

In some cases it appears highly probable that one such irregular fluviatile action, modifying the continuous depositions from the sea, would sufficiently explain the phenomena of the association of sandstone, shale, and limestone; because, by such action, the shores would be margined by a sandy deposit, beyond which clay would predominate in the sediments, and at a greater distance calcareous matter would be nearly unmixed with the effects of littoral agitation.

In the diagram No. 53. S represents the sandy accumulation near the shore, passing by gradation to the

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deposit of clay, *c*, which extends further, and is finally replaced by nearly pure carbonate of lime, *b*, which grows thicker farther from shore.

Still the question recurs, where was the land from which the materials were drifted? The slaty mountains of Cumberland, the Isle of Man, Cavan, &c., were perhaps above the water; but could they alone yield the materials for the argillaceous sediments, 1000 feet thick, of Enniskillen, Derbyshire, and Craven, even if we suppose them to have been much diminished by the operation? The Lammermuir mountains, to the north, seem not to be of such composition as would yield the coarse quartzose sandstones; we must therefore appeal to the Grampians or Scandinavian ranges, or finally close all further discussion, by admitting that tracts of land which supplied part of the sediments, mixed with the limestones of the carboniferous period, have disappeared from the Northern and Western Oceans.

The coal formation, lying above these limestones, appears in many cases (Yorkshire, Lancashire, &c.) to have been accumulated, or according to the other hypothesis, submerged, in estuaries or lakes: if so, the local origin of the materials must be sought around those lakes, and in one or more directions from those estuaries.