now inhabit more northern seas, where we may, perhaps, hereafter find living representatives of some of the unknown fossils. The distance to which erratic blocks have been carried southwards in Scotland, and the course they have taken, which is often wholly independent of the present position of hill and valley, favors the idea that ice-rafts rather than glaciers were in general the transporting agents. The Grampians in Forfarshire and in Perthshire are from 3000 to 4000 feet high. To the southward lies the broad and deep valley of Strathmore, and to the south of this again rise the Sidlaw Hills\* to the height of 1500 feet and upwards. On the highest summits of this chain, formed of sandstone and shale, and at various elevations, are found huge angular fragments of mica-schist, some 3 and others 15 feet in diameter, which have been conveyed for a distance of at least 15 miles from the nearest Grampian rocks from which they could have been detached. Others have been left strewed over the bottom of the large intervening vale of Strathmore.

Still farther south on the Pentland Hills, at the height of 1100 feet above the sea, Mr. Maclaren has observed a fragment of mica-schist weighing from 8 to 10 tons, the nearest mountain composed of this formation being 50 miles distant.<sup>†</sup>

The testaceous fauna of the boulder period, in Scotland, England, and Ireland, has been shown by Prof. E. Forbes to contain a much smaller number of species than that now belonging to the British seas, and to have been also much less rich in species than the Older Pliocene fauna of the crag which preceded it. Yet the species are nearly all of them now living either in the British or more northern seas, the shells of more arctic latitudes being the most abundant and the most wide spread throughout the entire area of the drift from north to south.

This extensive range of the fossils can by no means be explained by imagining the mollusca of the drift to have been inhabitants of a deep sea, where a more uniform temperature prevailed. On the contrary, many species were littoral, and others belonged to a shallow sea, not above 100 feet deep, and very few of them lived, according to Prof. E. Forbes, at greater depths than 300 feet.

From what was before stated it will appear that the boulder formation displays almost everywhere, in its mineral ingredients, a strange heterogeneous mixture of the ruins of adjacent lands, with stones both angular and rounded, which have come from points often very remote. Thus we find it in our eastern counties, as in Norfolk, Suffolk, Cambridge, Huntingdon, Bedford, Hertford, Essex, and Middlesex, containing stones from the Silurian and Carboniferous strata, and from the lias, oolite, and chalk, all with their peculiar fossils, together with trap, syenite, mica-schist, granite, and other crystalline rocks. A fine example of this singular mixture extends to the very suburbs of London, being seen on the summit of Muswell Hill, Highgate. But south of London the northern

\* See above, section, p. 48.

<sup>+</sup> Geol. of Fife, &c. p. 220.