ALBERTO FORTIS AND THE ISTRIAN KARST, CROATIA, IN 1770 AND 1771

POPOTOVANJE ALBERTA FORTISA PO HRVAŠKEM ISTRSKEM KRASU V LETIH 1770 IN 1771

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Trevor R. Shaw & Nadja Adam: Alberto Fortis and the Istrian karst, Croatia, in 1770 and 1771

An unpublished letter written by Alberto Fortis in 1771 describes his visit to the Mramorica cave near Brtonigla (Istria) in 1770, and a journey over the karst from Pula to Rovinj in 1771. He argues that caves are formed by collapse initiated by underground streams washing away soil from bedding planes, with subsequent collapse of higher levels until an opening appears at the surface. Dolines result from rain and frost action causing the entrance walls to collapse into the cave.  

**Key words:** Istria, history, speleogenesis, dolines, collapse dolines, Fortis, Mramorica.
INTRODUCTION

The purpose of this paper is to make available a previously unpublished letter written by Alberto Fortis (1771a) which contains his observations on karst features in Istria including the cave at Verteneglio (now Brtonigla in Croatia).

In this letter, written while he was travelling in June 1771, he describes and discusses some of the dolines and shafts he had seen a few days earlier between Pula and Rovinj in the southern part of Istria. Then, to continue on the same subject, he copies from his diary of the previous year an account of his visit then to the Verteneglio cave in north-west Istria (Fig. 1). That exploration was made with his travelling companions of 1770, John Symonds of England and Domenico Cirillo of Napoli, who then went on with him to the island of Cres.

The letter itself was the first of several written during his 1771 journey

Fig. 1: In the summer of 1770 Fortis and his two companions stayed in Novigrad and explored the cave at Brtonigla.
Sl. 1: Poleti leta 1770 je Fortis skupaj z dvema tovarišema ob postanku v Novigradu raziskal jamo pri Brtonigli.
which took him, after leaving Istria, across Italy to Roma and Napoli. It was addressed to his friend John Strange, an English archaeologist in Venezia who later held a diplomatic post there. The original Italian text of the letter is printed here as Appendix II, while a translation into English forms Appendix I.

Before that, the five main people concerned are introduced, with their backgrounds, interests and interrelationship. After a note on the manuscript itself, the journey is summarized, remarking on or explaining any points of special concern. Then comes a summary of Fortis’s views on the formation of dolines and shafts. Finally the cave seen in 1770 is described as it is now known after more recent exploration.

THE PEOPLE INVOLVED

Alberto Fortis

Fortis (1741-1803) (Figs. 2 and 3) was baptized as Giovanni Battista, but always called himself Alberto. He was born at Padova and lived there for much of his life, as priest, physician and naturalist with a special interest in geology (Ciancio 1997). In 1795 he was elected Fellow of the Royal Society in London. His extensive travels in Dalmatia and its karst between 1770 and 1774 resulted in the books for which he is best known (Fortis 1771b, 1774) and he wrote also on other subjects. In 1777 he was in the classical Karst region of Slovenia near Trieste, where he visited Vilenica, and he went from there to Postojna and Planina (Shaw 2000, 74-78).

He was not a rich man but his enthusiasm enabled him to get financial aid for his travels from wealthy and influential people. Thus a journey to Cres in 1770 had been largely funded by John Stuart, the 3rd Earl of Bute (1713-92). Later in 1771 he was further south, at the karst sources of the Cetina river near Vrlika and of the Krka near Knin where he explored the underground river source at Tapolje (Shaw, in press). He was accompanied there by Frederick Augustus

Fig. 2: Alberto Fortis, engraved by Fusinati after a portrait by G. Dala.
Sl. 2: Alberto Fortis, bakrorez Fusinatija po portretu, ki ga je napravil G. Dala.
Hervey (1730-1803) who paid all expenses. Hervey was also with him in the Pula-Rovinj journey described here. These people’s generosity was recognized in the dedications in the English edition of his *Travels into Dalmatia* (Fortis 1778a).

Fortis was only 29 years old during this second Istrian journey, the youngest of the 1770 party, and 11 years younger than Hervey in 1771.

### John Symonds

John Symonds (1730-1807) (Fig. 4) was made professor of modern history at Cambridge University the year after his journey with Fortis (Carlyle 1898) at which time he had been 40 years old.
Domenico Cirillo

Domenico Cirillo (1739-1799) (Figs. 5 and 6) was, like Fortis, a medical man as well as a naturalist. In his case, his main interest was in botany; he was made professor of botany at Napoli in 1760 at the age of 21. He was 31 when in Istria. Earlier in 1770 he had submitted a paper to the Royal Society (Fig. 7) and it was published in their *Philosophical Transactions* (Cirillo 1771). It may have been this that led the standard biographies (Paladino 1931; Baldini 1981) to state that he was a member of that society, but there is no record of this in its archives.

He had a serious interest in politics and in 1799 when Napoleon’s troops were in Napoli he joined a revolutionary republican government, for which he was executed.

Fig. 5: Domenico Cirillo who in 1770 was with Fortis and Symonds in the Verteneglio cave.
Sl. 5: Domenico Cirillo, ki je bil leta 1770 s Fortisom in Symondsom v jami “Verteneglio”.

Fig. 6: Domenico Cirillo. A portrait by Bramati engraved by Luigi Rados in the 1790s.
Sl. 6: Domenico Cirillo. Bramatijev portret in bakrorez Luigija Radosa iz leta 1790.

Fig. 7: Cirillo’s (1770) signature in a letter written to the Royal Society on 4 February, four months before his cave visit.
Sl. 7: Podpis Cirilla (1770) iz pisma, ki ga je pisal Kraljevi družbi 4. februarja, štiri mesece pred obiskom jame.
John Strange

John Strange (1732-1799), to whom the letter printed here was written, was a graduate of Cambridge University and had travelled widely in the south of France and Italy. As a result of his scientific and especially archaeological researches he had been elected a Fellow of the Royal Society in 1766. By 1771 he was living in Venezia and in 1773 he was given the official diplomatic position of British Minister there (Seccombe 1898).

It was in 1771 that he met Fortis in Padova and in April of that year he was in the mountains near Vicenza with both Fortis and Hervey. He was quite wealthy and helped to finance Fortis’s travels in Dalmatia (Ingamells 1997, 903-904).

Well known to many travellers in the region, he seemed able to inspire several of them to write long letters to him during their travels. Some of these the writers later published, as Fortis did his later ones describing the islands of Krk and Pag, the Velebit mountains and the Lika region inland of them (Fortis 1778a, 509-544). The mineralogy book by Fortis’s friend František Dembšher (1777), with whom he visited the Vilenica cave in that year (Shaw 2000, 75), was written in the form of a letter to Strange. Otherwise the letters remained unpublished and many of them were given to the British Museum library (now the British Library) where they are bound into volumes and catalogued. It is there that the present letter, written by Fortis to Strange on 13 June 1771, now exists (Fortis 1771a).

Frederick Augustus Hervey

“Mylord Hervey” (“young Mr Hervey”, despite his age), who travelled with Fortis from Pula to Rovinj in June 1771 as described in this letter, was Frederick Augustus Hervey (1730-1803), bishop of Derry in Ireland (Fig. 8) and later the 4th Earl of Bristol (Dunlop 1891). Later in the same year he was with Fortis in Dalmatia as mentioned above. When Fortis met him at Pula on 6 June Hervey had already been in Istria for several weeks, for on 29 May he wrote to the same John Strange in Venezia, saying “I have visited almost every subterraneous river in Istria”, something he had done after 4 April (Hervey 1771). The two surviving letters he wrote about that journey are being prepared for publication.

