# VIII. MESTICA CALAPPA, THE COCONUT PEARL, TRICK OR TRUE?

J.F. VELDKAMP

Nationaal Herbarium Nederland, Universiteit Leiden branch,
P.O. Box 9514, 2300 RA Leiden, The Netherlands
(e-mail: veldkamp@nhn.leidenuniv.nl)

## SUMMARY

A bibliographic study is made of *Mestica calappa*, the Coconut pearl. It is concluded that if pearls do grow in coconuts, they are exceedingly rare, and the ones analyzed on structure and chemical composition were fake ones.

## INTRODUCTION

Prompted by my biography of Georg Everhard Rumpf, better known as Rumphius (Veldkamp, 2002), I received an e-mail from a correspondent, who for personal reasons wished to remain unnamed, asking me what I knew about the Coconut pearls that Rumphius (1705, 1741) had written about, as he thought he had discovered one. I had heard about them, but knew nothing, and to please him I asked about. One thing led to another and the result is this account.

## RUMPHIUS

Rumphius' first book of the Herbarium Amboinense (1741) opened with a glowing account in four chapters of the *Calappus*-tree or Coconut (*Cocos nucifera*), then as now the symbol of our tropical beaches: "Because the *Palma indica* or Cocos-tree usually is the first thing seen by those who from the sea approach the Indian islands, emerging with its crown above the others, so he may appointed with reason as the Captain of this Amboinese herb-book".

In Chapter 3 ('Uses and virtues of the *Calappus*-tree') he gave a description of the presence of curious concrescences or 'bezoars' in the nut, the so-called Coconut pearls or *Mestica calappa.*

An extensive account of these *Mesticas* to which the observant reader is referred is given by Krikorian (1982), who pointed out that before Rumphius Alzina, who was in the Philippines around 1632, had already mentioned them in a manuscript dated 1668, but which was not published until 1931 in a translation from the Spanish into English by Uichancos. Also, Kamel had written about them in 1704. However, in the few references to Coconut pearls Rumphius is the prime source, especially the description given in his famous 'Rariteitskamer' (1705), which was translated by Krikorian (1982: 111–113). Note that this was written after, but published before, the 'Herbarium Amboinense'. The two stories are basically identical but differ in details.

It is perhaps best to let the Master speak first. Note that the original language of the 'Herbarium Amboinense' is 17th century Dutch, published side by side with a Latin

translation made around 1735 by Johannes Burman. A translation of the Dutch text into English has been made by Dr. E.M. Beekman who kindly sent me a preview allowing me to consult it. I have used some of it in places where I erred or lacked the background. If published it may be compared to the following attempt by me. Remarks between (square) brackets are by me.

CALAPPITES, in Dutch *Calappus*-stone: Malayan, *Mestica calappa*, is a small white stone similar to alabaster, or a white pebble, also of the same hardness, level and smooth, which I had intended to describe in another place with other stones and minerals. But as it is found in the *Calappus*-nut, and as I am afraid that this work I refer to will not be finished, I have agreed to include its description here: Thus it is a white, smooth little stone that grows inside the *Calappus*-nut, sometimes floating freely in the water: Being of two shapes.

The first is oblong, as an obtuse small cone, or a lizard's egg, in the size of the heart of a small bird, sometimes also as a dove's heart. At the base and widest end he is dirty yellow and has a small crown, as a tooth fallen out, with which he was attached to the Tampurong (shell), on the tip and narrowest end one sees a shiny spot, when held against the daylight, similar to a small shiny sun, and if they don't have this they are regarded as dead or a bastard.

