

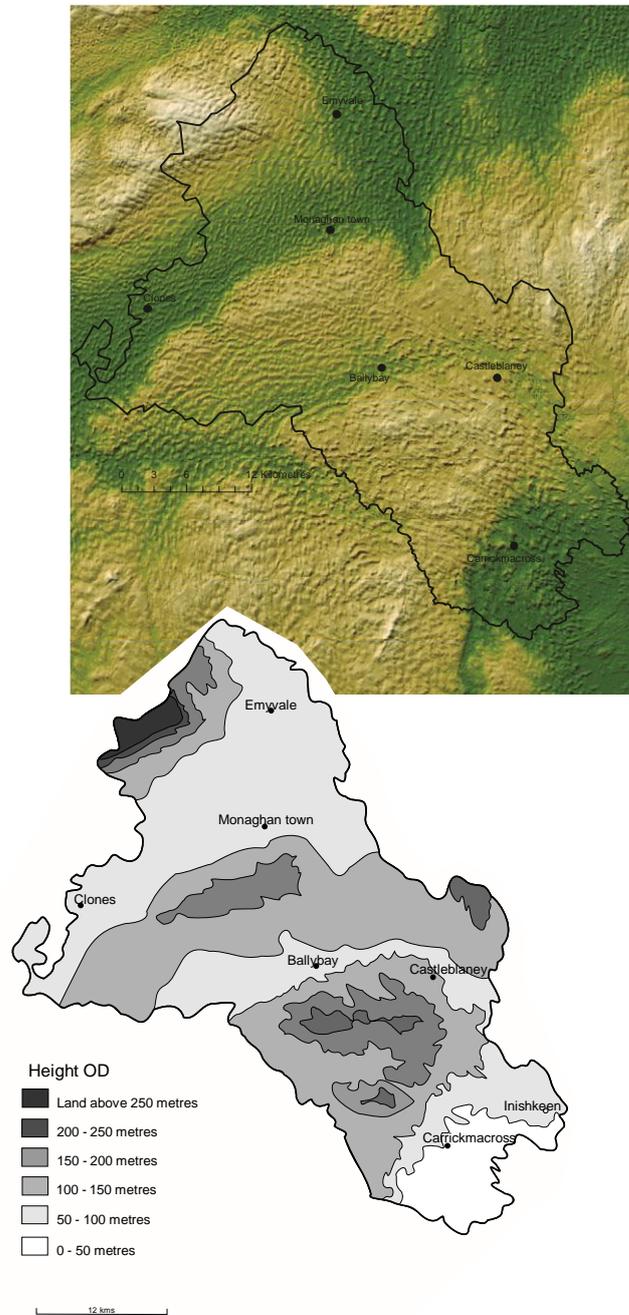
# Monaghan's physical landscape: exploiting its natural resources

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## Introduction

When the author of the *Irish Times* article in 1863 called Monaghan the 'Cornwall of Erin', he may have somewhat embellished reality.<sup>1</sup> Indeed, this idea of an industrialised Monaghan may have been merely aspirational, as the landowners of Monaghan began to engage in exploitation of their mineral resources in the nineteenth century. However, it is true to say that the physical landscape of any area is the foundation for any future development – cultural and social. The raw materials of an area shape the historical experience of its economy and society. Therefore, in this chapter we will examine the evolution of the physical landscape of Monaghan, its endowment of raw materials, and how these have been exploited over the years.

Even a cursory glance at the basic physical geography of Monaghan (fig. 1) will suffice to note that the county can be broken up into four areas. The northwestern corner of the county contains its highest point, around the Slieve Beagh uplands. To the east and south of this, is located a lowland area composed of limestone, with average heights of 70 metres above sea level. In the centre of the county, south of Monaghan town, the land rises to an average of 160 metres above sea level. Then further south around Carrickmacross, the land falls again, averaging 60 metres above sea level. All of these changes in landscape and elevation are due to the underlying rock types (fig. 2). Glaciation has also had a significant impact on the landscape of Monaghan, with drumlins being one of its most characteristic features. This chapter aims to answer two interlinked questions. How has the county's physical landscape with its four distinctive regions originated and what are their distinguishing features? And although the industrialisation of Monaghan did not develop to the heights that were dreamed of in the mid-nineteenth century, the chapter will explore how the endowment of natural raw materials has been used over the past two centuries.