Fig. 8: Frederick Augustus Hervey painted by Zoffany, probably in the 1770s. Hervey was with Fortis in 1771 when they examined dolines and fossils in the Istrian limestone.

Sl. 8: Frederick Augustus Hervey kot ga je najverjetneje leta 1770 naslikal Zoffany. Hervey je bil leta 1771 s Fortisom, ko sta preučevala vrtače in fosile v istskem apnencu.
THE MANUSCRIPT

The letter printed, translated and discussed here was the first of a series of contemporary copies of eight letters written by Fortis between 13 June and 13 November 1771 to his friend John Strange, in which he describes his journey from Venezia, through part of Istria, across Italy to Napoli and then in Dalmatia. Although the letters are not in Fortis’s own writing, he has signed one of them (1771a, f.30) (Fig. 9).

The whole series is bound together as Add. MS.19313 in the British Library. The first letter, the one concerning Istria, consists of five leaves measuring 291 x 207 mm and written in ink on both sides of the paper (Fig. 10).

Translation presented some problems. Although the writing is usually quite clear, it is not always so. The Italian of 230 years ago used some words that are no longer familiar, and geological terms have sometimes changed also. The greatest difficulty arose where the casual style of a rapidly written unrevised letter is less precise than the style in which Fortis wrote his books.

It has been our aim to write what we believe Fortis himself would have written, had he used English, neither restricting to a literal translation, nor allowing ourselves to rewrite his letter as we would have done it. Words that we have added to clarify the sense appear in square brackets [], so do the modern Croatian place-names equivalent to the Italian names he used. Those names with no modern equivalent after them when first used have not been identified. Towards the end of the letter (ff.5 and 5v) he does divide his text into paragraphs but the first six sides (165 lines) run continuously, so we have sub-divided this into paragraphs to make it easier to read. Words underlined in the original are printed here in italics. Italics are also used, in the normal way, for the name of any animal genus (but not for larger groups such as ostrocoda) even though Fortis does not underline them.

On f.2 we have translated the word galeotto as a galley slave, although in later times it can mean a prisoner of any sort. Galleys were still used in 1771 and it seems more likely to have been one of their crew that has come from an infected area, for other captives were usually kept in one place.

THE JOURNEYS

As already mentioned, Fortis’s letter of 13 June 1771 printed here contains not only observations on Istrian karst made then but also quotes from his diary of 1770.

Fortis’s own account in his letter is printed here in Appendices I and II. The purpose of this
Fig. 10: The fifth page of Fortis’s letter of 13 June 1771, describing the cave at Verteneglio. Reproduced, with permission, from British Library Add. MS. 19313, f.4.

section is to introduce it, clarify its dates, discuss its routes and explain some of the people and things he refers to.

In 1770 he had left Venezia “about the middle of May” (Fortis 1771b, 1) with Symonds and Cirillo to visit the island of Cherso [Cres] and Osero [Osor]. That journey resulted in a book (Fortis 1771b) describing the island, but it did not include their landing at Città Nuova [Novigrad] on their way home. It was from Novigrad that they went to the Verteneglio cave at Brtonigla as reported in the letter.

The 1771 visit to Istria is better dated. The letter itself was written on 13 June at Ancona on the Italian mainland, after he had left Istria, and it states that he had left Venezia on 4 June, arriving at Rovinj the same day. He left there on the 6th for Pula with the intention of going on to Cres again. But, hearing that a galley slave who might have been infected with the plague had escaped in that island, they changed their plans to avoid being held in quarantine. They therefore returned to Rovinj, travelling on horseback to see something of the country. This journey must have lasted from 6 or 7 June until 11 June.

Although Cherso and Osero are not described in the letter they are repeatedly mentioned, so it is necessary to explain that in the 18th century the name Osero [Osor] applied not only to the town of that name but also to the island later called Lussin and now Lošinj. It is thus named in the Homann [1720?] maps used by Pococke and Milles in 1737 and also in Fortis’s (1771b) own map. His published text of 1771, too, explains (pp 34, 35) why that book’s title speaks of the island of “Cherso ed Osero” in the singular:

Cherso and Osero ought indeed rather to be called two islands united, than one island alone; but the channel of the sea, that divides them, is so very narrow, that it can scarcely be reckoned any separation at all. … I think I may be permitted to consider both parts divided by the strait, as one island only, on account of the contiguity, and artificial connection, as well as of the uniformity of soil, products, and inhabitants.

Fortis’s travelling companion in 1771 was his friend Frederick Augustus Hervey, though at first he did not name him explicitly in the letter. At Rovinj on 4 June he “received news about my lord Hervey” and two days later in Pula he “reached my illustrious friend”. That this was indeed Hervey is confirmed later when he says that “a few days ago with young Mr Hervey” some fossils were found on their Pula-Rovinj journey. Childe-Pemberton (1925, 1113) is wrong in saying that Fortis met Hervey at Rovinj and that they then continued to Cres as planned.

Their host at Rovinj, Dr Costantini, was a lawyer (Nappo 1997, 796).

By what route they went from Pula to Rovinj is not known. The six or seven days the journey occupied would allow them some choice. Clues in the text lead to two alternative conclusions. Almost certainly they would have gone north to Dignano [Vodnjan]. From there the shortest route would be through Valle [Bale] which may be where they found fossils near Torra di Valle (f.5). On the other hand the letter (f.3) contains a first-hand description of a newly opened shaft between S. Vincenti [Svetivinčenat] and S. Lorenzo [Sv. Lovreč]. The latter place is too far north to have been on their route but a road runs to it from Svetivinčenat, and if the travellers did come this way they would have used nearly half of it before turning left at Canfanaro [Kanfanar]. The second alternative is the most probable, as the Valle site for Torre di Valle which seems to suggest the shorter route is by no means certain (see below).
There are four main subjects covered in Fortis’s letter:

- What he calls foibas, a term he uses for dolines as well as shafts;
- The formation of shafts by collapse into water-formed cavities beneath;
- The cave of Verteneglio (now Mramorica at Brtonigla), taken from his diary of 1770;
- The fossils occurring in the limestone, or marble as he calls it. This leads him on to modern shellfish in the region and the Roman extraction of imperial purple dye from the murex mollusc.

In addition, he reports on other places of interest such as mines, minerals and springs.

The part of the letter dealing with dolines and shafts, and Fortis’s explanation of the way in which they are formed, is treated separately in the next section. The exploration of the Verteneglio cave with Symonds and Cirillo in 1770 is discussed in the section after that.

The caves of Socerb and Vilenica, mentioned in f.4v, had been seen by Hervey (1771) in his journey in April or May of the same year without Fortis. The Foiba di Pisino [Pazinska jama] referred to, with its large sinking stream, was later explored by Martel (1894, 478-480) and was the location in Jules Verne’s (1885) story Mathias Sandorf for an imaginary journey along an underground river from the cave to the sea, using tree trunks as boats.

The Peutinger map referred to was a Roman road map, possibly made by Castorius in the second half of the 4th century. It was engraved and published in the second (1624) edition of Ortelius’s Theatri orbis terrarum parergon, which is where Fortis would have seen it (Tooley 1987, 5; Karrow 1993, 27). A much reduced copy of the map with fewer details shown had been published before that, in 1598, and has recently been reprinted (Pandžić et al. 1992, 28) but it does not show the spa.

