MEATH

AREA OF COUNTY: 2,342 square kilometres or 904 square miles

COUNTY TOWN: Trim

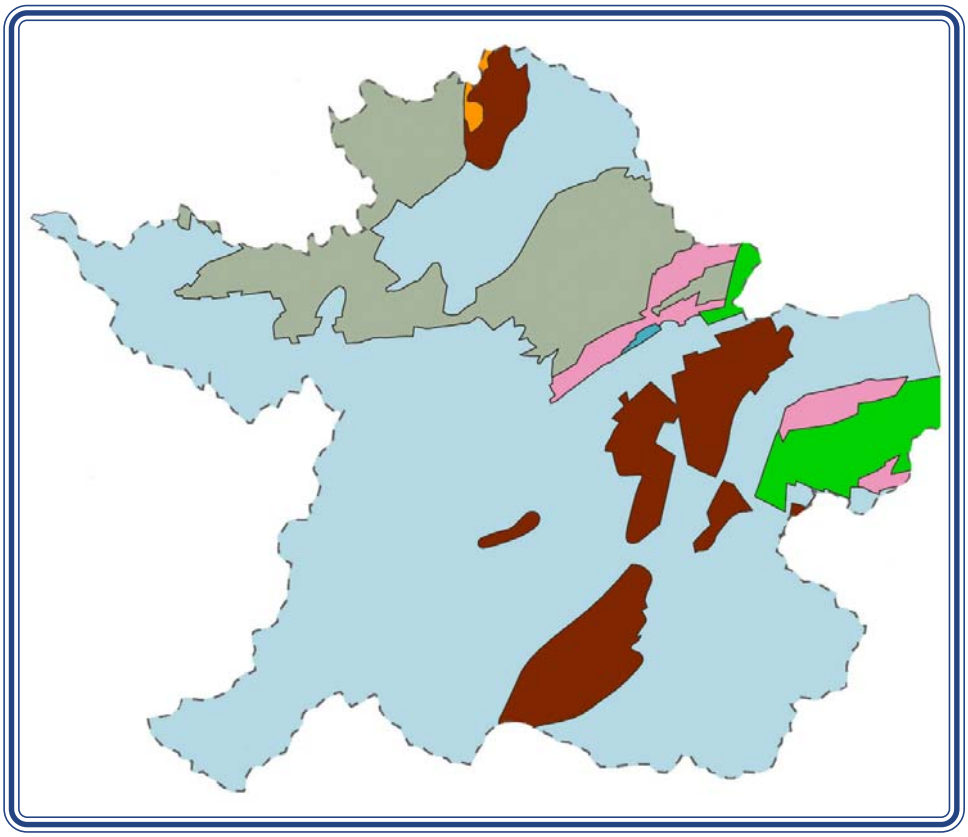
OTHER TOWNS: Athboy, Duleek, Enfield, Kells, Navan

GEOLOGY HIGHLIGHTS: Ice Age eskers, Carboniferous limestone quarries, Ordovician volcanic islands

AGE OF ROCKS: Ordovician-Silurian; Carboniferous-Triassic

Arial view of Tara Mine, Navan

This is one of the largest Lead and Zinc mines in Europe.
The metal ore is contained within Lower Carboniferous limestones.



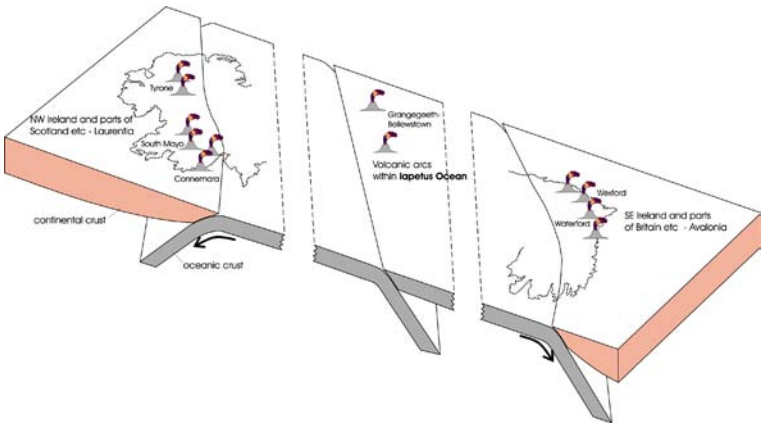
Geological Map of County Meath

Pink: Ordovician; **Dark blue:** Ordovician volcanic rocks; **Grey:** Ordovician & Silurian sediments; **Green:** Silurian mudstones; **Light blue:** Lower Carboniferous limestone; **Brown:** Upper Carboniferous shales; **Orange:** Permian and Triassic salts and sandstones.

Geological history

It is now well understood that Ireland is made up of two 'halves', which were originally separated by an ocean that geologists call Iapetus. The northwestern half was on the margins of a North American continent, whilst the southeastern half was on the margins of the European continent. Plate tectonic movement throughout the Ordovician period saw this Iapetus Ocean close and the two halves converge and eventually combine in Silurian times. Meath's rocks tell part of this story, and need to be understood in the wider context.

