

with an interest that carried the knowledge of his work far beyond the limits usually set to the labours of specialists. Forbes' ideas on many points are no longer entertained; had he lived longer he himself would doubtless have been the first to discover and proclaim the error of many of them. "To Forbes is due the credit of having been the first to treat these questions in a broad philosophical sense, and to point out that the only means of acquiring a true knowledge of the *rationale* of the distribution of our present fauna is to make ourselves acquainted with its history, to connect the present with the past. This is the direction which must be taken by future inquiry. Forbes, as a pioneer in this line of research, was scarcely in a position to appreciate the full value of his work. Every year adds enormously to our stock of data, and every new fact indicates more clearly the brilliant results which are to be obtained by following his methods, and by emulating his enthusiasm and his indefatigable industry."<sup>1</sup>

Before Forbes' time the bathymetrical distribution of marine animals had been investigated to a certain extent, but the works of Audouin and Milne-Edwards (1830), Sars (1835), and Oersted (1844), applied only to the more superficial waters of the sea.

In 1840 Forbes joined as naturalist the surveying ship "Beacon" while in the Mediterranean, and for eighteen months he studied the Ægean Sea and its shores, taking more than one hundred dredgings at different depths down to 130 fathoms. In 1843 he read to the British Association at Cork his Report on the Molluscs and Echinoderms of the Ægean Sea, and their distribution as connected with geology,<sup>2</sup> and in 1844 Forbes published his memoir On the Light thrown on Geology by Submarine Researches.<sup>3</sup> He maintains that the dredgings show the existence of distinct regions at successive depths, having each a special association of species. He remarks that the species found at the greatest depths are also found on the coasts of England, and he concludes, therefore, that such species have a wider geographical distribution.<sup>4</sup> Forbes divided the area occupied by marine animals into eight zones of depth, in which animal life gradually diminished with increase of depth, until a zero was reached at about 300 fathoms. He showed that in Cretaceous and Tertiary layers similar zones may be distinguished, and that depth must have been in former times, as it is now, one of the factors in the distribution of marine organisms. He found fewer species in the deep zones than in the shallow ones, and supposes that plants, like animals, disappeared at a certain depth, the zero of vegetable life being at a less depth than that of animal life. Forbes concluded that, as nearly all marine basins are over 300 fathoms in depth, most of the sedimentary beds must be devoid of organic remains, and the absence of organisms in some strata convinced him that they had been formed at great depths, or deposited prior to the existence of organisms. He observed that the number of organisms found in colder regions increased with

VERTICAL  
DISTRIBUTION OF  
MARIN

GEOLOGICAL  
PHENOMENA.

<sup>1</sup> Thomson, *The Depths of the Sea*, p. 6, London, 1874.

<sup>2</sup> *Brit. Ass. Report* for 1843, p. 130.

<sup>3</sup> *Edinburgh New Phil. Journ.*, vol. xxxvi. p. 318.

<sup>4</sup> This generalisation, though correct for certain areas, cannot be applied to the great oceans; it is applicable only to a part of the Mediterranean.