The identity of the place Sdregna, at the top of f.5, is uncertain. Although this is the former name of Žrenj, a small town on the far side of Buzet, that is nearly 30 km away from Učka with the larger town between them so it seems unlikely to be the place meant. This may perhaps be Vragna [Vranja], 6 km north west of Učka.

The fossil hunting on ff.5-6 needs little comment except to discuss the possible location of Mr Torre’s park at Torra di Valle and to say who Vitaliano Donati was.

As noted in the translation of f.5, Torra di Valle might be at Valle (now Bale) on the direct road from Vodnjan to Rovinj. It might also be at Torre (now Tar, in Fig. 1) near the bay Val di Torre, close to Città Nuova [Novigrad] where Fortis had spent three days in 1770. As his 1771 route seems to have taken him past a newly opened foiba near S. Vincenti [Svetvinčenat] on a quite different road to the one with Valle on it, the Torre [Tar] site for Torra di Valle seems the most likely.

Vitaliano Donati (1717-1762), Fortis’s fellow citizen whom he admired but disagreed with over the abundance of fossils in the limestone, had been professor of botany at Torino. In 1759 he had started on a voyage to the east to collect specimens for a natural history museum and he died at sea en route to India (Mori 1932). The book cited is Della storia naturale marina dell’ Adriatico saggio, Venezia 1750.

The region known as Morlachia is Velebit planina, inland of the Adriatic coast and roughly opposite the islands of Rab and Pag.

The Murex mollusc described as the source of an important Roman industry yields a purple dye used for the robes of Roman emperors and hence called imperial purple. The Roman inscrip-
tion was published by Strange (1775, 338) with full acknowledgement to Fortis and again in *Inscriptiones Italiae* 10 (1) 1947, 271 (12*), where it is regarded as a counterfeit. Cissa was the name, in Roman times, of the island of Pag and its principal town (Butler 1907). Punta Cissana, where the inscription was found, is not in Pag, however, but is present-day Rt. Barbariga between Pula and Rovinj.

### “FOIBAS” - SHAFTS AND DOLINES

Fortis distinguishes two main types of foiba and believes that in course of time one is modified into the other. First come vertical shafts with quite small openings in flat ground which are therefore dangerous. Over long periods of time the action of rain and frost causes the rock near the top to break away and fall to the bottom, so that ultimately there are sloping sides with cultivatable soil at the bottom. Some small depressions are formed, he thinks, when this broken rock does not fall to the bottom of the shaft but blocks it near the top so that the resulting doline never becomes very big.

Some of the shafts have running water at the bottom from which he concludes that there must be long underground rivers flowing from the mountains to the sea. This water, by removing soil from between the limestone strata, causes them to collapse and break up. “This effect progresses upward from the lowest level”, until an opening appears at the surface. “No doubt … it is the water that does the work”. He notes the existence of submarine fresh water springs, now called vrlje.

Fortis (1771b, 130-131 ) printed these ideas on the formation of shafts by collapse caused by water, in a different form, in his book on Cres. The following quotation is taken from the published English translation (Fortis 1778a, 475-476). It follows on from a discussion of Pliny’s belief that the Danube had an underground connection with the Adriatic, so “he” is Pliny:

He would have found, by being on the spot, and anatomizing the bowels of that part of the continent, that *Istria* and *Liburnia* are formed by vast beds of marble, divided horizontally by strata of ochre easily dissolved, and which may be carried away by little water. He would have understood, that the slow dissolution and asportation of the ochre placed between the marble, must have thrown the strata out of equilibrium, and caused them to split and fall in of themselves for want of an equal base. Nor would he have stopped here; but passing rapidly in his mind from stratum to stratum, and from dissolution to dissolution, he would have imagined the erosions, and the thousands of years necessary to produce a whirlpool or gulf, or to sink a large hollow on a sudden. The prodigious number of ancient gulfs, and vast caverns, which are everywhere met with in those provinces; the frequent formation of new ones; the inequality of the ground, which bears evident marks of an habitual succession of ruins; and the waters, which in large quantities, run to the sea through those vast subterranean passages, would altogether have made a strong impression on him.

Thus Fortis’s speleogenetic ideas were printed, albeit in a not very prominent way but sufficient to establish priority for them.
His views on the formation of dolines, on the other hand, remained unpublished until now. They amount to a belief that all dolines were caused initially by collapse and that many were subsequently modified into a conical shape. This is not very different to modern opinion on collapse dolines. It also illustrates the still continuing difficulty in determining whether a large doline with sloping sides started life as a straightforward vertical-sided collapse doline (Mihevc 2001, 160). It would be interesting to have Fortis’s ideas compared with some of the other early theories recently reviewed by Šušteršič (2000).

THE CAVE AT VERTENEGLIO (BRTONIGLA)

The cave that Fortis calls the “foiba di Verteneglio” was known to later Italian explorers as either the Grotta di Verteneglio or Grotta del Marmo, and today it is Mramorica. It is located 1400 m S 20°W of the town of Brtonigla at an altitude of 188 m asl (Bertarelli & Boegan 1926, 290).

He writes that it was already well-known when he saw it in 1770, and the year 1775 (Fig. 11) is written among names and dates on a stalagmite column that he likens to a doorway inside the cave. Later dates are evidence of many visits from 1842 onwards. The next properly recorded

Fig. 11: The year “1775” is written on a stalagmite column on one side of the opening that Fortis describes as “rather like a doorway” into the Temple (photo A. Mihevc 28 January 2001).
Sl. 11: Leto “1775” je napisano na kapniški steber na eni strani odprtine v tempelj, ki jo Fortis opiše kot “vratom podobno” (foto A. Mihevc 28. januarja 2001).
Fig. 12: The cave survey made on 21 August 1898 by members of the Società Alpina delle Giulie (Boegan 1898, 69).

Slovenian: Sl. 12: Načrt jame, ki so ga 21. avgusta 1898 narisali člani Società Alpina delle Giulie (Boegan 1898, 69).

Visit, however, appears to have been made 115 years after Fortis was there, on 16 August 1885 by the Società Alpina delle Giulie (Anon. 1885; Boegan 1898, 71).

The first detailed description was published when the same society explored and surveyed the cave on 21 August 1898. Their plan and section, together with a small location map and a geological section, are reproduced here as Fig. 12. Their description (Boegan 1898) is quite lengthy and was later condensed to form the entry in Bertarelli & Boegan’s (1926, 290-291) standard book on the caves of the region which also contains a redrawn version of the 1898 survey. No later descriptions have been traced in the Italian or Croatian literature.

The cave is reached today from the group of houses marked on the 1:100 000 map as Pavići, but whose name board by the road calls it Stancija Drusković. There is a sign-posted Agroturismo place there. From it the cave entrance, masked by a clump of trees, can be seen in a field less than 500 m away in line with Brtonigla church. It is reached by going back along the approach road towards the north west for 390 m and then turning N 65° along a field track for about 160 m.

The entrance doline measures about 8 m by 11 m and contains Quercus, Ficus, Prunus, Crataegus and Rubus (Fig. 13). When the terra rossa mud is wet a handline is almost essential. The maximum length of the cave is 68 m but its breadth makes a complete exploration of it a lengthy task. The greatest depth is 29 m below the surface at the entrance. The general form is seen in Fig. 12 and does not need describing here.
Fig. 13: The doline containing the entrance to the Mramorica cave is masked by trees and shrubs. A photograph looking just west of north, taken on 28 January 2001 by Andrej Mihevc.

Fig. 14: Entering the main chamber from the foot of the entrance shaft (photo A. Mihevc 28 Jan. 2001).

