

like those of the north of Scotland occur. There is even reason to infer that it may have ranged eastward into Russia, for, as already stated, some of its most characteristic organisms are found also among the Devonian strata of that country. Several distinct contemporaneous volcanic centres have been detected in this basin. A third minor area of the Lower Old Red Sandstone (Lake Cheviot) lay on the south side of the Southern Uplands, over the east of Berwickshire and the north of Northumberland, including the area of the Cheviot Hills, where a copious volcanic series has been preserved. A fourth (Lake of Lorne) occupied a basin on the flanks of the southwest Highlands, which is now partly marked by the terraced volcanic hills of Lorne. There is sufficient diversity of lithological and palæontological characters to show that these several areas were on the whole distinct basins, separated both from each other and from the sea. The interval between the Lower and Upper Old Red Sandstone was so protracted, and the geographical changes accomplished during it were so extensive, that the basins in which the late parts of the system were deposited only partially correspond with those of the older lakes.

In the central basin, or Lake Caledonia, both divisions of the Old Red Sandstone are typically seen. The lower series of deposits, attaining a maximum depth of perhaps 20,000 feet, everywhere presents traces of shallow-water conditions. The accumulation of so great a thickness of sediment can only be explained on the supposition that the subterranean movements, which at first ridged up the Silurian sea-floor into land, inclosing separate basins, continued to deepen these basins, until, eventually, enormous masses of sediment had slowly gathered in them. This massive series of deposits passes down conformably in Lanarkshire into Upper Silurian rocks; elsewhere its base is concealed by later formations, or by the unconformability with which different horizons rest upon the older rocks. Covered unconformably by every rock younger than itself, it consists of reddish-brown or chocolate-colored, gray, and yellow sandstones, red shales, gray flagstones, coarse conglomerates, with occasional bands of limestone and cornstone. The gray flagstones and thin gray and olive shales and "calmstones" are almost confined to Forfarshire, in the northeast part of the basin, and are known as the "Arbroath flags." One of the most marked lithological features in this central Scottish basin is the occurrence in it of extensive masses of interbedded volcanic rocks.