

and water; each new point on the globe, when correctly determined, could be placed on the map with great exactness. At this time the science of oceanography may be said to have been founded. The navigator could henceforth direct his vessel into unknown seas, could return by the same or another route, and could point out to others the course he had followed. (See Plate III.)

Hipparchus regarded the whole habitable world as divided into eleven climates or zones of latitude, for each of which he indicated the length of the longest day. He had also a dim idea of connecting distant points by a kind of triangulation similar to that made use of by modern geographers. He did not admit that the Atlantic and Indian Oceans were connected towards the south of Africa, or that the former was united with the sea that bathes the northern shores of Scythia.¹ These views were apparently based on some observations of a Babylonian author, named Seleucus, with reference to the tides, which appeared to Hipparchus incompatible with the idea of a circumfluent and continuous ocean.

POLYBIUS.

The historian Polybius,² a contemporary of Hipparchus, in like manner, did not admit it as proved that the habitable world was surrounded by the ocean.³ This author had more advanced ideas regarding marine sedimentation than his predecessors; he points out that in the Palus Mæotis the rivers bring down considerable quantities of sediment, and estimates the time it would take for the fluviatile alluvium, not only to fill up the Palus Mæotis, but also the Pontus Euxinus or Black Sea.⁴ The ideas of Polybius, from a geological point of view, are most reasonable, but the rate of encroachment has been much slower than he supposed during the two thousand years which separate us from the time when he wrote. The modification in these seas has not been very appreciable, for Polybius reports that in his time the greater part of the Sea of Azov was only from 5 to 7 fathoms deep, and the same depths are marked on modern hydrographic charts.

Polybius also gives a detailed evaluation of the dimensions of the Mediterranean. Its length from the Strait of Gibraltar to Seleucia in Syria he gives at about 2440 miles, or 19,520 stadia,—a calculation nearer the truth than that of Eratosthenes, and short of the real length by only 500 stadia—and to it he assigned a width of 3000 stadia. This was considerably less than the reality, and caused him to bring the coasts of Gaul and Liguria much too far towards the south.⁵ Polybius had probably received some dim, floating tradition of the populous and fertile regions south of the Soudan, for he states that the immediate neighbourhood of the equator is much less hot than the torrid zones on either side, and that it was habitable—indeed, inhabited.

CRATES OF
MALLUS.

About this time Crates of Mallus⁶ is said to have constructed the first globe on which the Atlantic Ocean is extended to the south pole. A corresponding ocean is placed on

¹ Strabo, i. 1, 9.

² 204 to 122 B.C.

³ Polybius, iii. 38.

⁴ Polybius, iv. 39-42.

⁵ See Bunbury, *op. cit.*, vol. ii. p. 35.

⁶ Flourished about 150 B.C.