Sl. 13: Vrtača, kjer se nahaja vhod v jamo Mramorico, je zakrita z drevjem in grmičevjem. Fotografijo, ki gleda nekoliko zahodno od severa, je 28. januarja 2001 posnel Andrej Mihevc.

Fortis went to the cave from Novigrad (Fig. 1), with men, ladders and torches provided by his host, Count Carlo Rigo, who has not been further identified. The cave is easily recognized from his description and seems little changed. The slipperiness of the hole from the surface has not changed at all and it is still best to enter the chamber head first (Fig. 14). Breakage of stalagmites, etc., had already started in his time and has continued, but still much of the cave remains attractive. The “small tubes” decorating the roof are still, or again, present and there are some helictites near the bottom of the cave, as well as most of the large columns.

The “great Tournefort” to whom he refers was Joseph Pitton de Tournefort (1656 - 1708) (Fig. 15), the French botanist who believed that stalactites and stalagmites possess a kind of primitive mineral life and grow in much the same way as plants do, only more slowly (Tournefort 1704, 226-227). This idea was not uncommon between 1676 and 1745 (Shaw 1992, 179-184). Tournefort (1717) discussed those he had seen in the cave in the Greek island of Antiparos. The stalagmites that Fortis likened to great “heads of cauliflower” had been described in those very words by Tournefort (1741, 1 203-204) himself and those in his engraving (Fig. 16), which Fortis would have seen, do resemble that vegetable.

What Fortis called the Temple (Fig. 17) is on the north side of what appears in Boegan’s plan to be a rock wall in the middle of this chamber. This is a flowstone-covered bank with large stalagmites and columns reaching the roof. In the middle of it is an opening (Fig. 18), passed by stepping over a narrow rock barrier about 1 m high, through which a survey line passes in Boegan’s plan. This is the second “doorway” mentioned in Fortis’s text, and about 6 m (20 feet) further on is the rectangular opening “rather like a door” which he described. It is nearly 2 m high and 65 cm wide. Between the two openings are more stalagmites and a mass of stalactite curtains in the roof that are still bright and magnificent even though much shortened by breakage. Certainly this is his Temple, though it is rectangular in shape rather than circular as he implies.

The guides’ tale he repeats, that several holes at the bottom of the cave led to many long galleries, is reflected in this statement by Bertarelli & Boegan (1926, 291): “The local people say that in the past the cave was bigger and deeper”. An inhabitant of Pavići in January 2001 stated that it continued for several kilometres before reappearing at the surface.

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Fig. 15: Joseph Pitton de Tournefort (1656-1708) who thought that stalagmites grew in a similar way to plants. Fortis disagreed.
Sl. 15: Joseph Pitton de Tournefort (1656-1708) je mislil, da stalagmiti rastejo podobno kot rastline. Fortis se z njim ni strinjal.
Fortis himself did later refer very briefly to this cave in print, in two rather obscure journals (Fortis 1778b, 258-259; 1778c, 13) in which he described the cave of Vilenica:

… the Grotta di Verteneglio, which is a few miles from Città-Nuova, whose peculiarity is to have an underground slope formed by the collapse of the upper layers [of rock] and the top of which is connected with the roof by a circular wall of stalactites, forming a sort of small temple.
Fig. 17: Part of what Fortis called the Temple. Despite centuries of breakage, the stalactites are still attractive (photo A. Mihevc 28 January 2001).
Sl. 17: Del jame, ki jo je Fortis imenoval tempelj. Kapniki so ne glede na večstoletno lomljenje ohranili privlačnost (foto A. Mihevc 28. januarja 2001).

Fig. 18: Looking across the Temple towards the second “doorway” mentioned in Fortis’s letter (photo A. Mihevc 28 January 2001).
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To Mr and dear friend

Ancona, 13th of June 1771

[f. 2]

At first sight you will believe that I was punished for my exaggerated courage, if you learn that I started to cross the Gulf [of Quarnaro] in stormy weather; a man who set out for the islands of Quarnaro [Kvarner] [i.e. the island of Cherso = Cres] yet dates his letters from Ancona, has all the appearance of an orphan of the storm. I left Venezia on the 4th of this month, and the storm wind served me very well; at 11 o’clock in the morning we sailed, and at midnight we arrived at the mouth of Rovigno [Rovinj] harbour. I received there some news about my lord Hervey from our good friend and host, Dr Pier Francesco Costantini. On the 6th I embarked for Pola [Pula] where I arrived after sailing close to the coast to check the map. There I reached my illustrious friend [i.e. Hervey], and again I visited with pleasure the amphitheatre, the temple, the arch, and the scattered ruins of that great ancient city. My lord Hervey thinks to send his architect to make accurate drawings of these precious ruins, before they decay completely as they threaten to. Our journey was directed, as you know, to the island of Cherso [Cres] and Osero [Osor], and to others beyond, but the escape of a galley slave coming from suspect country had put these islands into quarantine. We were not prepared to risk 40 days confinement just to make further observations [i.e. in addition to those made the year before], which we could have done, so we changed our plan and went in a different direction. The newspapers told us that Vesuvio was erupting violently; this is a great event. We decided to cross the Gulf again and so we went back to Rovigno.

We travelled on horseback through part of Istria and this added a little to my knowledge of its geography. The most remarkable fact about the fossils [i.e. geological history] which distinguish it [f. 2v] is the large number of foibas [i.e. shafts or dolines], that you see there. Foiba is a corruption of the Latin fovea, used in Istria (where far more traces of latinisms persist) to indicate a sinking of the ground, or rather a very large hole resulting from such a sinking.

There are two different types of foibas, and two different kind of subsidence. The most dangerous caves for passers-by are shafts with quite small openings, which sink almost vertically into the ground. Some of them contain underground rivers from time to time, and in others there are permanent rivers flowing to the sea. There is no slope on the surface of the ground around them, where you walk, which could warn someone passing at night of their presence. Animals quite commonly fall in by day. You are not even always protected by having known the district for a long time, because new shafts often open up. The other type of foiba has a rather large and more or less circular and funnel shaped opening, whose bottom, and frequently also the sloping sides are in the form of an amphitheatre. Maybe they were the first amphitheatres used by the people.

This second kind of cavity I am talking about was once like the other sort, vertical shafts; then over the long passage of centuries the action of water and ice caused the stone to [fracture and] fall towards the bottom, resulting in passable slopes. Finally they can be cultivated on the earth washed in by rain which, together with rotted leaves and decayed stone from round about, provides suitable soil for growth. Some small foibas are depressions formed when the shattered
rock completely blocked [f. 3] the shaft beneath them at an early stage, and these foibas are not very deep.