The other is round, a bit flattened on both sides, as a lentil, sometimes completely round, everywhere white and at the clearest side also the sun as mentioned before: the largest as the seed of a lupin, the smallest as a pea, and these float freely in the water; in both one sees usually some cracks, that do not go deeply, and do not make the stone more beautiful, caused, as the stone grows in a moist material, and then dried the air makes cracks in this way. I call him in Latin *Calappites*, and regard him as a co-species of *Dendrites* – mentioned in Plinius Lib. 37. Cap. II, together with similar stones – which until now had been regarded as unknown and fabulous, however many have been found by me here in India: in Malayan they are called *Mestica calappa*; however know that the Malayans call all kinds of stones that are found in animals, fruits, woods, and other unusual bodies *Mestica* or *Mostica*, which we will point out in the further parts of this work: one does not find this stone very often, and also not in all countries, although the *Calappus*-trees are plentiful there, but most in the island of Celebes around Makassar, and the north bay of Kajeeli (in Buru); also in Buton, which both islands have this characteristic that they produce many such-like *Mesticas*, both in animals as in plants, there hardly being not a single fruit, or one can in Makassar and Buton show a *Mestica* of it.

The natives in general love all *Mesticas*, being so smitten with some of them, that they regard them higher than the best jewels: for they attribute to them wonderful powers, and among those without doubt many superstitious ones, carrying them on their bodies, in rings, and in their weapons to have good luck in certain intentions: the most beautiful and roundest of the *Calappus*-stones they place in rings, or hang from their krisses laid not in gold, but in silver, as they say that this agrees better with the nature of the stone. They carry it, as said, to have good luck both in business, as well as in agriculture, yes, in general in all kinds of ventures, even in war, which last has been laughed at by others, and with reason, as these stones are fruits of a tree which has no affinity to things of war: similar to other instances which grow throughout nature there is no affinity between plants called *Joviales* and *Martiales*. They also put him in water and drink of it in fevers,

but there must be a broad imagination. For instance: a little rubbed on a stone with water, and put into the eyes, cures, as they say, the temper: the proof of the truth of this is argued thus: place it under padi or rice for the chickens, they will not eat of it as long as the stone lays there; however, this has not succeeded with me, for had I not warded off the chickens they would have eaten the stone with the rice, yet I am convinced that I had a true one. The Malabars have taught me an even more unbelievable test: namely, that a real *Calappus*-stone hung on a *Calappus*-tree will cause all its fruits to drop off, which I have never tried. Plinius, cited before, places an other test to his *Dendrites*, to wit, that when buried under the root of a tree that one intends to cut down, the axe will not become blunt.

Another, but miraculous *Dendrites*, also obtained from a *Calappus*-tree I must add here, of which I have seen and possessed only one. This was found in the island of Ceylon (Sri Lanka) in the wood of a *Calappus*-tree, which just earlier had been felled by the thunder, and had split open. The slaves of a Dutch officer happened to pass by and went to it to obtain the palmetto (growing point) from it, and opening up the upper part of the stem with bush knives, discovered this stone to be so stuck in the wood, that one could safely conclude that it had grown there, which they gave to their master, who being a Dutch Captain (Beekman suggests that this might have been Isaac de Saint Martin), a curious and trustworthy man, who later honoured me with it: this stone was round or a little lumpy, the size of a Black cherry, hard and smooth as a pebble, not translucent, yolk yellow in colour, on which there stood around many white eyes or circles inside with a yellow space, some large, some small, as if they had been painted on it, the upper eye was the largest and inside it another dark circle, as the iris in an eye, of the others some merged with each other, some also were completely white, similar circles one sometimes sees in a form of the *Lapis victorialis* (chrysophrase, fide Beekman), of *Astroïtes* (possibly an error for *astriotes*, or star stone, fide Beekman); on one side one saw a white spot deathly of colour of which it was suggested that it had been hit there a little bit by the fire of the lightning. The Captain explained to me, that the Singalese had told him, that such stones had been found several times in *Calappus*-wood, but could not produce or point out any, although at that time as Dessave, or Prefect, he had them under his command. He supposed that they did have such but kept them hidden from him, because this nation, as so many other Indians, keep such rare *Mesticas* in high regard, carrying them for good luck, especially in war, which I could believe in no way as it had not been able to protect the tree against the furor of thunder, for as the proverb says, when a superior comes, an inferior must yield: I have never heard of or seen another one in these Eastern regions, and it has, placed in a ring together with other rarities has been sent in 1682 to the Grand Duke of Toscane under the name *Dendrites calapparia*. It has been depicted in the second plate with the letter K and another two *Calappus*-stones of various shapes are to be seen under L and M [error: the Ceylon stone is M, the *Calappus* ones K and L; see Krikorian (1982: 115) for a copy of Rumphius' plate. JFV].

