

MERCATOR'S
CHARTS.

tenth degree south latitude, at the horizon of Nuremberg. But a more important modification was introduced by G. Mercator, who, towards the middle of the sixteenth century, invented his well-known method of representing the whole surface in true bearings, which was destined to render such signal services to navigation.¹ The researches of Ed. Wright, relating to the theory and construction of these charts,² and those of Henry Bond and Gregory (1668), added to the advantages this method offered to navigators. This cartographic process was created at a time when marine charts were far from being complete. Henceforth it was no longer necessary to trouble about finding a system of projection, and attention could be devoted to improving the charts in all points useful to mariners.

METHODS OF
DETERMINING
LONGITUDES.

Although the science of geography made rapid advances, owing to the great voyages of discovery, still the progress of those branches of geodesy relating to map-making was slow. Distinct advances, however, are to be observed in the *Cosmographia* of Sebastian Münster as early as 1544, and in the triangulation of Snellius in 1615. The methods already known for determining longitudes were developed, while other methods were invented, and when the astrolabe was replaced by the sextant (octant), invented, it has been said, by Newton about 1700 and quite independently by Hadley in 1731, mariners possessed the means of establishing the position of places with tolerable accuracy.³

The seventeenth century was a remarkable period for astronomical and mathematical studies, on which the exact knowledge of the globe rests, and by the end of that century sufficiently numerous astronomical observations had been made to determine the position of many points on the earth's surface, and hence to allow of the errors in the charts being rectified. The great French geographer, Guillaume Delisle, undertook this herculean task, and his work was continued by Bourguignon d'Anville, who was 29 years of age when Delisle died in 1726. D'Anville was superior to his predecessor, especially as regards workmanship.

HYDROGRAPHIC
SIGNS IMPROVED.

Progress was soon manifest in the indication of depths, hydrographic signs, the first meridian, the scale, the orthography, the type, &c. As to hydrographic signs, crosses were used to show reefs and rocky bottoms; sandbanks and shallows were marked with dotted lines or masses of dots; other hydrographic signs were introduced at a later period. Marine charts, as compared with land maps, present some differences. In marine charts the sea is left white, the coasts alone are distinctly marked, and the mountains inland are only represented when of service to the mariner for finding out his bearings; on the sea area are shown the soundings, the shallows, the currents, the tides, the compass, &c. Even at an early period note was taken of the nature and the colour of the bottom of the sea, for these characteristics might be of service to seamen in a fog as denoting the approach to land.

¹ Mercator's map on this increasing cylindrical projection was first published in 1569.

² *Certain Errors in Navigation*, London, 1610.

³ The sextant was also invented independently by Godfrey of Philadelphia in 1730.