TIPPERARY

AREA OF COUNTY: 4,303 square kilometres or 1,661 square miles

COUNTY TOWN: Nenagh (north) and Clonmel (south)

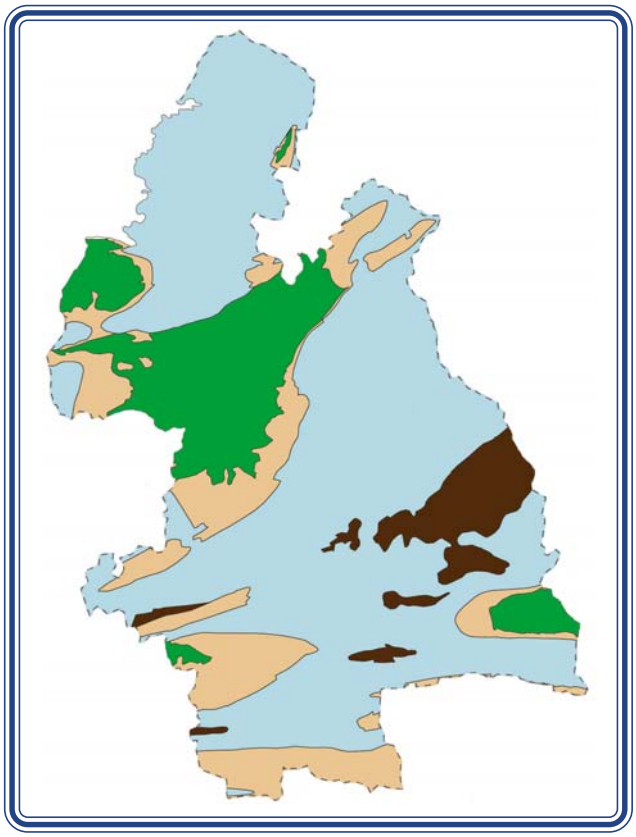
OTHER TOWNS: Cahir, Cashel, Roscrea, Thurles, Tipperary

GEOLOGY HIGHLIGHTS: *Cooksonia* an early land plant, Rock of Cashel, Slieveardagh Coalfield, Killaloe Slate, Slievenamon pebble beds.

AGE OF ROCKS: Silurian to Carboniferous; Paleogene

Slievenamon to Slieveardagh

Blocks of Devonian conglomerate are strewn across the summit of Slievenamon, towering above the lowlands formed on the younger Carboniferous limestones. In the distance are the low hills of Slieveardagh, formed of still younger Carboniferous sandstones and mudstones.

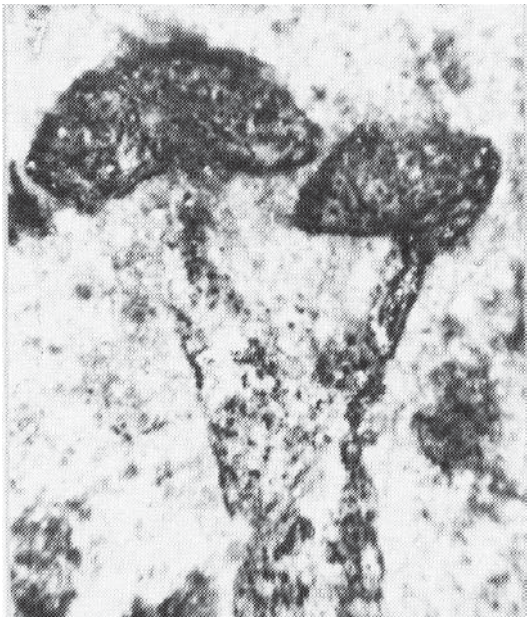


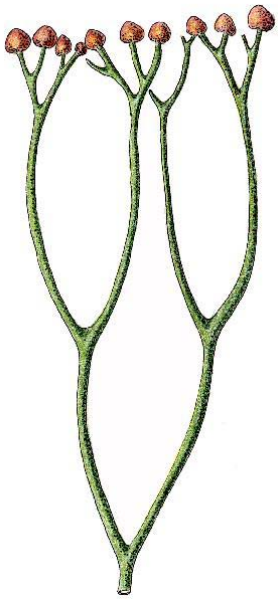
Geological Map of County Tipperary

Green: Silurian; **Beige:** Devonian sandstones and conglomerates; **Light blue:** Lower Carboniferous limestone; **Brown:** Upper Carboniferous shales.

