

Mapmakers

1. The Province of Philosophers

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Harini Nagendra has worked extensively with satellite images, and their interpretation into maps, for ecological analysis. During this process she became interested in the history of mapmaking, and how things were done in the pre-satellite days. Hence, this article! Her other research interests include the study of landscape organization and dynamics at various scales, and the design of computer-based visual aids to help in teaching ecology.

Primitive man lived in a strange and mysterious world, perhaps not knowing quite what to make of it. He must have wondered how far the world extended, how it worked, where it ended. Most important (since we tend to think a lot of ourselves) – he must have wondered, where do I fit in? Of course, it is difficult to reconstruct ideas held by man in the past. We can reconstruct some of the past by interviewing tribes who till recently have lived isolated from the rest of the world, and assuming that this was how primitive man thought and felt. And indeed, many of these tribes have similar conceptions of the world, so this is likely to be true. We also have a few written records and references to maps, which have lasted through thousands of years, as well as a few old maps themselves. These help us to understand matters further.

Early views about the world were coloured by a large number of prejudices. The earth had to be flat, for otherwise people would keep falling off, wouldn't they? It was very large, as no one could see its end. It stood still – for if it moved, we would have felt ourselves moving too. And, of course it had to be at the centre of the Universe – if you looked up at the sky, did you not see that it surrounded you? It is not surprising then, to find that almost every society, whether Indian, Chinese, Greek or Aztec, viewed itself as being at the centre of the world.

These primitive ideas may in the face of knowledge today seem peculiar, even ridiculous. But we must remember that they were quite logical, considering the state of knowledge available then. They were also in some sense reassuring, comforting ideas, for after all if you believed yourself to be at the centre of things it gave you a sense of security. And in those times, when nature was

far less predictable and much less in control, reassuring ideas must have been – well, reassuring! These then, were the factors that drove early civilization's *cosmogony*, or worldview. It is important to understand them, as these very processes influenced the maps that were made.

An interesting fact made clear from these old records is that map making in the early days of human civilization had two aspects to it – the practical and the philosophical. This may seem puzzling at first, but a little thought makes it clearer. On the one hand mapmaking was the province of practical men, used as a means to get from place to place. However, distances travelled in these times were not large, and maps at this small scale could be easily drawn in detail. Making larger maps, of the entire world which no one would possibly ever travel to (or so they thought!), did not seem to offer any practical short-term use. Instead, they were used as a means of understanding how the world functioned, and man's place within all these processes that were going on around him – in other words, the subject of a philosopher's interest. Thus whether in early Egypt, Mesopotamia, China, India or Greece, it was the priests and the philosophers who made the first large-scale maps, and these were not practical guides to travel, but religious conceptions of the world.

In ancient Egypt the centre of life was believed to be the Nile, which divided their world into two halves. The world was a bowl of earth surrounded by a ring of mountains, and floated in an ocean. It was separated by a layer from the waters above, which caused rain from time to time. Above this bowl of earth, the sky was held up by four supports, so that the sky would not fall down on anybody's head (for those of you who read Asterix, somebody should have mentioned this to the Gauls!). The Egyptians also had clear maps of the afterlife, or heaven, which are beautifully illustrated in tomb paintings. At the bottom of coffins, paintings showed two different routes to the afterlife, by land and by sea. These may be the first route maps made by man – they are surely the oldest to be ever discovered!

At the same time as Egypt, another civilization, that of Babylon (Mesopotamia), was flourishing nearby. This has left us the first authenticated world map, which bears semblance to reality. It is an impression on a tiny clay tablet, made around 1000 BC, barely the size of one's hand. It shows the Tigris and Euphrates, with Babylon at the centre, surrounded by the circular Bitter River, beyond which legendary monsters lived. Although exciting to see, it in many ways contrasts with what we know of their other scientific capabilities. The Babylonians had well-developed theories of science in many other fields – they were, for example, brilliant astronomers. However their worldview was, like the Egyptians', predominantly based on religious rather than scientific ideas.

The Chinese had three different major schools of thought on cosmology. They also had a well-developed mapping system, probably used to defend their vast and well-coordinated empire. Three silk maps discovered in Chinese tombs and dating to more than 2000 years ago demonstrate this clearly – one is a map of towns and villages, the second a relief map and the third a map of a local military garrison, complete with details of strategic defence routes. The idea of mapping the world using a coordinate system of grids also seems to have originated in China. An anecdote (apocryphal?) mentions that this discovery was made by a lady in the royal court who, while embroidering a map on silk, realised that the warp and the weft of the material provided ideal coordinates for a grid.

Other anecdotal details confirm that for over a thousand years BC, the Chinese had a well-developed mapping system whose accuracy and degree of skill was astonishing. This was due to the fact that the Chinese used to travel a lot, within as well as outside China. However, as time went on, wars within China increased and the Chinese emperors concentrated their resources on consolidating their power within China. With this, China became increasingly isolated, and cartography, especially of areas outside China, decreased.



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New books will get preference in review. A list of books received by the academy office will be circulated among the editors who will then decide which ones are to be listed and which to be reviewed.

