

Old Red Sandstone, while, on the other hand, they pass up conformably into the Carboniferous rocks above. As already remarked, they were deposited in basins, which only partially corresponded with those wherein the Lower Old Red Sandstone had been laid down. Studied from the side of the underlying formations, they seem naturally to form part of the Old Red Sandstone, since they agree with it in general lithological character, and also in containing some distinctively Old Red Sandstone genera of fishes, such as *Pterichthys* and *Holoptychius*; though, approached from the upper or Carboniferous direction, they might rather be assumed as the natural sandy base of that system into which they insensibly graduate. On the whole, they are remarkably barren of organic remains, though in some localities (Dura Den in Fife, Lauderdale) they have yielded a number of genera and species of fishes, crowded profusely through the pale sandstone, as if the individuals had been suddenly killed and rapidly covered over with sediment (see p. 1075). Among the characteristic organisms of the Scottish Upper Old Red Sandstone are *Bothriolepis* (*Pterichthys*) *major*, *Holoptychius nobilissimus*, *H. Andersoni*, *Glyptopomus*, *Glyptolæmus* and *Phaneropleuron*.

In the Upper Old Red Sandstone of the Firth of Clyde, *Bothriolepis* (*Pterichthys*) *major* and *Holoptychius* occur at the Heads of Ayr, while a band of marine limestone, lying in the red sandstone series in Arran, is crowded with ordinary Carboniferous Limestone shells, such as *Productus giganteus*, *P. semireticulatus*, *P. punctatus*, *Chonetes hardrensis*, *Spirifer lineatus*, etc. These fossils are absent from the great series of red sandstones overlying the limestone, and do not reappear till we reach the limestones in the Lower Carboniferous series; yet the organisms must have been living during all that long interval outside of the Upper Old Red Sandstone area (p. 1370). Not only so, but they must have been in existence long before the formation of the thick Arran limestone, though it was only during the comparatively brief interval represented by that limestone that geographical changes permitted them to enter the Old Red Sandstone basin and settle for a while on its floor. The higher parts of the Upper Old Red Sandstone seem thus to have been contemporaneous with a Carboniferous Limestone fauna which, having appeared beyond the British area, was ready to spread over it as soon as the conditions became favorable for the invasion. It is, of course, obvious that such an abundant and varied fauna as that of the Car-