

# BY A SENIOR CARTOGRAPHIC HISTORIAN

## 'As it Was

Claudios Ptolemaios (to use the Greek version of his name), the greatest geographer of ancient times and the father of our geography, was a scholar who lived in Alexandria, Egypt. He originated from Upper Egypt and lived from about 100AD to 180AD. He reached the peak of his creative activity under the Roman emperor Antonius Pius.

His endeavour was to represent the oikumene (Europe, Africa and Asia) with its countries, peoples, places, rivers and mountains in their correct positions within a reference grid. In implementing this task Ptolemy followed on from the work, unfortunately no longer in existence, of Marinus of Tyre, whose cartographic methods he nevertheless subjected to critical examination.

One of Ptolemy's special achievements was to create a new method of projection for drawing a map of the world. The problem was to find a meaningful way of transferring a spherical surface to a flat plane. Ptolemy identified the weaknesses of the cylindrical projection that had been in common use since Eratosthenes (third century BC) and which his predecessor Marinus had used to enter places in a rectangular system of coordinates. The problem was that this gave rise to great distortion with increasing distance from the equator. Instead, Ptolemy propagated a new, highly ingenious method that gave a much truer representation of the proportions of the spherical surface: the conical projection.

In his detailed design instructions he proposed two variants, a basic conical projection with straight meridians, known as the first Ptolemaic projection, and a modified conical projection with curved meridians which achieved an even better approximation to the appearance of the sphere. Medieval manuscripts contain superb coloured world-maps using both methods, which continued to influence cartography until well into the eighteenth century. If one bears in mind the circular maps based on medieval thinking that still influenced the then world picture of western civilisation, it is not difficult to imagine the amazement in scholarly circles when the first Ptolemaic maps came to light in Italy and immediately enjoyed broad circulation.

Attempts to find some means of keeping track of where places are date from a long way back; it had already been possible to determine geographical latitude quite accurately by means of the shadow of a gnomon at the equinox. Long before Ptolemy there had evidently been lists of shadow lengths for important places, and some of these have survived. It was also possible to determine the distance from the equator by measuring the length of the longest day. It was on the basis of such information that Eratosthenes had based his world-map on certain reference parallels at irregular intervals, for example the famous parallel of Rhodes at 36 degrees, which according to him runs through Gibraltar and divides the Mediterranean, or the parallel of Alexandria at 31 degrees. Individual places of roughly the same geographical latitude were even assigned to 'climatic zones', lists of which also existed.

A far more difficult task was determining geographical longitude, and hence the east-west distance between points. To obtain results independent of travellers' reports and unreliable measurements of distance, people used observations of lunar eclipses, which made it possible to draw conclusions about longitudinal distances. However, precise observations of the same eclipse of the moon from different places were very rarely available, which meant that determinations of longitude were largely based on terrestrial measurements and estimates. Here too lists were compiled of 'facing places', i.e. those that lay more or less on the same meridian, though such lists were much less accurate than in the case of latitude data.

Ptolemy first introduced a coherent system of coordinates and recalculated all the information about shadow lengths and hours into the system of degrees that is still used today. Moreover, following the tried and tested example of his star catalogue, he also compiled a catalogue of some eight thousand places, for each of which this latitude and longitude information was given in tabular form. By doing so he brought order to the confusing multitude of lists providing information sometimes in one form, sometimes in another.

The fourteenth and fifteenth centuries, the age of the early Renaissance, was a decisive period for Europe's breakthrough into a new phase of history and provided the real stimulus for the age of discovery. In the field of cartography, the Renaissance began in Italy with the coming to light in 1400 of Ptolemy's Geography. The first Latin translation of this begun by the Greek humanist Emanuel Chrysoloras (1335-1415) was completed in 1406 by his student, Jacobus Angelus, who re-titled it Cosmography. Around 1415, two Florentines transposed the maps into Latin on the basis of a thirteenth-century Greek manuscript. From this time on came a constant succession of copies, of which some fifty codices are still preserved.

The sudden flourishing of cartography was due, among other things, to the march of the Turks into the Dardanelles in 1365 and the fall of Constantinople at the hands of Sultan Mohammed II in 1453. This triggered a great exodus towards the west, and among the possessions refugees brought with them were copies of the Geography. In the library left behind by the Byzantine rulers, the Turkish sultan found a manuscript of the Geography. As the world-map was missing, he commissioned a philosopher to recreate it on the basis of the text.