Generally the biggest caves of Istria are 150 [46 m] to 200 [61 m] feet deep, cut in the solid rock. I think I now understand how and why they occur. I would be very pleased if you, sir, were to be convinced by my way of thinking and found it consistent with the evidence. The province of Istria lies at the foot of mountains much bigger than its own hills are. These are covered in snow for long periods and send towards the sea much water which first trickles along and then flows in quantity along channels it forms on its way to rivers and to the sea. Often too it forms underground streams and branches of little rivers, whose flow varies with the season so that in summer droughts they are quite dry. You can well see, that for the water to travel all this way through the interior of the country there must be some long caverns and rushing waters. It is equally necessary that the structure and material of the beds and their inclination must be suitable for the water to flow through. It is sufficient to examine carefully the inner rock surface of one foiba or a rocky sea cliff to see the underground structure (or do you prefer skeleton?) in this region which enables it to give free passage to the underground water. One of the foibas recently opened between S. Vincenti [Svetivinčenat] and S. Lorenzo [Sv. Lovreč] is the most instructive that you can visit. The boundaries between individual strata show quite clearly because grass and plants have not had time to grow over them and the rock has not been weathered by rain and frost. It is well known that between one layer of rock and another there is a distinct division line made of a different material; the individual rock layers would not be distinguishable if this line were not clearly exposed. The strata of the Istrian marble are usually separated by thin lines of ferruginous soil which is easily carried away by the penetrating water, leaving great masses of rock unsupported. They certainly cannot remain like that and the lower layers must give way because of the weight of rock above, collapsing in various places. Thus the previously impermeable rock strata become broken stone through which new streams can make their way. This effect progresses upward from the lowest level, with the strata breaking progressively until the highest layer breaks and an opening appears beneath the feet of farmers and bullocks. To emphasize the time necessary to produce such a shaft in this hard Istrian marble, which is the same as we use in Venezia for the bases of houses wet by salt water, and to prevent you doubting that it is the water that does the work, I must remark that, in addition to Istria’s four main rivers, there are innumerable streams flowing between the rock strata and coming out in the sea. Sometimes after heavy rains springs of fresh water emerge under the sea far away from the coast. This is water which has rushed into the underground reservoirs with too much force and in too great quantity.

Near at hand I have got my diary of the last year’s journey and I shall copy a part if it about foibas. Returning from Cherso [Cres] to Venezia we landed at Città nuova [Novigrad] in Istria [f. 4] to see the famous foiba of Verteneglio [Brtonigla]. We were all foreigners and without escort: Mr Symonds, Professor Cirillo and me. Count Rigo welcomed us with extremely generous and magnificent hospitality in his beautiful house and he had us taken to the foiba to which he had previously sent some men with torches and ladders. The cave entrance is formidable. You start by going down a narrow and slippery hole, from which you descend by ladder in an even narrower one which comes out at the side of the main hall of the cave. To get into the cave it is necessary to lie on your stomach with your hands and on the floor and your legs behind you, otherwise it would be impossible because in one place you must descend through a very tight hole. When we stood up straight we saw an underground slope of marble, scattered with those trunks like the
trunks of trees and columns, which were thought to be real plants by more than one naturalist, notably by the great Tournefort who saw them in the famous Cave of Antiparo [Antiparos]. Some of these are more than ten feet [3 m] in diameter and others of various smaller sizes down to the thickness of an arm. The roof is all adorned with pretty decorations and groups of stalactites. The top of the underground slope is connected to the roof by a wall of stalactite forming a Temple about fifteen feet [4,5 m] high and of proportionate diameter into which you enter through an opening rather like a doorway, and you go out through another one about 20 feet [6 m] away. The walls of this Temple are transparent and equally transparent are the columns on the outside of this natural wall, which have channel-like ornaments on them and low relief gothic decorations or those great heads of cauliflower with which the Antiparos cave is embellished. The roof is decorated with small tubes, cones and branches, with glittering roses made of [f. 4v] purest stalagmite material. At various distances from the Temple are columns which support the roof and seem to have served as models for gothic candlesticks or for columns worked with that stupendous and barbarous taste in the fronts of Milano and Orvieto cathedrals. The underground slope is very steep and slippery but is much visited by barbaric people who take brutal pleasure in breaking off the most superb pieces of the columns and the formations of the roof. The guides told us that at the foot of the slope are several holes through which it is possible to descend a long way, passing through many galleries decorated with formations.

We did not go to the cave again, although the bad weather and the hospitality of our host caused us to spend three days near Città nuova. In Upper Istria there are many other caves, some of them famous for their stalactites like those of S. Servolo [Socerb] and of Corgnal [Vilenica] and others because of rivers sinking in them like the one at Pisino [Pazin]. All these have been visited by my lord Hervey who prefers them to Verteneglio. Count Carlo Rigo and his brother Count Abate, who is equal to him in hospitality and kindness, told us of various natural curiosities of Istria. Between Montona [Motovun] and Pinguente [Buzet] near the cave of S. Stefano, there is a sulphur spring [Istarske Toplice]. It seems it was known to the Romans. It may have been there that the [Roman] spa shown on the Peutinger map was. Near the castle of Verk in the Montona valley there is a bitumen mine. Well exposed rocks and black volcanic stones are found on the slopes of Monte Maggiore [Učka], where there are also [f. 5] (towards Sdregna [Zrenj, Vranja?] especially) flint of various colours, a kind of stone that you cannot find in the lower mountains of Istria. Not far from Albona [Labin], there is a coal mine at Arsia [Raša].

In the short journey riding from Pola to Rovigno I had the chance to notice again in many places that Istrian marble is formed of visible and recognizable remains of sea animals, like almost all other calcareous stones are. The more or less smooth surface of this marble hides many of these because its compactness makes it resistant to weathering. For example it is Istrian marble of which the amphitheatre of Pola is built. I again noticed a large quantity of fistular ceratomorph fossils similar to those in the stone that I had drawn and engraved to illustrate my book about Cherso and Osero. At other times I noticed the Buccinum and other Turbo fossils, and few days ago with young Mr Hervey, who is inspired by the spirit of natural history, we found in addition to these species also ostrocodi of great size and in beautiful condition. Vitaliano Donati, my famous fellow citizen, had not observed thoroughly enough when he asserted in his Saggio della Storia Naturale dell’Adriatico [Essay on the Natural History of the Adriatic] that they occur only rarely in the provinces of Istria, Croatia, Morlacchia and Dalmatia, where you need good eyes to see the petrified remains. In the vicinity of Mr Torre’s Park at Torra di Valle [Balle near
Rovinj or Tar near Novigrad?], by searching stones exposed to the air, you can find ones composed of echinodermata, of nummulites, and of fragments of several bivalve species, clearly recognizable because they stand out on the white surface of the stone because the blackish iron content of [f. 5v] the original shellfish is acted upon by the acid in the air and oxidizes. I remember that a long time ago I collected a similar petrifaction [fossil] near the village of Altura [Valtura near Pula] overlooking the Quarnaro. You know how dear and respected is for me the memory of Donati, who perhaps should not have died so soon and in such a distant land, and you know that I have no wish to contradict him: but the truth escaped him and a mistake by such an attentive and scrupulous observer is a caution to others who are less well known.

In the same way as petrifications of marine animals occur in the Istrian rocks, so the present limestone coastline has many living univalve and bivalve shells. Among these we can distinguish Pinna [a genus of bivalve molluses that has a large silky byssus or “beard”], of which silk stockings and gloves are made in the province of Istria like in Padova, and they are sold for a lot of money in foreign countries. In the past a kind of Murex and Buccinum formed a very important article of trade; the marvellous quantity of these, which are found among the seaweed, stimulated the Romans to built a dye works. Only two years ago an inscription on a tombstone was found at Punta Cisana, where there are ruins along the edge of the sea. Here it is:

D. M.
Q. C. PETRONIO. M. C. PETRONII. F. VIVIRO. AVG.
PROC. BAPHY. CISSAE. HYSTRIAЕ. ET COLLEG.
PURPUR. CISSENS. HYSTRIAЕ. PATRONO.
T. COR. CHRYSOMALUS. PURPUARIUS. AUG. LIB.

