Moray Firth, extending on both sides of Loch Ness till within a short distance of Fort Augustus, and then proceed­ing northward, expanding the whole breadth of Caithness, and constituting the principal formation of the Orkney Isles. On the western site of the mainland, the old red sandstone is deposited in numerous patches on the gneiss formation, as at Loch Broom, Gairloch, and Applecross.

The new secondary rocks have been but sparingly ob­served in Scotland ; yet it is a curious fact that the few patches that have been discovered are superimposed on the old red sandstone, and have not been reposing in uninter­rupted order in the secondary series. Thus the lias shales, highly micaceous, and some of the upper beds of the oolitic system, occur at the mouth of the Cromarty Firth, from Dunrobin Castle to the ord of Caithness, Applecross, and other points on the mainland, and in the Western Islands, on the borders of Mull, the south and east of Skye, and near to the rocks of Arran. The equivalent of the fresh water de­posits of the wealds of Sussex, geologically situated above the oolitic group and below the chalk, is seen in Moray and Skye. In the central and southern divisions of Scot­land, these newer groups of rocks have not been detected. In this division of Scotland very few metallic ores have been found. Lead mines were formerly wrought at Tyn- drum, to the west of Loch Tay. Lead mines are at present wrought at Stronbean in Argyleshire, at which place the carbonate of strontian was first discovered. At Glen Strath- fairer, in Inverness-shire, there have been detected veins of plumbago running between the laminæ of the mica slate.

We may here briefly refer to the geological character of the Western Isles. Dr. M'Culloch@@1 calls the Long Island, consisting of a series of islands lying in a south-west and north-east direction, the gneiss island, from the predomin­ance of that species of rock. Another group, embracing Skye, Rum, Canna, Mack, Egg, and Mull, he denominates the trap islands. There are five basaltic islands off the north-west side of Mull, of which the smallest but the most celebrated is Staffa, which is well known for its basaltic columns and cavern, called Fingal’s cave. This cave, one of the most remarkable natural excavations in the world, is formed of the columnar bed of basalt, where it declines to the level of the sea, which washes the feet of the columns, that are like the pillars of an immense cathedral, placed close to each other, the sea forming the floor. The top of the arch, at the entrance, is 66 feet ; but it gradually declines to 40 at the extremity, at the distance of 227 feet. The breadth of the cave is about forty feet. There are other similar caverns of less note on the island. The basalt of which the columns in Staffa are composed, is similar to that of the Giant’s Causeway in Ireland ; and it is probable that they are both of submarine origin, having been raised by the sea. St. Kilda,the most western of the Hebrides, is composed of seve­ral varieties of the trap rock. Arran, in the Firth of Clyde, even to the top of the highest mountains, is principally granitic.

In tracing the geological features of the country in the ascending order of the groups, we come next to the tran­sition or greywacke system, now divided into two principal sections, the lower or Cumbrian, and the upper or Silurian. As far as has hitherto been ascertained, the Silurian division is unknown in Scotland ; and the Cumbrian rocks, destitute of organic remains, cover the greater part of the area of the south of Scotland. These greywacke strata stand at high angles of from sixty to ninety degrees, and consist chiefly of coarse slatystrata, seldom divisible into thin roofing slates, and often alternating with arenaceous and coarse conglo­merates. Amongst them, limestone is seldom found, and, when it is, the quality of it is inferior. In the division of which we now treat, coal and its accompaniments are known

in few places ; it is, however, wrought at Canonby, near Langholm, and at the Carter Fell. The only other rock for­mation, found in connexion with the old transition group here, with the exception of igneous rocks, is a red sand­stone, ascertained, in some situations, to be the old red, but in others, considered as the new red sandstone, particular­ly in Dumfries-shire.

In the third geological division of Scotland, namely, the centre of the kingdom, is placed the great coal basin ; but, adhering to our rule of marking the successive formations in the ascending order, we shall first treat of the old red sandstone, the most ancient rock in this subdivision of the country. This rock abuts against the line of the primary rocks, and stretches across the whole country from the German Ocean to the Atlantic, pursuing, like the mountain ranges, a south-westerly, or north-easterly direction. Its line forms a long, uninterrupted, extensive, and fertile valley. In the north-western part, it rises into hills, on the sides of one of which, east of Menteith, are deep and hideous fis­sures, the effect of some convulsion of the earth.

The formation appears to be of vast thickness, especially towards the north, and may, it is supposed, be divided into three portions ; the lower, the middle, and the upper beds. In what are considered as the lower strata, the remains of fishes have been found in a high state of preservation. The well known Arbroath pavement belongs to the old red sand­stone series.

But the most important group in this central district is the coal formation, consisting of limestone, ironstone, free­stone, coal, and clays. The extent from east to west is bounded only by the extremities of the land. To the north, it is cut off from the old red sandstone by a range of trap hills, crossing the country from east to west. On the south, it is bounded by the greywacke and the old red sand­stone. Its breadth, extending on both sides of the Forth and Clyde, averages forty miles, and its length about seventy miles.

The mountain limestone forms generally the basis of the group, although it is frequently found interstratified with other members of the series, and abounds with great numbers of organic remains. Below the mountain limestone, how­ever, but belonging to the same group, a bed of limestone is worked at Burdie-house, near Edinburgh, in which the or­ganic remains differ essentially from those which have been just named. These remains consist of many of the plants which distinguish the coal formation ; but that allud­ed to includes also the teeth, scales, and other bones of fishes which partake of the reptile character, some of which must have been of gigantic dimensions. Small fishes are also found in a fine state of preservation. The same limestone has been found in other parts of the country, and is of su­perior quality to the common limestone, for mortar, plaster, and the smelting of iron.

The clay limestone is found in beds and nodules, the work­able kind containing from twenty-seven to forty-five per cent. of iron. The kind termed black band is in high request. From this ore is smelted vast quantities of pig iron. The iron works in Scotland have been increasing beyond all ex­ample ; at Carron, Gartsherrie, Shotts, Cleland, Airdrie, Clyde, and other places. The quantity of iron produced in Scotland in 1830 amounted to 37,500 tons. But tour years afterwards, in 1834, the latest date of which we have any correct accounst, the quantity had nearly doubled, be­ing about 72,000 tons. These works are generally within ten or a dozen miles of Glasgow.

The coal is found in beds varying from a few inches to forty feet in thickness, is extracted in great quantity, and is used as fuel, both for domestic and manufacturing pur­poses. One variety, cannel coal, is of superior quality for

@@@, Western Islands of Scotland, VoL II.