The maps of Africa based on Ptolemy's Geography give a fairly clear picture of the ancients' geographical ideas about this continent. Relatively accurate knowledge was available only for the northern part of Africa as far as the Tropic of Cancer, and the lower reaches of the Nile are portrayed quite well as far as the fifth cataract. The interior of Africa is dominated by a number of river systems: the sources of the Nile lie in the 'Mountains of the Moon' (montes lunae) to the south of the equator, and its upper reaches feed several lakes (palades Nili). The Niger flows from west to east. In the south, a terra incognita joins Africa to Asia, turning the Indian Ocean into an inland-sea. Africa north of the equator is known as Libia Interior, while Ethiopia interior is a collective term for the central and southern parts of the continent across its entire width.

In the far east of Asia lies the country and capital city 'Thinae', and to the south of this the city of Kattigara, an emporion Sinarum. Parts of the Malayan peninsula (aurea Chersonesus) are quite well depicted, though Sumatra is attached to it by a land bridge. The representation of India has many deficits: the Deccan peninsula is cut off at its base and its place taken by a huge island called 'Taprobana'. The outlines of the Arabian Peninsula were already well known. Ptolemy mistakenly gave the Caspian Sea a west-east elongation, which stubbornly persisted into the eighteenth century. The Aral Sea as a water basin in its own right was unknown, and the Syr Darya (Jaxartes) and the Amu Darya (Oxus) flow into the Caspian Sea. The Jaxartes was the limit of ancient knowledge concerning the interior of Asia, to the north and north-east there was no knowledge of rivers or lakes, only mountain ranges and the varying regions populated by steppe peoples.

Ptolemy underestimated the size of the Earth. A copy of a Ptolemy edition found its way into the hands of Columbus, who made an intensive study of it during preparations for his voyages of discovery. Because the Earth's circumference that he found in it was much too small, he believed until the day he died that he had not discovered a new continent but had succeeded in reaching India.

As we all know, the fashion in our modern times is to denigrate scientific achievements with the aim of boosting the circulation of one's own work. And so it was that Ptolemy became the victim of the American astronomer R.R. Newton. In his book *The Crime of Claudius Ptolemy* (1977) he makes Alexandria's greatest scholar out to be a plagiarist and forger. Ptolemy's world picture survived the Renaissance. Some innovations that Ptolemy introduced are valid to the present day; for example, indicating gradations in the margin and aligning maps with north at the top. Nevertheless, the fact that Renaissance scholars once again sat at the feet of the old Alexandrian geographer as enthusiastic students posed a great challenge. The rediscovery of Ptolemy had a contradictory impact: it was both a stimulus to and a brake on progress at the beginning of the age of discovery. Despite this, there is to this day no complete translation into a living language of Ptolemy's Geography, a work of such great importance for the history of science and civilisation. The 'most recent' complete edition of the Greek text, albeit in places in great need of revision, is by Carol Friedrich August Nobbe of Leipzig and dates from 1843/45.

The creation of facsimiles of manuscripts began with an edition of the Codex Athos Graecus (Vatopedi Monastery, Athos, British Library, London, Paris, 1867), and the most recent facsimile of the oldest printed Ptolemy atlas appeared in Amsterdam in the 1960s. For this reason, a Ptolemy Research Unit was founded in 2000 at the Institute of Classical Philology at the University of Bern in Switzerland. The aim of this unit is to publish Ptolemy's geographical work in a new, revised edition of the original text, complete with German translation and integrated maps.

The basis for this is the parchment manuscript (Cod. Saragliensis GL.57) dating from the late thirteenth century, today preserved at the Topkapi Museum in Istanbul, Turkey and containing the eight books of Ptolemy's Geography, complete with the full set of maps: a world-map and 26 country maps. Though badly damaged, this is probably the oldest and most important Ptolemy manuscript. Prof. Dr Alfred Stäckerlberger and his team believe all the signs indicate that Ptolemy himself also played a part in the drawing of his maps.

The Ptolemy experts hope that the new, two-language edition will be published by the renowned publishers Schwabe & Co AG of Basel, Switzerland, by the end of 2006. When that happens we will be able, even without any knowledge of ancient Greek, to find out what places in Europe were known to Ptolemy. As a Roman citizen he naturally knew more about the regions to the west of the Rhine than about, for example, 'Greater Germany'.

It is to be hoped that this will usher in a new phase of Ptolemy research, and thereby enrich the history of cartography.

#### Further reading

Dreyer-Eimbcke, Oswald (2006). A new light on Ptolemy and recently discovered papyrus map. IMCOS Journal, No. 104, spring 2006.

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