

volcanic rocks, the latter being typically developed in the Ochils and Sidlaw Hills, where they form a well-marked arch. Between this outer range and the Highland Border, the overlying sedimentary strata, composed of sandstones and marls, lie in a trough now represented by Strathmore and the Howe of the Mearns. The Upper Old Red Sandstone rests with a strong unconformability on the lower division of that formation, outliers of it being found at intervals on the coast of Forfarshire and Kincardineshire. In this region, as in the Pentland Hills, there is clear evidence for maintaining that the members of the Lower Old Red Sandstone were folded and denuded before the strata of the upper division were deposited.

A glance at a geological map shows that the rivers Tay, North Esk, and Bervie traverse the marginal belt of the Highlands in deep consequent valleys, thence cross the plain occupied by the Lower Old Red conglomerates, sandstones, and marls, and breach the volcanic arch of the Ochils and Sidlaw Hills. Ultimately they joined the trunk river that flowed northwards along the East Coast. It is obvious that, at the time of the initiation of these consequent streams, Strathmore and the Howe of the Mearns had no existence. There must have been a graded slope from the margin of the Highlands towards the south-east. The behaviour of the rivers on entering the belt of weak strata along Strathmore reveals the processes by which the existing topographical features were brought about. Thus the Isla, a subsequent tributary of the Tay, by working north-eastwards along the weaker Lower Old Red strata, has captured several of the old consequent streams draining the Highland Plateau from the Ericht to the Upper Isla. The deflection of these waters into the Tay led to the initiation of obsequent streams draining into the Isla on the north-west slope of the Sidlaw Hills, and the formation of wind-gaps across the volcanic arch, of which the hollow traversed by the Dundee and Alyth Junction Railway is a good example.

In like manner the South Esk, which may be regarded as a subsequent tributary of the North Esk, by working south-westwards along the same weak strata has tapped the old consequent streams of the Highland Plateau as far to the south-west as the Prosen. Again, the Luther Water, a subsequent branch of the North Esk from the north-east, has captured several minor consequent rivers. Wind-gaps resulting from this deflection are still to be found in that portion of the Sidlaw range; one conspicuous example occurring to the east of Marykirk. Similar phenomena on a smaller scale are observable where the Bervie River crosses the Howe of the Mearns.