Why were medieval sea charts still being produced four centuries later? Does the answer lie in the Aegean?

Tony Campbell
formerly British Library

Portolan charts were one of the three ways of presenting large land areas in the later Middle Ages. The others were the mappaemundi and the rediscovered maps of Ptolemy. Numerous scholars have studied these intriguing documents over the last two centuries. Frederick Lane described the portolan chart as 'the first map drawn to scale, indeed, the first extensive map ever made with accurate picturing of landforms'. ¹ {Fig.1}

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¹ Frederick C. Lane, *Venice: A Maritime Republic*, Baltimore and London: Johns Hopkins Press, 1973, p.120.
It was the magnetic compass that seems to have made possible both the charts' creation and their navigational use. Their most obvious distinguishing features are the network of compass directions and the 2000 or so place-names, carefully written in one continuous sequence within the land area so as to leave the sea uncluttered.

Much interest today focuses on the still-unresolved questions of their origin: the precise nature of the prototype and how it was constructed. This author's detailed work over recent years has concentrated on various aspects, ignored in the past, such as differential island colouring (one of several innovations in the charts) and the minute marking of navigational dangers. Overall clarity is also beginning to emerge about toponymy, a vital diagnostic aid.

However, those issues will not be dealt with here. Nor will the focus be specifically on Cyprus, about whose portolan chart development an article was published in Kupriakai Spoudai in 1984. \(^2\) {Fig.2}

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\(^2\) Tony Campbell, "Cyprus and the medieval portolan charts", Kupriakai Spoudai 48 (1984, i.e. 1986), pp. 47-66. This includes a table of the names on 'Lo Compasso' and 43 portolan atlases and charts (up to 1497).
Instead, the concentration here will be on the unrealistic shape of the smaller islands, specifically those in the Aegean. It will be argued that what at first sight seems a trivial detail in fact reveals the inventiveness of the portolan charts' creators. It also helps us understand more clearly the charts' practical use at sea and why they continued to be bought and used for over three centuries.

These findings were made possible by the DVD (containing images of almost all the surviving charts up to 1469) which accompanied the notable study published by Ramon Pujades in 2007.  

3 Ramon J. Pujades i Bataller, *Les cartes portolanes: la representació medieval d'una mar solcada*, Barcelona: Institut Cartogràfic de Catalunya; Institut d'Estudis Catalans; Institut Europeu de la Mediterrània; Lunwerg, 2007. [In Catalan and Spanish, with English text ‘Portolan charts: the medieval representation of a ploughed sea’, pp. 401-526. The references are made to this. The accompanying DVD contains zoomable, rotatable images of over 120 charts and atlases pre-1469]
The overall accuracy of the portolan charts
Before looking at the question of island shape, it is necessary to dispose of the argument that the inexact outlines might be the result of the chartmakers' ignorance. A direct comparison between a modern map and a mid-15th century chart highlights the astonishing accuracy of the overall coastal outlines - one that had been achieved by about 1320. {Fig.4}
Similar comparisons for Cyprus and Crete confirm that lack of skill was certainly not the problem. {Fig.5}

Indeed, when other Cyprus outlines are considered it is apparent that the early portolan chart, here represented by Pietro Vesconte in 1318, gives a broadly accurate picture - a significant improvement on that by Ptolemy - that would not be bettered until the Franco map of 1570. Even the 1635 Cavallini chart, one of the jewels in the Sylvia Ioannou Foundation collection, shows little improvement, although its toponymy has been refreshed and there is now some inland detail. {Fig.6}
Mnemonic island shapes

We can easily understand why the early chartmakers, when faced with islands that were either entirely imaginary or badly misplaced, gave them fictitious shapes - such as those to the north of the Canary Islands. (Fig.7)
Note the *genuine* Madeira, with to the north *mythical* islands such as St Brendan and 'Brazil'. So while an attempt was made to give a realistic shape to Madeira, the non-existent islands were treated imaginatively.

Is this so surprising? The chartmakers had no proper information to work on. The alternative would have been to draw random island shapes. This way was more honest. As every sailor knew, it was quite impossible for any island to have Brazil's regular shape or that of the trefoil above it. So we can justifiably surmise it was for that reason they gave those unvisited islands, supposedly to the east and west of Scotland, the simple shape of a circle or oval, for the same reason.