The natives have taught me another, but unfit proof to try various *Mesticas* whether they are genuine: this occurs when they are put in strong vinegar or acid lemon juice: because when they boil and throw around bubbles, then they regard them as true; this happens well to the *Calappus*-stone, and all *Mesticas* which are not translucent nor black, but loose their clear luster, therefore this test must be rejected; it is better when one places the *Calappus*-stones a few hours in the water of a *Calappus*-nut and rubs it with

its kernel, thus they again get their purity and shine, which they otherwise also loose by long usage. The above mentioned cooking or ejection of bubbles is caused by the fact that these *Mesticas* are more porous than other true pebbles, and hide more or less air within, which is expelled by the penetrating vinegar or lemon juice, and cause the bubbles mentioned above, similar to what one sees in the European *Astroïtes* or star-stone. Yes, also that he starts to move in the vinegar: but those *Mesticas* which are translucent, or dark and black, will not show the cooking mentioned, without doubt because they do not have these pores, as I have tried with snake stones that were as clear as a crystal, and were found in the head of a certain evil snake in the island of Celebes, which according to story of the natives, are to be compared to Dragons and Basilisks; and therefore her stones may be regarded as *Dracontia*.

The said *Dendrites calapparia* was much harder than the usual *Calappus*-stones, and at night when struck against an agate, or another small pebble, sparked and produced a bright shine, which the mentioned snake stones also did; but the white *Calappus*-stones will not do this, neither do other dark stones.

In the 'Rariteitskamer' Rumphius compares the *Mestica calapparia* with *Chamites* (= *Tridacna gigas*), which lacks the 'sun', cooks more slowly and less in lemon-juice, is uneven, angular, and mostly yellowish (see Krikorian, 1982: 112, 114).

## SUBSEQUENT OBSERVATIONS

What the composition of the *Mestica* was, Krikorian did not know. The observation by Rumphius that the pearls 'boil and throw around bubbles' in an acid is highly suggestive of calciumcarbonate.

An important work that Krikorian has missed is the extensive treatise of all aspects of *Cocos nucifera* by Hunger (1920). Where Krikorian was uncertain about the chemical composition of the *Mestica*, Hunger cited several chemical analyses, e.g. by Bacon (1861).

The latter cut a pearl in half and reported that it was "composed of numerous concentric lamina, adhering pretty firmly together ... no foreign nucleus was found. The general mass is made up of radiating bands of crystalline fibres, inclined at different angles in contiguous bands". The pearl was nearly as hard as felspar or nearly as opal, while a normal pearl is never harder than fluorspar.

A chemical analysis showed that the pearl was mainly composed of calciumcarbonate [aragonite, JFV]. Bacon expressed his surprise at this, because he thought calciumcarbonate would be absent in the milk or meat of the coconut, but he did not rule out the possibility that it might have been present in developing stages. Very little organic components without structure was left, and it was nearly impossible to analyse it. It probably was not cellulose, but possibly a protein to insure the coherence. He noted that oyster pearls tend to have a foreign nucleus.

Hickson (1887) also cut a pearl in half and let it be analyzed by a Dr. Kimmins, the result of which agreed with that of Bacon. Another pearl Hickson gave to the Museum of the Botanic Gardens of Kew (depicted by Krikorian, 1982: 116). He (1889) compared them

with *Tridacna* pearls: "The difference between them both in appearance and texture is considerable, and I feel confident that they cannot be the product of the same animal".

On the other hand others, e.g. Harley & Harley (1888), Kirkwood & Gies (1902), Kunz (1915), Kreemer (1934), Quoy & Gaimard (1835), Reyne (1939, 1947), and Weber, as told to Reyne (1939, 1947) found the microscopical structure of Coconut pearls identical with that of *Tridacna*.