The oldest rocks in Meath are fine-grained sedimentary rocks of early Ordovician age that deposited in deep marine settings at the margins of the ancient Iapetus ocean. As Iapetus gradually closed during the Ordovician, by subduction of the ocean floor, volcanic rocks were erupted and built volcanic arcs (chains of islands) along the margins and within the ocean. Volcanic islands were centred on Grangegeeth and Bellewstown. By mid-Silurian times,



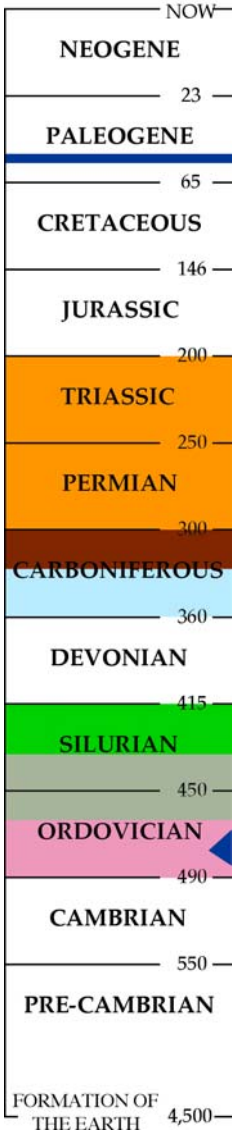
Reconstruction of the closing Iapetus Ocean with the development of volcanic islands in the Ordovician

the ocean had narrowed. Silurian rocks are widespread, though generally not well exposed in Meath.

Then the continents on opposite sides of the Iapetus Ocean were brought together, squeezing the oceanic sediments and volcanic arcs in between. The collision uplifted them to produce a range of mountains, followed by prolonged erosion which wore down the mountains, so that the next stage of deposition followed a major gap in the rock succession.

The eroded mountains were covered by marine sedimentary deposits. As the sea advanced northwards, during the early Carboniferous, limestone sediments accumulated in slowly subsiding basins. Richly fossiliferous mounds of carbonate mud ("Waulsortian Limestones") are common. Stretching of the Earth's crust beneath Ireland during this period of limestone deposition allowed mineralised fluids up through faults in the rocks. These fluids sometimes altered the limestone into dolomite (limestone with magnesium in it). Other minerals such as lead and zinc also percolated up through these faults forming economic deposits within the limestone. These valuable ore deposits are currently being extracted in Tara Mines at Navan.

The youngest solid rocks in the county are found in a small area in the extreme north of the county and extend into the neighbouring counties of Cavan, Louth and Monaghan. A thickness of several hundred metres of dark grey mudstones and sandstones, sometimes with plant remains and thin coal seams, are of Carboniferous age and lie above the limestones. They are overlain by mostly red mudstones and sandstones of Permian and Triassic age, deposited between about 280 Ma



Geological timescale showing age of rocks in Meath.

and 230 Ma. Two thick beds of gypsum show that the climate at this time was harsh and arid. Still younger rocks, around 60Ma (dark blue on timescale, but not shown on map), are the result of volcanic activity linked to the opening of the northern Atlantic Ocean. These are found as sheets, known as dykes and sills, of dark basalt lava that cut through the older rocks.

Till is a mixed glacial deposit of clay, sand and boulders, also called boulder clay, left behind by ice sheets during the Ice Age. In Meath the till often takes the form of drumlins (the name is derived from the Irish 'druim' - small, round-backed hill or mound). Lakes often occupy the badly drained, inter-drumlin areas. As the ice sheet shrank towards the end of the glacial period, glacial debris was frequently deposited at the ice margin in the form of ridges called moraines. Many hummocky moraines occur south of Slieve na Calliagh. Large expanses of sands and gravels deposited by meltwater streams flowing from a glacier are common, for example in the Gormanstown and Summerhill areas and along the Boyne. An extensive system of eskers, which have been sorted and deposited as ridges beneath the ice sheet, occurs around Trim and Summerhill. Erosion by meltwater has cut some spectacular channels in the area, notably the Boyne Channel, with its tributary channels.

Mining & Building Stones

Ireland's largest zinc and lead mine is Tara Mine at Navan. Zinc occurs as the mineral sphalerite, and lead as the mineral galena, both sulphides of the metal. There are plenty of ore reserves left for many years, but it is only economic to mine if the price on the world's markets is high enough to cover the costs of mining it. Outside Drogheda is the Irish Cement works, which mixes ground limestone and shale to make cement, with the addition of gypsum from Monaghan to control how fast the concrete hardens.

Dunshaughlin

A special feature exists at Dunshaughlin. No rocks are seen at the surface but geophysical techniques and some drilling have shown that there is a big depression below Dunshaughlin filled with silica deposits. This probably formed by prolonged humid weathering of Carboniferous limestone.

Map adapted with permission from Geological Survey of Ireland 1:1,000,000 map 2003.
Image credits: Tara Mines & John Ashton 1; Geological Survey of Ireland 3.

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