But Mediterranean trading ships would certainly have landed on the Isle of Man, between England and Ireland. This appears, in approximately the right place, and
roughly the correct size. Yet it is shown as a cross. Likewise Paxos, one of the smaller Ionian Islands, is also given the shape of a cross, though of a somewhat different form. And, to the north of that, can be seen what look like two pairs of headphones.

The three main early chartmaking centres, Palma in Majorca, Genoa and Venice, were also major trading states, with settlements along the Adriatic and in the Aegean. They knew the shapes of those islands very well. So how do we explain the outline given to the Ionian island of Zakynthos - rather like a piece from a jigsaw puzzle? Or Skyros in the mid-Aegean, with a shape that might suggest a space rocket? But the most extraordinary of all is Limnos, the largest of the islands in the north Aegean, which has sprouted five projections. These look like something a child might suck, a 'lollipop'. Clearly, an explanation is needed.

The island of Limnos (to the chartmakers *stalimene*) has a very complicated coastline. One can well understand why the chartmakers might have preferred a simple alternative. A selection of details shows how the early chartmakers dealt with this problem. {Fig. 8}
On what appear to be the earliest surviving portolan charts, dating perhaps from the beginning of the 14th or even the very end of the 13th century, the island, like others, is essentially shapeless. Although it is always possible to see, in the simplest outline, an attempt at realism, these two would have been of no help for anyone trying to identify or find their way around Limnos.

The chart by Pietro Vesconte appears to be more realistic, but comparison with the true outline shows that it is still highly misleading. But then, starting with Angelino Dalorto (or Dulceti) in 1330, the 'lollipops' outline appears for the first time. Even if there were minor variations, that basic design was to continue, on some charts, for at least a further 250 years. Finally, examples of Venetian work from the first half of the 15th century demonstrate an attempt at realism. It was not particularly effective and was never able to displace the imaginary version.

To see how artificial shapes could be applied more generally it is instructive to consider the smaller islands of the Cyclades and Dodecanese - those linking Euboea (negroponte) and Rhodes, with its cross of the Knights. A side-by-side comparison can be made of the strange, artificial shapes found on two different atlases from the 1460s by the prolific Grazioso Benincasa. {Fig.9}
By examining closely the long red island in the centre, Nicharia, and the little rocks or islets to its east, it becomes apparent that they are not absolutely identical in the two versions. This is because these were probably not traced but rather copied by hand very carefully, including, in most cases, their colour.

They must have been taken from a workshop model. But when drawing those islands for the 100th time - and these chartmakers probably produced a new chart every two weeks or so - they must have drawn them from memory. And memory, I suggest, is the key that allows us to understand the internal contradiction at the heart of the portolan charts: unprecedented overall accuracy on the one hand, and clearly invented shapes for the smaller islands on the other. Where most true island shapes are un-memorably irregular, my claim is that these are aids to memory. They are, in other words, **mnemonic devices.** [Fig.10]
{Fig.11} shows how long the chartmakers persevered with these cartographic fictions, in some cases for well over two centuries. Was it because they were ignorant and had no direct experience of the Aegean themselves? Certainly not. The Venetians were established in the Aegean from the early 13th century. Then again, a number of the chartmakers, particularly Benincasa and several Venetian practitioners, were, or had been, sailors, who must have known the sea very well.  

![Figure 11](image)

**Figure 11**  
Note the carefully named islets and rocks in the Aegean Sea  
Grazioso Benincasa, 1467  
Bibliothèque nationale de France, DD 1988

Indeed, Benincasa, whose fantastic shapes are the most elaborate, had even compiled a written sailing guide to the Aegean Sea, a *portolano*.  

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It is surely safe to assume that these simple, and intentionally distinctive shapes must have served some practical function.

**A better understanding of the charts' purposes and longevity**

We now need to consider the question of the charts' function: who were they made for, and what did their users do with them?

Of course, the ornate variety of chart - just the kind that would be carefully preserved over the ages - was not made to be taken to sea. However, archival documentation proves that charts were certainly carried on board ships. Indeed, they were clearly thought to be an essential item of a sailor's equipment, which is why a number were found in the private chests of those who died abroad. But that does not explain how the charts were actually used at sea. I propose that portolan charts had three quite distinct navigational functions: first, when out of sight of land, second, when sailing along a coastline, and lastly, when finding a way through a complicated archipelago.