Kirkwood & Gies (1902) have given an extensive account of the chemical composition of the coconut and quote an analysis made by Bachofen (1900) who reported the presence of 7.43% of calciumoxide in the ash of the milk and 3.10% in the kernel. Figures for carbonic acid and its salts were not given, only for phosphoric (5.68 and 20.33) and sulphuric acid (3.94 and 8.79). They briefly cite some previously published information on the pearls, referring to an analysis of a pearl obtained from Singapore by Harley & Harley (1888) who were "exceedingly sceptical" and doubtful that the specimen examined would be the product of a coconut. Instead, they found a great resemblance in external appearances to the pearls found in *Tridacna*, not in the least because it contained "organic matter (animal)".

De Kruijff (1906) reported that 98% of the gas in the milk is carbondioxide.

These analyses combined show clearly that plenty of the basic ingredients are available to form calciumcarbonate concrescences. The question is of course, how.

Perhaps with modern techniques a new analysis might at least show the organic composition of these stones.

It is curious to note that what Rumphius said about its local occurrence still seems to hold true: with the present world-wide distribution of the Coconut there appear to be hardly any accounts of this pearl being found outside Malesia. Remarkably, the first reports are from Luzon (Alzina (1668) in Uichancos (1931); Kamel (1704)), while Haile (1974) mentions an unnamed correspondent who had never heard about them in the Philippines, although he was in the copra business there.

Burkill (1935) summarised occurrences: never in Sri Lanka (Editor, 1887), now and then in Thailand ['very popular as a fairly cheap (!) gem'], a small collection from Perak, and of course Celebes. "It is clear that there a local race ... is somewhat prone to their production".

Curiously, I have not been able to find any mention of Coconut pearls in Heyne's dictionary on the useful plants of Indonesia (1950), although Rumphius is repeatedly cited in it.

Hunger (1923a–c, 1925) reports of a find in Madras, India. Except for this a local cause is suggested, perhaps some endemic infectious organism?

It has been stated (Armstrong, 2000) on the internet: http://waynesword.palomar.edu/ww0901.htm#coconut; Hunger (1923a–c; 1925) that the pearls come from 'blind' coconuts, i.e. nuts that lack the three 'eyes' of which one is the germination pore. Burkill (1935) mentions as local names for such fruits 'kelapa buta' (blind coconut) and 'kelapa buntat' (bezoar coconut), supporting this hypothesis. Some therefore call the pearls just 'buta' (Wong, 1984).

Hunger stated that the pearl "was attached without the least trace of a stalk, being merely embedded in the endosperm, and was quite easy to remove from the kernel". This agrees with Haile (1974) who, citing his correspondent, wrote: "It ... fitted the cavity, at the opposite end of the nut from the stem end, perfectly, just as though it had melted into place. The cavity under the nut showed pure white meat (not through to the shell) and there were absolutely no signs of tampering to the naked eye – *and no signs of any connection between the stone and the nut, say veins, fibre or something* [my emphasis. JFV], anything that might show the stone formed in the cavity". He added that he was assured that it was genuine, but added "If my life depended on a guess in the incident ... I would guess that the stone was false, but somebody went into a lot of trouble to be convincing".

Note, though, that Rumphius stated that it was "sometimes floating freely in the water" and "was attached to the shell". The first is not repeated by later observations, while for the second it has been noted that it was immersed in the meat. My informant reported and photographed the stone obstructing the germination pore.

Hunger suggested "that the germination, being in progress, is stopped by some cause or the other [e.g. absence of the germination pore. JFV], thus preventing the further development of the haustorium, it is conceivable that the haustorium in this state might become encrusted by the influence of the cocoa-nut milk, and that from this the completely petrified cocos-pearl would gradually be formed ... although it still remains unexplained why the cocos-pearl consists almost entirely of calciumcarbonate, while neither the cocos-kernel nor the cocoa-nut milk contains any calciumcarbonates". However, this suggestion is thrown into doubt by the absence of any trace of a nucleus in the pearl: no cellulose or (vascular) tissue were found in the various analyses made.