Geological history

During the Silurian period (430 million years ago [Ma]) Ireland was divided into two by a narrowing ocean called Iapetus. Muds and some sand were deposited into this ocean and these later made up the mountainous areas of The Silvermines, Devilsbit Mountains to the north and Slievenamon to the southeast. Later compression caused some of these muds to be turned into slate. By the beginning of Devonian (416 Ma) the Iapetus ocean had closed completely and a large continent had formed, that was thinly vegetated, and through which temporary rivers flowed. Sandstones and coarse conglomerates were deposited, and these now form the lofty ridges of Slievenamon and the Galtee and Knockmealdown Mountains. Following the Devonian the landmass was slowly covered by a shallow ocean that encroached northwards over time. This was warm and supported a huge diversity of living things which are now found as fossils preserved in the Lower Carboniferous limestone.

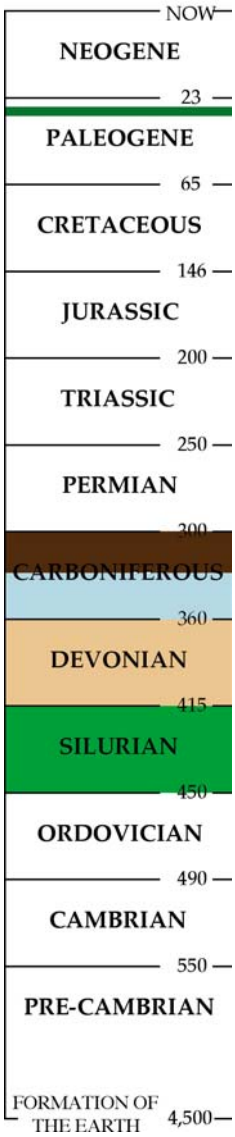




***Cooksonia* from near Moneygall (left), with a reconstruction.**

Later in the Carboniferous the region became land. Sandstones and mudstones, with thin coal seams, were deposited and these now form the low hills of Slieveardagh.

The youngest bedrock deposits are found as scattered patches of clay preserved in hollows in the underlying limestone of the Suir valley around Caher (not shown on map). Pollen grains have shown these so-called 'pipe clays' to be around 30 Ma - Paleogene (Dark green on timescale). Erosion has taken place during and since the Ice Age and some of the older rocks such as those of the Silurian have been revealed peaking out through younger rocks that once covered but now surround them.



Geological timescale showing age of rocks in Tipperary.

Cooksonia: an early land plant

In the early 1970s John Feehan, then a student at Trinity College, Dublin was examining mudstones and other rocks on a mountainside close to Moneygall. Once viewed under a microscope these rocks revealed a startling secret: they contained fossil plants. These were exceptional plants not much larger that 2-3 mm in height, and are called *Cooksonia*. They were among the first plants to have evolved that could live on land some 440 Ma. Unlike algae that had to live in water *Cooksonia* had short stems with tubes that could carry water to the tips of stems. On the tips the mature plants had small swellings that held spores which when released would germinate into new plants.

Economic minerals and resources: coal, slate and metals

Coal was mined from the Slieveardagh Coalfield in the east of the county from at least 19 collieries. The last finally closed in 1973. Like all coal in Ireland it is Upper Carboniferous in age and formed from forests that grew in swamps close to sea level. These developed as the warm, tropical seas that had covered Ireland in the Lower Carboniferous retreated. The plants flourished, and as they died they fell over and began to build-up. Over time they became compressed into coal. Some of the coal seams that were mined were up to 120 cm in thickness.

Slate is a metamorphic rock that was originally a mudstone that became compressed over time. This allowed the slates to be spilt into very thin slices ideal for roofing. At Portroe near Killaloe good quality slate was discovered and this supported an extractive industry where various quarries were worked from the 1820s until their closure in the 1950s. For a short time in the 1990s a slate quarry was reopened at Killoran.

Historic mines operated in the Silvermines (pictured right) near Nenagh at many times in the past up until the 1990s. Silver was the main metal extracted in historic times and Lead and Zinc in more modern times. Today a large wedge-shaped spoil heap of waste from the mines can be seen on the side of the Silvermines Mountain. In the 1980s a considerable time was spent prospecting for viable metal sources in the Lower Carboniferous limestones of the Irish midlands. Close to the Kilkenny border at Lisheen a deposit was discovered that contained a large proportion of lead and zinc ores and these are now being mined.

Map adapted with permission from Geological Survey of Ireland 1:1,000,000 map 2003.
Image credits: Mike Simms 1, 4; Geological Museum, Trinity College, Dublin 3.

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