Before embarking on a long voyage sailors would work out the direction to their destination (using the appropriately coloured compass direction) as well as the approximate distance. Then once they were underway they would use the chart to calculate how far they had actually travelled in the correct direction. Once they sighted land, which they might well recognise, the second function would come into play. A sailor worked from one headland to the next, and the charts' considerable overall accuracy extends to the placement of those capes but not of the coastline or bays in between. The place-names would help the navigators to identify the sequence of ports and river mouths they were passing, even if not their precise location.

What happened when the ship entered the Aegean? For a small island the seaman needed to know the approximate size and position, but the shape was of no significance to him as he would be sailing *past*, and not *round* it. So the smaller Aegean islands are in broadly the right place and true to scale, despite their artificial shapes. And even the smallest islet is carefully named, providing a comprehensive toponymic catalogue of the

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archipelago to go with the visual catalogue of their 'signature' island shapes. For a visiting ship this would be a valuable aide-mémoire, even if a local pilot or past experience was needed to find a safe way through the labyrinth.

It might be asked then why Cyprus, Crete and the other large islands are treated realistically. Because they fitted into the second category: coastlines along which a ship would run, noting the successive headlands and harbours. It seems probable that the outlines of those large islands were directly transferred in the same way as the continuous coastline, whereas the smaller ones were drawn in freehand. Testing if this is indeed the case might be a valuable exercise for a student of the cartographic history of Cyprus.

Although some of the smaller shapes were repeated in another archipelago (and indeed in those of 16th-century discoveries in the Atlantic and Indian oceans), each was obviously intended to be clearly different from the islands nearby. So that they could be easily memorised - by both chartmaker and sailor - some needed to be quite elaborate, while at the same time broadly symmetrical.

The long survival of these specific imaginary outlines confirms their essential navigational purpose. Surprisingly, it seems that the reason the charts continued to be relevant so long for merchant shipping in the Mediterranean was precisely because they changed so little. Leaving aside toponymy, which was being regularly refreshed, the charts’ hydrographical details remained broadly constant. And this must have been because of the chartmakers' working methods.

Apprentices would have been taught to follow the workshop model exactly, down to the smallest detail, without thinking. Most other craftsmen would have created a wide range of different products during their working life. But an early portolan chartmaker would probably have made much the same chart or atlas for his entire working life. He was trained to imitate, not innovate.

This reverence for the authority of the workshop model ensured that the main dangers of such a reproductive process were avoided. The coastlines were not carelessly
distorted, the names not (usually) mis-transcribed. There are signs of this happening, however, from the mid-16th century onwards, which presumably reflects a loosening of the medieval workshop discipline.

The mnemonic device would also have speeded up chart production and thus been of advantage to the chartmakers. When a modern viewer examines a portolan chart he or she is likely to notice the overall coastal outlines, the place-names, compass lines and illustrations. But each chart or atlas also contained an estimated 3,500 very small details in the sea.

As can be seen on an extract featuring the Sea of Azov (from a Benincasa chart of the Black Sea) {fig.12} these small off-shore marks warned about rocks and shoals, in the form of red or black dots and black crosses. Each symbol had a distinct message and most, if not all, can be found already on the earliest dated chart, Vesconte's of 1311. Their meaning is not explained but must have been universally understood.
It is natural for a modern student to overlook these minute details. However, the fact that they were regularly included and carefully positioned means that the labour involved in inserting this element may actually have taken up more drafting time than any other aspect.

If there are just three points that need to be stressed they would be these. First, the significance of apparently trivial details. The hierarchy of value and importance that historians have imposed on portolan chart content can be anachronistic. Every reproduced feature, whether large or small, real or invented, was placed in the new chart with the same care. Second, we must try to see these charts through the eyes of their makers and users.

The final concluding point would be this. The portolan charts combine a level of overall geometric accuracy (unprecedented for their time) and elaborate geographical fictions - what has been termed 'mnemonic devices'. Clearly, these were not just accepted by their users but actually preferred. If, as is claimed here, these imaginary mnemonic island shapes are both unprecedented and unrepeated in medieval and early modern cartography, the creativity of their inventors needs to be recognised. It was, in intellectual terms, an astonishing quantum leap.

**Endnote**
The detailed evidence underlying the findings set out here can be found in the online publication: A critical re-examination of portolan charts with a reassessment of their replication and seaboard function (2011, ongoing) <http://www.maphistory.info/portolan.html> and specifically in Explanatory notes and wider implications of 'The colours and shapes used to denote some of the smaller islands and the major estuaries on portolan charts up to 1500' (2011, ongoing) <http://www.maphistory.info/PortolanColourNotes.html>