This origin is supported by the local names in Celebes, 'buntat tumboh nyiur' or 'buntat tombang nyiur' (bezoar of the embryo of the coconut) (Burkill, 1935: 614).

Wong (1984: 238) extensively described the discovery of one of his three pearls in 1979 in Banjarmasin (verbatim): "A young lad in this family ['a trusted relative'. JFV] was actually in the process of opening a mature coconut for the family table. When he noticed a small hanstorium in its normal place, he quickly plucked in order to eat it (the rascal! JFV). Upon his first bite the boy found it strange that this hanstorium is of stone. Puzzled he showed it to his uncle. The latter instantly realised that it is a coconut pearl, a rare and valuable find".

The other two he obtained in 1984 simultaneously in Sarikei, Sarawak, "with pearls still embedded in the fresh watery kernel meat ... I was satisfied that there was no give-away signs of clever artificial insertion of foreign objects". He then gives an account of his careful examinations that seem to exclude tampering. "The nipple-like top of the pearls were clearly seen under each hole of the *porus-pervius*" (the germination pore). "The normal plumule (growing shoot) were reduced to a extremely fragile rudimentary pith-like tube".

After three days the meat had dried out, but even with some force the pearls could not be extracted. Only after five days "after a mild pressure of the fingers from the external tip the pearls came off easily. ... The two pearls carried throughout its length short (as if incised) grooves rather similar to those carved on some pottery wares ... all points noted here were in favour so to say of the pearls' natural birth, except the above groove which

to my mind looks all but too artificial. These curious grooves could by themselves be sufficient to be the tell-tale give-away signs against all the other overwhelming favourable signs. ... the popular assumption that the coco-pearls are actually calcified forms of the hanstorium is not supported in this study".

Hunger had personally collected 8 'blind' coconuts from various places in Indonesia. He cut open seven, one of which (from Tanimbar) contained a pearl. Why he didn't cut open the eight, he doesn't say. He also mentioned a coconut from Madras, where the pearl was attached at the place, where, in germination, the cotyledon forms a haustorium. He mentions a similar instance for a pearl from S Borneo. The plate he provided (1923a, b: Fig. 2) is strikingly similar to our Fig. 1a and Fig. XII-E of Wong.

Others (Skeat, 1900; Wong, 1984; and my correspondent (2002)), however, state that the pearl was found in the open germination pore of the nut sometimes together with the emergent shoot. The coconuts were not 'blind'.

The picture (Armstrong, 1996; Fairchild, 1943; Krikorian, 1982: 116) of the 'Maharaja' pearl, occasionally on display under armed guard (!) in the Fairchild Botanical Garden, Miami, appears to be stalked and affixed to the shell by what perhaps may be an ornamental setting. The caption to a picture of it in a coconut shell when it was obtained by Fairchild states "about as it would be found in the white meat of a coco-nut near the end where the sprout comes out through the 'pore'". This leaves open the possibility that it may be a fake.

The question is whether pearls can grow in coconuts. Is it a hoax similar to unicorn horns, the Loch Ness monster, mermaids, and the Piltdown Man to fool the gullible? Quite a few specialists think so and claim that the pearls have actually been made by or from *Tridacna gigas* or another large mollusc.

The picture presented here (Fig. 1), more or less identical to those by Wong (1984: fig. XII-C–F), still attached to the meat suggest a herbal origin.

If this is a vegetable pearl of great rarity and magic, obviously counterfeits can be expected. The people mentioned above, who performed analyses, and authorities as Hunger and Krikorian, an acute observer as Wong and my correspondent were convinced of an origin in coconuts. Also, I tend to believe the words of Rumphius, who always was very critical of local superstitions. He specifically said that it was attached to the shell, or sometimes floats freely in the water, but not that this was from personal observation. I suppose that the correspondent who sent me the question about the identity of Coconut pearls that started all this and provided the picture (Fig. 1a) would have no reason to fool me unless he himself was deceived.

Riedel (1887) reported that he himself had found a pearl in Celebes in 1866, but Wichmann (cited by Van Steenis-Kruseman, 1950) doubted his general veracity. Riedel's pearl was examined by Reyne (1939), who stated that all so-called Coconut pearls he had studied were derived from *Tridacna*, including the one of Hunger, which he also saw ("It seems likely that (he) ... has become a victim of some trick").

