

boniferous Limestone cannot have come suddenly into existence at the period marked by the base of the limestone. It must have had a long previous existence outside the present area of the deposit.

In the north of Scotland, on the Lowlands bordering the Moray Firth, and again in the island of Hoy, one of the Orkney group, yellow and red sandstones (with interbedded diabase and tuff), containing characteristic Upper Old Red Sandstone fishes, lie unconformably upon the Caithness flags.¹⁷¹ In these northern tracts, the same relation is thus traceable as in the central counties, between the two divisions of the system.

Turning southward across the border districts into the north of England, we find the red sandstones and conglomerates of the Upper Old Red Sandstone lying unconformably on Silurian rocks and Lower Old Red Sandstone. Some of the brecciated conglomerates have much resemblance to glacial detritus, and it was suggested by Ramsay that they have been connected with contemporaneous ice-action.¹⁷² Such are the breccias of the Lammermuir Hills, and those which show themselves here and there from under the overlying mass of Carboniferous strata that flanks the Silurian hills of Cumberland and Westmoreland. Red conglomerates and sandstones appear interruptedly at the base of the Carboniferous rocks, even as far as Flintshire and Anglesey. They are commonly classed as Old Red Sandstone, but merely from their position and lithological character. No organic remains have been found in them. They may therefore, in part at least, belong to the Carboniferous system, having been deposited on different successive horizons during the gradual depression of the land. In Devonshire, at Barnstaple, Pilton, Marwood, and Baggy Point, certain sandstones, shales, and limestones (already referred to in the account of the Devonian rocks) graduate upward into the base of the Carboniferous system, and appear to represent the Upper Old Red Sandstone of the rest

¹⁷¹ Trans. Roy. Soc. Edin. xxviii. 1878, p. 405; Quart. Journ. Geol. Soc. xlviii. 1892, Presidential Address, p. 100.

¹⁷² The examples of supposed glacial striae in the pebbles in these breccias may be merely frictional markings connected with faults or internal movements of the rocks. But the forms of the pebbles, their moraine like unstratified or rudely-stratified accumulation, and the occurrence of aggregated lumps of breccia in the midst of fine sandstone strongly remind one of the familiar features of true glacial deposits. Compare H. Reusch, on similar evidence from the Paleozoic rocks of Norway, Norges Geol. Undersög. Aarbog. 1891.