**Fig. 1:** (a) Topography of county Monaghan.

Source: Radar digital elevation model created by NASA and georeferenced by the author. Available at: <http://earthobservatory.nasa.gov/IOTD/view.php?id=5343>.

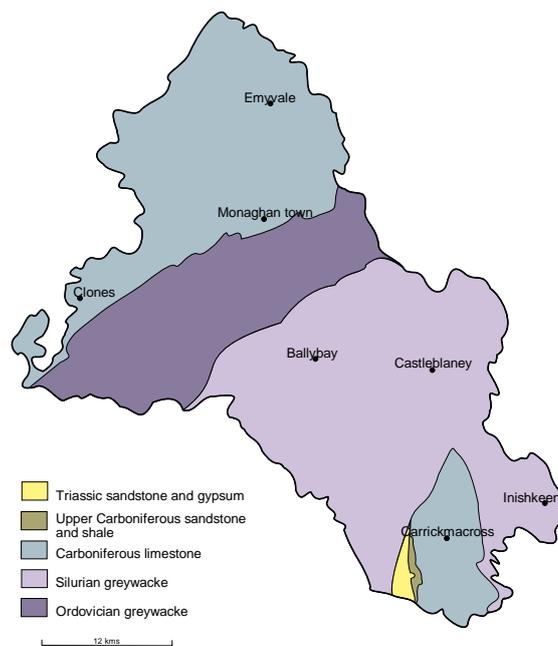
(b) Map showing the altitude of the various regions in Co Monaghan.

Source: drawn by author from OSI data.

### **Rocks from an ancient ocean**

Although we may think of County Monaghan as a low lying county, most of its land lies 100 m above sea level. Indeed, its oldest rocks are some of the highest rocks of the Monaghan landscape.<sup>2</sup>This is no coincidence. The oldest rocks of

the county are Ordovician in age, laid down some time around 460 million years ago. During this time, Ireland was split in two, with the northern half (parts of Donegal) on a continent called Laurentia, while the south-eastern tip of Ireland belonged to a continent called Gondwana. Although both of these continents were in the southern hemisphere of the globe, a vast ocean separated them. This ocean has been named the Iapetus Ocean by modern geologists and, at its peak, it was as large as the modern Atlantic is today. The Iapetus Ocean existed for approximately 160 million years until, due to the forces of plate tectonics, it disappeared as the two plates on either side of the ocean came together. During the Ordovician period, the area that we now know as Monaghan lay beneath this large ocean, just off the ancient continent of Laurentia to the north. Therefore, the sediments that were deposited were those typical of this type of environment – impure sandstones called ‘greywackes’. This rock type is not easily seen at the surface, as it is covered by many metres of glacial sediments. However, it plays an important role in the physical landscape of county Monaghan, as it is this Ordovician greywacke which underlies a high ridge that runs in a southwest-northeast direction from Scotshouse through Newbliss and to the south of Monaghan town (fig. 2).



**Fig. 2:** Simplified bedrock map of county Monaghan.  
Source: 1:500,000 bedrock map of the Geological Survey of Ireland.

As the Iapetus Ocean continued to close, the oceanic plate that underlay the ocean was subducted beneath the continental plate of Laurentia, as is happening today around Japan. This would have caused catastrophic earthquakes in the area, as well as volcanic activity as the rocks from the subducting plate melted and bubbled up through the earth’s mantle. There is evidence of this within the

Ordovician rocks of Monaghan, in the form of spilitic lava (formed when hot, basaltic lava comes into contact with sea water) found within the greywackes.