Wong (1984: 237) listed three types of counterfeits that could be bought for Mal$ 10 to 50.

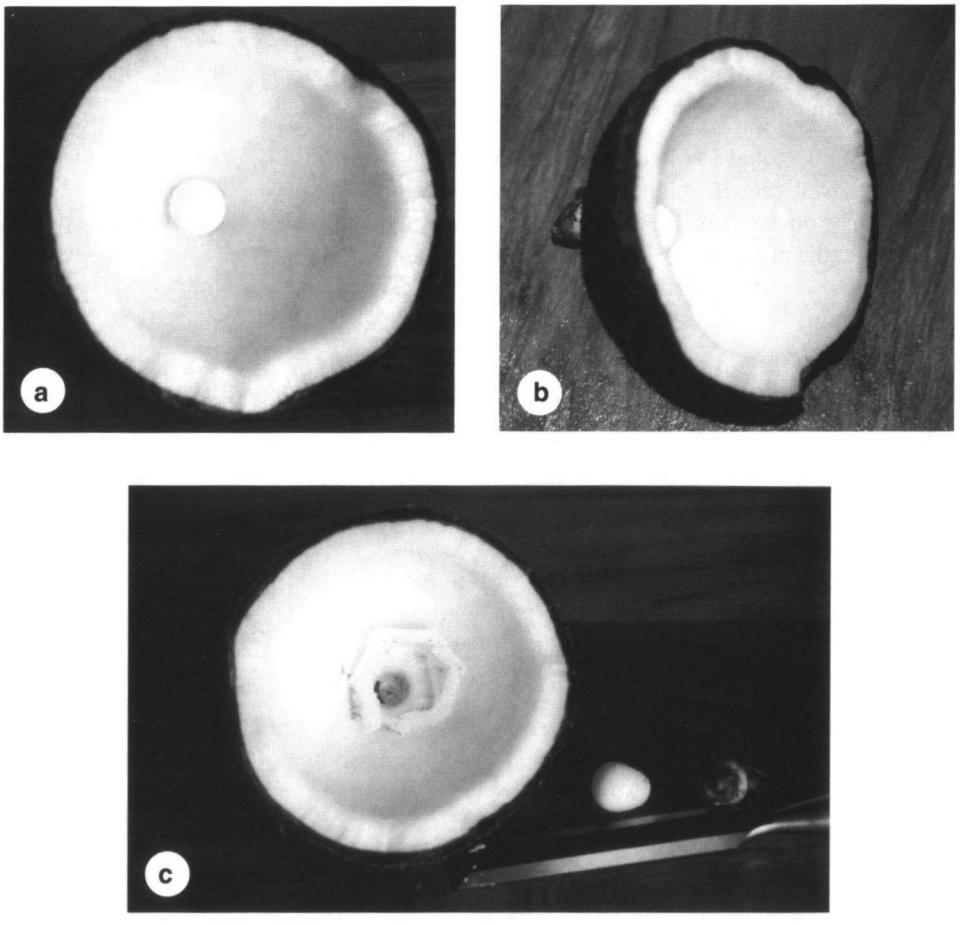


Fig. 1. a. Pearl in situ; b. side view; c. pearl removed.

Inquiries with a number of jewelers in Leiden drew a total blank. They had never even heard of Coconut pearls. So, if you in person happen to see one in situ, you might be able to solve this age-old curiosity. Any further information on these 'gems' will of course be appreciated.

Mr. J.C. Zwaan of the Netherlands Gemmological Laboratory, Naturalis Museum, Leiden, showed me a specimen, which under microscopical inspection he said was a piece of *Tridacna* shell cut into a kind of taw. This has been my only direct contact with the fabulous Coconut pearl.

## CONCLUSION

It seems to me that the Coconut pearls so far analyzed were fakes, but that it may not be ruled out that true pearls do exist, so the mystery remains. After all, it is curious that

personal reports of the discovery of them in situ in different areas of space and time are so consistent and the absence of any indication of tampering with the evidence is noted.