Besides probably fixing the location of classical Cissa, the inscription [f. 6] also corrects a part of Guido Pancirolo’s text in Notit. Imp. Occidente Cap. 39 where, talking about dye works at Baglio, he thinks that Batio Cissense may be a corruption of Cistense, i.e made from the bush Cistus. Just as the abundance of Buccinum and Murex and the presence of this tombstone prove the mistake of Pancirolo, so the fact that year after year very hard rocks are perforated by the boring of pholas prove at least partially wrong Reamur’s assertion that the lonely testacea must have lived in the marble before it became fully hardened. I too have frequently seen more than one live pholas in the marble cavity of gaidropoda [gastropoda], a species of ostrocoda that is very common in this environment. The Istrian coast is mostly well populated with testacea and the most delicious crabs can be fished not far off the coast. The coast of Punta Cisana is very rich in microscopic snail shells.

We stayed for two days in Rovigno where we enjoyed ourselves with a good friend, visiting the surroundings of the city and the harbour where there are attractive islands with olive trees and vines. The population of Rovigno is about 14000, and it is increasing every day. The men and women are hard-working and strong; the men are known as courageous sailors. There is nothing worthy of notice in the buildings of the city, except perhaps the big principal church on a hill. Its architecture is not bad at all and it contains some fine paintings.

We sailed on the 11th and arrived today in Ancona whence we shall leave in few hours.
... Ancona is a beautiful city with a great number of inhabitants, and they say that the commerce flourishes but when we arrived today, there were only two ships in the port... We are living for Rome today. And I promise you to continue sending you news about my observations. ...

APPENDIX II

ORIGINAL ITALIAN TEXT OF THE FORTIS LETTER

Chiamo Sig.re ed Amico Preg.le

Ancona a 13. Giugno 1771

[f. 2]

Voi crederete a prima vista che io sia stato punito del mio soverchio coraggio se avete saputo che io ò intrapreso la traversata del Golfo con tempo burrascoso; e di fatti un uomo, ch’era diretto all’Isole del Quarnaro, e che data le sue lettere d’Ancona, ha tutta l’apparenza d’un avanzo di burrasca. Io sono però stato condotto qui colla, maggior placidanza del mondo, anzi con soverchia flemma. Partii da Venezia, il di 4. del corrente, e mi servi per l’eccellenza il mal tempo; alle 11. ore fecimo vela, e alle 24. giunsi alla bocca del porto di Rovigno. Trovai colà delle nuove di Mylord Hervey presso un nostro buon Amico, ed Ospite il Dr. Pier Francesco Costantini; e mi’imbarcai il di 6. per Pola, dove arrivai costeggiando, erettificando una carta di quel litorale. Colà raggiunsi il mio Illustre Amico, e rividi con piacere l’anfiteatro, il Tempio, l’Arco, e i ruderi sparsi della grandezza di quella Città antichissima.

Mylord Hervey pensa di mandarvi il suo architetto, onde siano fedelmente disegnati quei preziosi resti, prima che periscano del tutto, come minacciano di fare. Era diretto il nostro viaggio, come sapete, all’Isola di Cherso ed Osero, e all’altre contigue: ma la fuga d’un Galeotto proveniente da paese sospetto le assoggetta alla contumacia. Noi non eravamo disposti a subire una prigonia di quaranta giorni per premio delle ulteriori osservazioni, che vi avessimo potuto fare; e quindi cangiammo progetto, e ci rivolsimo ad altra parte. I fogli publici ci fecero sapere che il Vesuvio erutta con grand’impeto; questa ~ una manifesta vocazione. Risolvemmo di rivarcare il Golfo, e d’andarci a Rovigno. Fecimo un tratto d’Istria, a cavallo, che aggiunse alcun poco alla conoscenza che io aveva del fissico di quella provincia. Il più osservabile fatto appartenente alla Storia Fossile, che la distingua, [f. 2v] vi è la gran quantità di foibe, che vi s’incontra. Foiba è una corruzione del Latino fovea, usata in Istria (dove moltissimi espressi vestigi di latinismo rimangono che fra noi) per indicare uno sprofondamento di terra, o per meglio dire, una gran buca nata dallo sprofondamento di terra. Di due spezie sono le foibe, e di due spezie gli sprofondamenti. Le foibe più pericolose pe’ viandanti sono voragini che hanno una mediocre apertura, e s’profondano quasi a perpendicolo ben addentro nelle viscere del suolo; per alcune di queste scorrono sovente rivi sotterranei eventuali, e per altre portansi al mare acque perenni. Non v’è alcuna inclinazione nel piano esteriore, per cui si cammina, che possa render avvertito della vicinanza d’un precipizio chi andasse di notte; e non di raro avviene che anche di giorno gli animali vi cadano. Nè la lunga pratica del paese preserva sempre;
imperocchè frequentemente vi si aprono delle nuove voragini all’improvviso. L’altra spezie di foibe ha un’apertura ben ampia, e per lo più circolare, e fatta a imbuto, di cui il fondo, e spesso anche le falde, che scendono con pendio praticabile, in modo di anfiteatro, sono costituiti? Forse furono queste i primi anfiteatri degli uomini non ancora del tutto ripuliti, o guasti dalla società. Cave ch’ellenco siano state anticamente simili alle altre, cioè precipizi tagliati a piombo; e che il lungo andare dei secoli, e il lavoro delle acque, e de ghiacci, facendo cadere da tutto all’intorno le pietre verso il fondo le abbia ridotte praticabili. Divengono finalmente alte a coltura? dopo che le foglie marcite, la terra portat avi dalle pioggie, e la calcinazione di qualche porzione delle pietre circostanti somministra un suolo opportuno a grani, alle viticoltori?

Avvalamenti di strati disequilibrati per mancanza di sostegno che chiusero [f. 3] colla prima caduta loro il vano che aveano sotto, e queste sono poco profonde. Per la maggior parte le foibe maggiori dell’Istria sogliono avere 150: e 200 - piedi di profondità perpendicolare; e sono scavate nel vivo marmo. Io credo d’avere inteso come, e perché accadano si fatti inabbissamenti. Sarei molto contento di me, se voi, o Signore, foste persuaso del mio modo di pensare, trovandolo coerente alle osservazioni. La Provincia dell’Istria giace al piè di monti molto maggiori che le sue colline non sono Questi per lungo tempo coperti di neve, mandano al mare tributo di mol’t acqua, che ora trapela a poco a poco, ora in considerevole quantità pè sotterranei meati va faccendosi strada per isboccare nel mare, o nei fiumi. Spesso anche essa forma rivi, e fiumicelli sotterranei divisi in vari rami, che ora più, ora meno, e nelle arese poi dell’estate niente d’acqua recano al mare. Voi ben vedete, che per fare strada attraverso le interne viscere del paese a tutta quest’acqua è necessario vi siano delle lunghe caverne e andirivieni, e perché questi vi possano essere è necessario egualmente, che la struttura degli strati, l’inclinazione, la materia loro s’accomodi agevolmente al passaggio delle acque. Basta esaminare con occhio diligente il circuito interiore d’una foiba, o anche alcun tratto di lido petroso, e ripido lungo il mare per chiarirsi della disposizione che hanno le viscere (od ossa che vogliam dirle) di queste Provincie a scomporsi per dare sfogo, e passaggio libero alle acque superiori. Una foiba di recente apertasi fra S. Vincenti, e S. Lorenzo è la più istruttiva che si possa visitare. Gli orli degli stratti vi si reggono assai distintamente, perché non per anche ingombre dall’erbe, e dalle piante, che non hanno avuto il tempo di nascervi, ne si trovano ancora offesi dalle pioggie, o dal ghiaccio. È costantissima legge, che fra uno strato, e l’altro vi sia una divisione più o meno riconoscibile; non si distinguerebbero gli strati se si fatta linea [f. 3v] o dalla differenza delle materie, o dalla succedanità? delle deposizioni di esse, o da qualche corpo intermedio non fosse ben espressa, e segnata. Gli strati del marmo Istriano sono nell’ordinario divisi da picciole linee di terra ferruginosa, la quale facilmente scogliendosi per opera dell’acque, che vi si filtrano, lascia senza sostegno vastissime, e pesanti masse di pietra. Queste non possono certamente restar in aria; ma le inferiori al peso dei superiori strati marmorei per necessità dovendo cedere, fendersi in vari luoghi, e disequilibrarsi più o meno a misura del vuoto che hanno loro scavato le acque di sotto, di continuo, e impenetrabili ch’erano, divengono scogli sfasciati a traverso dei quali nuovi ruscelli s’aprono il passaggio. Andate così discorrendo dalla più bassa parte interna dell’Istria sino alla superficie, e di sfasciamento in sfasciamento procedendo giungerete al momento, in cui precipita lo strato superiore, e manca tal volta sotto ai piedi degli agricoltori, e dei buoi. Per chiarirvi del tempo, ch’è neccessario a produrre, una voragine, vi dirò che tutta l’Istria è impastata di quella dura spezie di marmo, di cui ci serviamo a Venezia per le fondamenta delle case bagnate dall’acqua salsa, e per mettervi in necessità di non dubitare che le acque facciano questi lavori, vi aggiungerò, che oltre a quattro principali fiumi Istriani,
dove anche [f. 5] (verso Sdregna in particolare) trovansi selci focaie di vari colori, spezie di pietre che non si vede affatto né monti minori dell’Istria. In poca distanza d’Albona, sull’Arsia v’ha una cava di carbon fossile.