The closing of the ocean through the subduction of the oceanic plate also had the effect of scraping the sediments that had been deposited on the floor of the ocean up against the side of the Laurentian continent. This feature, known in geology as an accretionary prism, meant that the rocks to the north of Monaghan, which were older, were pushed upwards above younger rocks to the south in slices which are known as *tracts*. This also had the effect of creating a ridge of sediment that was slightly above the surrounding area (hence the ridge running through Monaghan from the southwest to the northeast, as mentioned above). This ridge extends into Longford and as far northeast as Down, and so is called the 'Longford – Down inlier'. Indeed, it continues through the Irish Sea to emerge again in Scotland, where it forms the Southern Uplands. The rocks get younger to the southeast of the county, and are Silurian (438 - 410 million years ago) in age from north of Ballybay to Inniskeen (fig. 2). However, these rocks were deposited in the same way as the rocks of Ordovician times, but within an ocean that was fast disappearing. The average height of the land underlain by Silurian rocks is 150 metres above sea level.

These rocks form the backbone of county Monaghan, both geographically as we have seen and, historically in terms of economic developments. As the oceanic plate of Iapetus subducted, the associated volcanic activity spouted out molten metals onto the ocean floor. The subducting ocean therefore not only left us with a landscape, but also with an economic resource which human ingenuity was able to explore and exploit.

### **Monaghan's metal mining heritage Antimony mining**

Antimony is an abundant element within the crust of the earth. As it easily forms a compound, it is generally not found in its pure state, but more often found as the mineral stibnite, which contains up to 71.8% antimony. Antimony is a metal element which is used to form alloys of lead and tin in particular. It is rare to find antimony being mined in Ireland. However, in county Monaghan, antimony exploitation began in the early nineteenth century in the area around Clontibret (fig. 3). Here, there is a zone of fracture about a foot wide within the Ordovician rocks of the Longford-Down inlier. As rocks fracture beneath the



**Fig. 3:** Lead, gypsum, coal and antimony localities of county Monaghan, showing the location of mines referred to in the text. Source: GSI minerals map.

ocean, various minerals, in particular metals, can use the spaces of the fractures to move upwards. This is what happened in the Clontibret area some 400 million years ago. As the continents of Avalonia (a sub-continent off Gondwana) and Laurentia came closer, and the Iapetus Ocean closed, the rocks within the Longford-Down inlier became fractured. Metals began to move up from the mantle of the earth and were deposited in veins along the fractures. These metals later became important resources as technology advanced and humans found new ways of producing goods in exploiting the resources of the earth.

The geologists who surveyed the county for the Geological Survey of Ireland (GSI) in the nineteenth century noted antimony having been mined within a 20 foot shaft in the townland of Stranoodan.<sup>3</sup> A more abundant antimony deposit was discovered in Clontibret in the late eighteenth century on the lands of Edward Lucas, a landlord who had his house at Castleshane.<sup>4</sup> Although this deposit was only four inches thick according to Kane (1845), it was subsequently mined in the middle of the nineteenth century. At least two shafts were located close together, in the townlands of Tullybuck and Lisglassan to the north of the village of Clontibret.

The report of the Mining Company of Ireland for 1825 shows that the company had leased land in the townland of Tullybuck from the Earl of Middleton for 31 years to mine for antimony.<sup>5</sup> In 1826, the Mining Company of Ireland drilled a shaft at Castleshane to a depth of 10 fathoms to tap into the antimony body.<sup>6</sup> For the six months of the beginning of 1826 alone, the company spent 154 4d on the mine.<sup>7</sup> However, by December of that year the company had advised against development of the mine, presumably as it was deemed uneconomical

to pursue the ore, having only produced 10 worth of deposit for 270 14s 2d of investment over the year 1826.<sup>8</sup>

