

along the crest of the arch, the higher members of the lower division were worn away, and the volcanic rocks were laid bare, before the Upper Old Red Sandstone was deposited. The members of the upper division occur near Bridge of Earn, and extend beneath the estuary of the Tay and the Carse of Gowrie to near Dundee. Between Forgan-denny and Bridge of Earn, the basement beds are found resting unconformably on the denuded Lower Old Red Sandstone volcanic rocks, where fragments of the latter occur in the breccias. On both sides of the estuary of the Tay, however, the Upper Old Red Sandstone is brought into conjunction with the volcanic series of the lower division by two parallel faults. The members of the upper division are composed mainly of friable brick-red sandstones and marls, which have yielded near Errol fine specimens of the genera of fishes characteristic of this division.

Reference has already been made to the fact that a small patch of Carboniferous rocks appears about half a mile to the south of Bridge of Earn, which are brought into conjunction with the Lower Old Red volcanic rocks to the south by means of a fault. The strata consist of blue clays and shales, sandstones, and calcareous bands belonging to the Cementstone group. Small though it be, this remnant is of great importance in proving the former extension of the Carboniferous rocks over the lower part of the Tay basin, from which it has been almost wholly removed by denudation.

The existing valley system of the basin of the Tay furnishes admirable examples of the influence of geological structure in determining the direction of the water drainage. The upper part of the Tay itself, and many of the tributaries within the metamorphic area, flow approximately in the direction of the strike of the crystalline schists. The massive Ben Ledi grits, the Green Beds, the sills of epidiorite and hornblende-schist, and the Perthshire quartzite have each had a powerful influence in the development of the prominent rock features of the region. Where these occur in association with zones of mica-schist and phyllite, they have more successfully resisted erosive action, and have given rise to rocky barriers or precipitous escarpments, thereby contributing to the formation of gorges, and in some cases of rock-basins.

The evidence relating to the glaciation of the Tay basin leads to the conclusion that, during the climax of the Ice age, the region must have been covered with one continuous sheet of ice, the movement of which must to some extent have been independent of the existing valley system. Where the rocks have been able to retain the striæ, the latter have been found up to elevations of 3000 feet, showing that the highest mountains were over-ridden by the ice. This stage was followed by a period of confluent glaciers, when the ice streamed over passes connecting adjoining valleys, leaving in its track lines of moraines.