Nel breve viaggio fatto cavalcando da Pola a Rovigno ebbi campo di riosservare in parecchi luoghi, che il marmo d’Istria è composto di visibili e riconoscibilissimi corpi marini, come quasi tutte le altre pietre calcarie lo sono. La grana più o meno fina di esso marmo nasconde più o meno i corpi presi, perché resiste all’azione dell’aria esteriore in ragione della sua compattezza, o delle varie combinazioni di componenti. È, per esempio, marmo istriano quello, ond’è fabbricato l’Anfiteatro di Pola. Io v’avea replicatamente osservato una gran quantità di corpi fistolosi ceratomorfi analoghi a quelli, di quali è ripieno un sasso ch’io ho fatto disegnare, ed incidere nelle osservazioni mie sopra Cherso ed Osero. Vi osservai anche in altri tempi dei buccini, ed altri turbinati, e nei giorni scorsi col giovinetto Mr Hervey, ch’è animato dal genio della Storia Naturale, vi scoprirmi oltre le anzi dette spezie anche ostraciti di esimia grandezza e di perfetta conservazione. Non aveva bene osservato quei materiali il celebre mio concittadino Vitaliano Donati quando asserì nel suo Saggio della storia naturale dell’Adriatico, che nelle Provincie dell’Istria, Croazia, Morlacchia, Dalmazia, di rarissimi, e appena da sommamente diligenti occhi discernibili si trovano i corpi marini impetrati. Nelle vicinanze del Parco del Sig. Torre presso alla raguardevole Terra di Valle, esaminando le pietre esposte all’aria, trovansi composte di echinodermati, di nummularie, e di frantumi di varie spezie bivalvi assai chiaramente riconoscibili, perché giallegano sul bianco della pietra a cagione del ferro [f. 5v] aneridato? nei testacei, che pell’azione dell’acido universale errante pell’atmosfera sprigionarsi e arruginisce. Mi risovviene d’aver, anni sono, raccolto delle petrificazioni simili presso il Villaggio d’altura che guarda il Quarnaro. Voi sapete quanto cara, e rispettabile sia per me la memoria del Donati che non avrebbe forse dovuto perire in sì lontane terre, e così immaturamente; nè potrete credere che voglia di contradirlo mi animi: ma la verità gli è fuggita; e lo sbaglio d’un sì attento, e scrupoloso osservatore deve far conto qualunque altro, che da meno di lui si conosca.

Come di petrificazioni marine sono composte, o sparse le pietre dell’Istria così di gran varietà di conchiglie univalvi, e bivalvi sono popolati i di lei lidi marmorei. Fra queste si distinguono a giorni nostri le Pinne Marine, della seta delle quali si fabbricano calzette, e guanti sì nella Provincia, che in Padova, e si vendono nei Paesi stranieri a caro prezzo. Anticamente il genere di muriciti, e di buccini che v’è moltiplicatissimo, formava importante articolo, la prodigiosa quantità di queste bestiolazze, che pelle fenditure dei lidi d’erbe marine vanno pascendosi?, invogliò i Romani di eriggervi una Tintoria. Di questa si trovò non ancora due anni sono il documento in una Lapida scoperta a Punta Cisana, dove gran tratto di ruderi, e macerie stendesi lungo il mare.

Eccola:

D. M.

Q. C. PETRONIO. M. C. PETRONII. F. VIVIRO. AVG.
PROC. BAPHY. CISSAE. HYSTRIAE. ET COLLEG.
PURPUR. CISENS. HYSTRIAE. PATRONO.
T. COR. CHRYSOMALUS. PURPUARIUS. AUG. LIB.
POPOTOVANJE ALBERTA FORTISA PO HRVAŠKEM ISTRSKEM KRASU
V LETIH 1770 IN 1771

Povzetek

V 18. stoletju so si učenjaki največkrat sporočali informacije in nova odkritja po pismih, pa tudi s knjigami in strokovnimi zapismi. Le včasih se je zgodilo, da so vsebine teh pisem kasneje objavili, največkrat pa so ostale neznane širšemu občinstvu. Eno izmed slednjih je tudi pismo, ki ga je leta 1771 napisal naravoslovec Alberto Fortis.


V prvem pismu (Fortis 1771a) je opisana pot po cesti od Pulja do Rovinja, od 6. ali 7. do 11. junija. Pismo vsebuje informacije o fosilih, ohranjenih v apnencu in zelo zanimive podrobnosti o vrtačah z njegovo razlago o njihovem nastanku. Fortis nato nadaljuje s temo o krasu s prepisom dela svojega dnevnika iz leta 1770, kjer je opisal obisk jame Mramorice v bližini Brtonigle. Pismo, napisano na desetih velikih straneh, je v tem prispevku predstavljeno tako v originalu, to je v italijansčini kot tudi v angleškem prevodu.

Fortis uporablja izraz “fojba” tako za vrtače kot za brezna. Razlikuje dve glavni obliki fojb in verjame, da se sčasoma prva oblika le-teh preoblikuje v drugo. Najprej nastanejo navpična brezna z malimi odprtinami v ravnih tleh in prav zaradi njih so ta brezna tako nevarna. Po dolgotrajnem delovanju dežja in ledu se kamenine pri vrhu odlomijo in zgrmijo na dno, nato pa se oblikujejo poševe strani z rodovitno prstjo na dnu. Fortis je mnenja, da nekatere manjše depresije nastanejo, ko odlomljene skale ne padejo na dno brezen, temveč se zaustavijo v bližini vrha in prav zaradi tega ta brezna nikoli ne postanejo zelo velika.


