

long glacial period are contained in shell-bearing sands, gravels, and clays which overlie the coarse older till, and are perhaps, to some extent, furnished by erratic blocks.<sup>17</sup> It is difficult to determine the extent of the submergence, for, when the land rose, the more elevated portions continued to be seats of glaciers, which, moving over the surface, destroyed the deposits that would otherwise have remained as witnesses of the presence of the sea, while at the same time the great bodies of water discharged from the retreating glaciers and snow-fields must have done much to reassort the detritus on the surface of the land. From the evidence of marine shells, southern Scandinavia is believed to have sunk about 600 feet below its present level. In Britain the submergence was probably not less than 500 feet. If indeed we take the beds of marine shells which have been found in North Wales, Cheshire, and elsewhere as marking actual sea-bottoms, the depression which they would then indicate must have been at least 1350 feet. But these shelly deposits are probably not conclusive proofs of submergence.<sup>18</sup>

That ice continued to float about in these waters is shown by the striated stones contained in the fine clays, and by the remarkably contorted structure which these clays occasionally display. Sections may be seen (as at Cromer) where, upon perfectly undisturbed horizontal strata of clay and

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<sup>17</sup> For an account of the dispersion of the "erratics" of England and Wales, see Mackintosh, *Q. J. Geol. Soc.* xxxv. 1879, p. 425; and Reports of the Committee appointed to investigate this subject by the British Association, 1872 *et seq.* For those of Scotland much information has been gathered by the Boulder Committee of the Royal Society of Edinburgh; *Proc. Roy. Soc. Edin.* 1872-84. Erratic blocks have probably in the vast majority of cases been dispersed by land-ice and not by floating ice.

<sup>18</sup> Mere fragments of marine shells in a glacial deposit need not prove submergence under the sea; for they may have been pushed up from the sea-floor by moving ice, as in the case of the shelly till of the west of Scotland, Caithness, Holderness and Cromer. How far this may have been the origin of the shelly deposits found at high levels in Britain is still a disputed question.