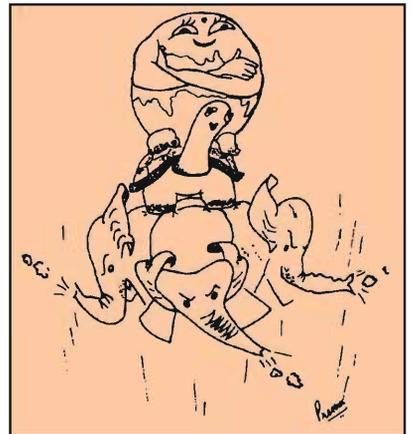




Figure 1. The earliest extant world map – a Babylonian clay tablet ~1000 BC. The Earth is shown as a flat circular disk surrounded by the Bitter river, several mythical islands and monsters. The world itself consists mainly of Babylon, shown as a long rectangle with the Tigris and Euphrates rivers originating from it. The Assyrians are depicted to the east and the Chaldeans to the southwest. This is possibly more a philosophical or political statement, than a map!

Indian theories of cosmogony were influenced by Babylon, but in turn proved very influential in other parts of early near-Eastern civilizations, notably China. Indian cosmogony stated that the world was balanced on a tortoise, supported on the backs of four elephants (*Figure 2*). The inhabited world consisted of a disc surrounded by other concentric discs of land which were not inhabited. In the centre of the disc on which we lived was a large mountain out of which all rivers flowed. Not much is known about early Indian mapmakers and maps, however. Although descriptions survive, no actual maps have been found. It is possible that they existed on palm leaves or other perishable material which have not lasted these thousands of years.

Figure 2. Delegation of responsibility?



Box 1. Flat Earth, Round Earth

Hecateus, a scholar of Miletus, is considered the author of the world's first book on geography in 500 BC, in which he stated that the world was flat. Just a generation later Herodotus and his followers, while expanding on the same book, questioned the notion of the earth as being flat, and put forward a number of alternate hypotheses. For a number of years after this, philosophers appear to have been preoccupied with discussions on this matter. The first hypothesis of a spherical earth has been attributed by some modern scholars to Pythagoras (6th century BC); alternatively to Parmenides (5th Century BC). The idea developed into a consensus through many years of discussion, and by the mid-fourth century it was well accepted by Greek scholars. In ~350 BC Aristotle for the first time detailed six arguments to prove that the earth was spherical, and from then on the idea became generally accepted.

Taoist travellers from India communicated the Indian theories of cosmogony to China and other near-Eastern parts of Asia. Following this, between 600 and 250 BC Buddhist travellers from India influenced Chinese cosmogony with their theories about the inhabited world being suspended in a universe, which was almost infinitely large. In turn influenced by China, India modified its worldview and included China as well as the Oxy region into its map of the inhabited world.

In other countries meanwhile, travelling became more and more common. Well drawn, accurate maps then became a necessity as verbal descriptions would no longer be enough to guide such long journeys. They were possibly even more essential for sea journeys than land, as the dangers of taking a wrong route by sea would be far more than by land. Well drawn Arab sea route maps are known to exist around this time. More major breakthroughs in mapping were made in a small town called Miletus, on the coast of Turkey, in the 6th century BC. This town traded with several parts of the world and hence had a more broadened worldview. It is Miletus that spread the idea that the world is round and not flat (*Box 1*).

One of the earliest surviving descriptions of the world in these times belongs to Herodotus, from the 5th century BC. Herodotus, born in Asia Minor, visited Europe, Asia (though not India) and Africa and then returned to Italy to write descriptions of his

Box 2. Science or Fiction?

Cartography is the art and science of making maps and charts – to begin with, more an art than a science! Particularly in the case of far-away places, mapmakers took a great deal of artistic license with their work. They drew fabulous pictures of lands like India and Africa having two-headed men and fantastic monsters, as well as heaps of gold and jewels. It was such reports, partly fact but mostly fantasy that motivated travel and conquest of these lands. As man continued and expanded his explorations and as they acquired commercial value, the accuracy and quality of his maps improved. However, until the seventeenth century, such flights of fantasy persistently occurred in maps, and it was this that prompted Jonathan Swift to say

*So geographers in Afric maps,
With savage pictures fill their gaps,
And o'er uninhabitable downs
Place elephants for want of towns.*

journey. India itself was described by Erasthenes (an Athenian philosopher) in the 3rd century BC, based on stories told by soldiers who had travelled to India with Alexander's invading army. Several nonsensical tales are mentioned in this, such as India being peopled by 'men that sleep in their ears', 'men without mouths and noses', and 'having snakes that swallow entire oxen along with their horns'. This was not an isolated wild tale – not much was known about India, Africa or other far away lands, and as a result, imaginative tales were told, and believed, by most people about these 'exotic' countries (*Box 2*). People believed them to contain strange races of men and beasts, and be fabulously rich, with rains of jewels and gold and other such treasures. The desire to travel and trade was mainly motivated by a desire to exploit the wonderful wealth of these lands. In an effort to fulfil these desires, people began travelling more, and this led to further development of the science of cartography, as will be discussed in the next part of this series.

Suggested Reading

- [1] John Noble Wilford, *The mapmakers*, 1st edn. Knopf, New York, 1981.
- [2] R V Tooley, *Maps and mapmakers*, 6th edn. Crown, New York, 1978.
- [3] John Goss, *The mapmaker's art: An illustrated history of cartography*, Rand McNally, Skokie, IL, 1993.

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