

ments; before we meet with similar definite statements on deep-sea soundings centuries pass away. Plutarch<sup>1</sup> says:—"The geometers think that no mountain exceeds 10 stadia (6067 feet) in height, and no sea 10 stadia in depth." Cleomedes<sup>2</sup> says:—"Those who doubt the sphericity of the earth on account of the hollows of the sea and the elevation of the mountains are mistaken. There does not in fact exist a mountain higher than 15 stadia (9107 feet), and that is also the depth of the ocean."

The documents of the Middle Ages relative to orography and bathymetry are indefinite and unimportant. The wide-spread opinion among sailors, that the greatest depth of the sea is found near the steepest coasts, appears to be very ancient, and is partly founded on fact. Ibn Khaldoun, who, in the fourteenth century, wrote his famous history of the Berbers, remarks that if the highest mountains are situated near the sea, it must be regarded as a providential arrangement to arrest the invasion of the ocean.<sup>3</sup>

Nicolaus Cusanus, who lived in the first half of the fifteenth century, invented an apparatus consisting of a hollow sphere, to which a weight was attached by means of a hook, intended to carry the sphere down through the water with a certain degree of velocity. On touching the ground the hook became detached, the weight remained at the bottom, the sphere ascended alone, and the depth was calculated by the time it took to return to the surface.<sup>4</sup> This apparatus was afterwards improved by Püchler, Alberti,<sup>5</sup> and Hooke,<sup>6</sup> but the various instruments produced were not satisfactory as regards sounding in the deep sea.

Science, and in a special manner what may be called the Science of the Globe, plays a large part in the intellectual and moral changes which characterise the transitional period known as the Renaissance. The thirty years from 1492 to 1522, through the discoveries of Columbus, Vasco di Gama, and Magellan, added a hemisphere to the chart of the world. Not only did these voyages double at a single bound all that was previously known of the surface of the earth, but by creating new ideas, enlarging the field of research, observations, and studies, they contributed more than anything else to the progress of the past four hundred years, and the rapid development of modern civilisation. The existence of the Antipodes, and the sphericity of the earth, were no longer scientific theories, but practically demonstrated facts; the fundamental principles of all scientific geography were for ever established.

During his voyage across the Pacific, Magellan<sup>7</sup> attempted, for the first time, to sound in the open ocean. Navigators at that time had sounding lines of only 100 and 200 fathoms in length. With these Magellan did not reach bottom between the coral islands of St. Paul's and Los Tiburones, and he somewhat naïvely concluded that this was

<sup>1</sup> Flourished towards the end of the first century A.D.

<sup>2</sup> Flourished probably in the second century A.D.

<sup>3</sup> Ibn Khaldoun, *Histoire des Berbers*, trad. de l'Arabe par M. le Slane, tom. i. p. 194, Paris, 1852.

<sup>4</sup> For description of this apparatus see Poggendorf, *Geschichte der Physik*, p. 116, Leipzig, 1879.

<sup>5</sup> 1404-1472 A.D.

<sup>6</sup> 1635-1703 A.D.

<sup>7</sup> 1470-1521 A.D.