V pismu pravi naslednje:

Obstajata dve vrsti vrtač in dva različna tipa brezen. Za potopnike so najbolj nevarne jame z manjšo odprtino, ki se skoraj navpično spustijo v notranjost. Po nekaterih se le včasih pretakajo podzemne vode, po drugih pa vedno tečejo podzemne reke. Na površju ni mogoče opaziti nobene nagrjenosti terena, ki bi mimoidoče lahko opozarjala na brezno. Podnevi vanje večkrat padejo celo živali. Tudi dobro poznavanje terena nas ne obvaruje, kajti nova brezna se večkrat nepredvidoma odprejo. Druga vrsta brezen ima široko in precej okroglo odprtino ljakaste oblike. Dno in pogosto tudi poševne stene so v obliki amfiteatra. Mogoče so to bili prvi amfiteatri, ki so jih uporabljali ljudje.
Ta druga vrsta jam, o katerih govorim, je bila v začetku podobna prvim - navpičnim breznem. Večstoletno delovanje vode in ledu je kamenje začelo lomiti in ga nalagati na dno jane, kar je brezna spremenilo v bolj dostopna. Od dežja sprana zemlja, ki skupaj z nagitim listjem in zdrobljenim kamenjem ustvarja primerno prst za rast, dokončno oblikuje vrtače. Nekatere manjše fojbe so pravzaprav depresije, ki so nastale, ko je zdrobljena kamenina že popolnoma zapolnila brezno pod njimi, zato takšne jane niso preveč globoke.

Največje istrske jade so ponavadi globoke od 150 [46 m] do 200 [61 m] čeviljev. Mislim, da sedaj razumem kako in zakaj nastanjo brezna. Bil bi zelo zadovoljen, če bi vas, gospod, prepričal moj način razmišljanja podkrepljen z dejstvi. Pokrajina Istra leži ob vznožju hribov, ki so precej višji od njenih gričev. S hribov, katere daljše obdobje pokriva sneg, se zbiva proti morju veliko vode, ki sprva le počasi curlja, se zbiva proti morju razredjuje in se izstopi dolgo jame in pretakajoče se vode. Prav tako je potrebno, da so podzemni potoki in rečice, katerih vodostaj se spreminja glede na letni čas, ali ga ob poletnem sušnem obdobju skoraj žalno kržamo. Razumemo podzemno strukturo (t. j. podzemno zmožnost), ki omogoča podzemnim vodam prost prehod. Fojba, ki se je pred kratkim odprla med krajema Sveti Vinčenat in S. Lovreč, je za ogled najbolj poučna. Ne meje med posameznimi plastmi so dokaj prepoznavne, kajti trava in rastline jih ni uspele prekriti, kamenino pa ni načenjata dež in mraz. Splošno je znano, da je izrazita meja med posameznimi plastmi narejena iz različnih lateralnih tipov, posamezne plasti ne bi bile razvidne, če mejna črta ne bi bila tako jasno vidna. Plasti istrskega marmorja so ponavadi razmejene z drobnimi črtami prsti, ki vsebuje že lepolejše. Le-te z lahkoto izpere pronicajoče voda ter tako pusti velike in težke kamnine razbregnete podpodne. Te seveda ne morejo obstati v zraku ter tako podzemne vode popustijo pod težo zgornjih, se odlomijo ter popadajo na različne strani. Tu učinkovito se postopno širi z lomljenjem plast, od najnižjih plast navzgor proti vrhu, se takoj razbregnete plasti ne odlomijo in tako na površini pod nogami kmetov in volov zaseva brezno. Da bi podarili čas potreben za nastanek takšnega brezna v trdem istrskem marmorju; ravno takega uporabljamo v Benetkah za temelje hiš, ki jih razširimo sladke vode, in da ne bi podvomili, da je voda tista, ki opravi vse delo, moram dodati, da poleg štirih glavnih istrskih rek, obstajajo še številni potoki, ki med plastmi kamenin tečejo v podzemne zbiralnike.

Jugovjo razmišljanje bi lahko stvrdnilo v to, da verjame, da so vse vrtače sprva nastale s podori, kasneje pa jih je veliko dobroloko stotočno oblikovalo. To razmišljanje se ne razlikuje bistveno od sodobnega pogleda na udorne vrtače. Zanimivo bi bilo primerjati Fortisova razmišljanja z nekaterimi prvotnimi teorijami, ki jih je nedavno ponovno ocenil Šušteršič (2000).

Jama Mramorica (njegova "foiba di Verteneglio") je bila že znana leta 1770, ko je jih Fortis ogledal. Še danes je v jami viden njegov podpis iz leta 1775. Njegov opis jane, citiran v nadaljevanju, pravzaprav kaže na to, da se je jane do takrat, ko jo je izmeril Boegan (1898), le malo spremenila. Jama je tudi danes ohranila precejšnjo privlačnost ne glede na 250 letno uničevanje kapnikov. Zaradi prostranstev glavne dvorani, se zdi jane presenetljivo velika v primerjavi z njenimi resničnimi dimenzijami.
Fortis v svojem pismu pravi:

Izkrcali smo se v Novigradu v Istri, da bi si ogledali najslavnejšo jamo Brtoniglo. Vsi smo bili tujci in brez spremstva: gospod Symonds, profesor Cirilli in jaz. Grof Rigo nas je izredno gostoljubno sprejel v svoji lepi hiši in nam pripravil ogled jame, kamor je že vnaprej poslal možne opremljene z baklami in lestvami. Vhod v jamo je grozljiv. Začneš s spustom skozi ozek in spolzkev prehod, nato se s pomočjo lestev spustiš do naslednjega še bolj ozkega prehoda, ki te pripelje do glavne dvorane. Če hočeš vstopiti v jamo, se moraš uleči na trebuh in roke, noge pa pustiti zadaj, drugače ni mogoče vstopiti. Na določenem mestu, se moraš spustiti skozi zelo ozek prehod. Ko smo se zravnali, smo zagledali podzemno marmornato vzpetino, posuto z debli (podobnimi drevesnim) in s stebri. Več naravoslovcev, med njimi tudi veliki Tournefort, ki jih je videl v znani jami Antiparos, misli, da so rastline.

Nekatera od debel imajo več kot 10 [3 m] čevljev obsega, obstajajo pa tudi manjša in najmanjša imajo le obseg roke. Strop je ves okrašen s skupinami stalaktitov in drugimi okraski. Vrh vzpetine povezujejo s stropom dvorane prečudovito stalaktiti, ki oblikujejo okrogel templj, ki je visok približno 15 [4,5 m] čevljev in je sorazmernega premera. V templj se vstopi skozi vratom podobno odprtino, izstopi pa se skozi drugo odprtino oddaljeno okrog 120 [6 m] čevljev. Stranice templja so prozorne, tako kot so prozorni stalaktiti na zunanji strani tega naravnega obzidja, ki imajo okrasko v obliki žlebov, gotskih reliefov in cvetač. Podobni krasijo tudi jamo Antiparos. Strop je okrašen s cevičcami, storži in vejami s svetlikajočimi vrtnicami, izdelanimi iz najčistejšega kapniškega materiala. V različni oddaljenosti od templja se dvigujejo stebri, ki podpirajo strop, in ki izgledajo tako, kot da so služili za modele gotskim svečnikom in stebrom na čudovitih fasadah katedral v Milanu in v Orvietu. Podzemna vzpetina je zelo strma in spolzka, toda vseeno jo še vedno obiskujejo neotesani ljudje, ki uživajo v lomljenju najčudovitejših stebrov in stropnih okraskov. Voditi so nam povedali, da se ob vznožju vzpetine nahajajo različni rovi ter da se je možno skozi lepo okrašene galerije še globlje spustiti.