emerald) is green because it is so coloured by my consciousness.'

The pursuit of interest in beryl family minerals continues in our modern society. Till 1991 the Guinness Book recorded the largest emerald crystal to be a 7025 - carat stone from Colombia (one carat is approximately 0.2 g.). This record was broken in 1992 when an emerald crystal weighing over 1.5 kg. was found in the Ural mountains. Like ruby, emerald has the strategic importance in the newly emerging laser technology.

The banks of the Mahānadī in the southern Orissa has been recently found to be a 'a virtual treasure trove of precious and semi-precious stones like aquamarine'. Beryl mining has assumed great urgency in view of the important uses of the beryllium metal - in ferrous and non-ferrous alloy industries and in nuclear metallurgy.

24. Biswas, A.K., Minerals and Metals in Ancient India, Two Volumes, Terminal Report submitted to the Indian National Science Academy, New Delhi, 1991, specially chapters 15-17 in vol. I and chapters 7-9 in vol. II.

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