## SOME ADDITIONAL NOTES

### *Dendrites calapparia*

As far as the even more rare *Dendrites calapparia* is concerned, Hunger mentioned (1920: 250) a communication that a stony object was found in the stem of a Coconut tree after a strike of lightning in, of all places, Ambon, but otherwise gave no details.

As Rumphius said, this stone was part of a sale of curious objects to the Grand Duke Cosimo III de'Medici in 1682. Zaunick (1961) described the manuscript of a Latin catalogue and letter by Rumphius dated 15 August 1682 preserved in the Sächsische Landesbibliothek (Saxon Country Library) in Dresden. This may have been the original of the catalogue in Italian prepared by Targioni-Tozetti (1763) published by Martelli (1903). Zaunick doubted that this would be a translation of a Dutch text. I think it is, as one can hardly expect VOC custom officials to be able to read Latin, while the VOC kept a tight reign on what its employees were sending to and from in order to suppress smuggling (which was rampant, nevertheless). It is therefore not improbable that an original bill of lading is present in the VOC archives in The Hague. In the letter appended to the Catalogue it is stated that the VOC knew about and permitted the shipment and transactions and kept care of the 400 rix-dollars already paid.

Targioni-Tozetti remarked that the Calappite stone was missing (Martelli, 1903: 163). I think that this is because it was set in a ring, and so was not among the curiosities, but with the jewellery of the de'Medicis.

Zaunick also explains the reason why Rumphius would have sent these specimens. Cosimo, plagued by marital troubles, had been sent by his father on a grand tour of several years through Europe during which he visited Belgium, England, Germany, the Netherlands, France, Portugal, and Spain. He met many learned men, studied politics, and bought rare books, art objects, and other curiosities. He visited Amsterdam three times where he was guided by members of the Blaeu family (still famous for their maps and globes), and one of these, probably Pieter (1637–1706), who was fluent in Italian, is mentioned as the intermediary in the transaction. In Amsterdam Cosimo became so much interested in the East Indies, that he even contemplated to travel there himself. Zaunick's suggestion that Cosimo's attention was drawn to Rumphius as a source of Indian curiosities by the Blaeu's therefore seems quite likely.

The price of the collection was 650 'thaleri imperiales' (rix-dollars of 50 Dutch shillings each), inclusive the preparation of the crates and the catalogue (50 rix-dollar). Blaeu had already sent 400 to the East, the other 250 were to be given partly to Rumphius' son, Paulus Augustus, then studying in the Netherlands, partly to Blaeu for books Rumphius had ordered. This sale earned him quite a fortune, even for Rumphius who had a top-salary of about 288 rix-dollars a year (an unskilled labourer got about 95, and a soldier 44, but with lodging and food).

For those interested, Zaunick published the part of the catalogue dealing with corals (which Rumphius thought to be of a vegetable origin) in 1915.

*Rumphius in Portugal (1645–1648)*

It is known that Rumphius spent about 3 years in Portugal, but how and why he got there and what he did has remained speculative. Buijze (2002) has now tried to unravel this, partly based on the first translation into a modern language (Dutch) of the autobiographic poem in the Herbarium Amboinense, partly on the few remarks about plants observed in Portugal mentioned in this work.

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I am extremely grateful to Dr. E.M. Beekman (Coconut Grove, Florida, USA) who graciously sent me a preview of the relevant parts of his forthcoming translation into English of the 'Herbarium Amboinense' and his permission to make use of it here. It would be a boon to Malesian science (and beyond) if he would be allowed to finish it. Further thanks are to Dr. J. Dransfield (K) and Dr. H. Harries (Mérida, Mexico) for their advise on coconuts, Dr. D.H. Nicolson (US) for looking up some references unavailable in the Netherlands, and Mr. J.C. Zwaan (Netherlands Gemmological Laboratory, Leiden) for a discussion on the origin, composition, and very existence of Coconut pearls. It is a pity that the correspondent who initiated this paper and provided the pictures wishes to remain anonymous.

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