The antimony mine was reopened during the First World War by two entrepreneurs, Robert Espinasse and Charles Chaytor, solicitors in Dundalk and Dublin, who had been granted a two-year lease on the property by the Land Commissioners.<sup>9</sup> In 1917, six were employed at the mine but it appears to have closed soon after.<sup>10</sup> Neither Espinasse nor Chaytor had any knowledge of mining<sup>11</sup> and, in 1917, the ton of ore that had been mined since the prospecting licence was issued was lying on top of the mine itself without being sold on. When Lieut. Russell spoke to both gentlemen in the course of his explorations during that year, they expressed a concern that the mine should be managed better, either by being sold to the Government to include a royalty for them on all ore raised subsequently, or for them to continue mining with some financial assistance from the Government. Russell concluded that the mine would be more profitable if it were more competently managed.

### **Mining for lead**

Certain types of rock within Ireland are host to a variety of metals. While our limestone has given us one of the most important sources of zinc in Europe (in Navan, Galmoy in Kilkenny and Lisheen in Tipperary), rocks from the Ordovician and Silurian periods have given us metals such as copper and lead, which in some areas are of sufficient quantities to be economically viable. This is true of Monaghan, where lead has been mined for centuries. Kinahan, writing at the end of the nineteenth century, recorded thirty-two locations within Monaghan where lead had been mined (fig. 3).<sup>12</sup>

Most of Monaghan's lead mines are centred on the Castleblaney – Ballybay area. Mineral-bearing veins are generally steeply dipping and trend northnorthwest.<sup>13</sup> The earliest records of mining activity in the area go back to the mid-eighteenth century. Donald Stewart, the 'itinerant minerologist' who carried out a report for the Royal Dublin Society in 1799, reported that lead ore was being worked 'for great profit' in Aughnamullen, to the southwest of Ballybay, in 1750.<sup>14</sup> By the time Samuel Lewis was writing his *Topographical Dictionary of Ireland* in 1837, the lead mine had been discontinued.

The largest lead mine within Monaghan historically was the Tassan mine (fig. 3), located just northeast of the village of Annyalla. The lead deposit in this area is said to have been discovered and worked by Joseph Backhouse probably some time before the first survey of Monaghan by the Ordnance Survey (OS).<sup>15</sup> The locations of four shafts of 'old lead mines' in the townland of Coolartragh are marked on the first edition OS 6" maps (1836), as well as the location of shafts around Lough Tassan itself. A building to the west of Lough Tassan was subsequently marked on the GSI 6" fieldsheets as the 'engine house', showing that the lode was being worked mechanically before 1836.<sup>16</sup>

The Tassan lead lode appears to have been systematically worked from 1849 to 1866 by various companies. The mine was worked principally between 1854 and 1861 by the Tassan Mining company, and then by the Castleblaney Mining

Company from 1861 to the mine's closure in 1866.<sup>17</sup> At the time of the Griffith Valuation (*circa* 1861), Captain James Skimming was managing the mine for the Tassan Mining Company. With the change in ownership of the mine in 1861, production increased significantly, peaking in the years 1861 – 1865. Production of ore went from 20.3 tonnes in 1859 to 101.6 tonnes in 1861.<sup>18</sup> During this time, the lead deposit was extensively worked to a depth of 500 feet.<sup>19</sup> Today some of the workings of this mine (the workshop and offices, as well as part of the slag heap) are still visible on the landscape to the west of Tassan Lough.

James Skimming was a major influence in Monaghan mining in the second half of the nineteenth century. The Hope mine, in the townland of Cornalough, four kilometres to the south of Castleblayney (fig. 3), was worked around the same time as the Tassan mine by the Cornalough Mining Company (with James Skimming again as manager<sup>20</sup>) on land belonging to Henry T. Hope. Hope was a wealthy London banker who had inherited, among other things, the Hope Diamond, and was the owner of the Hope estate near Castleblayney.<sup>21</sup> The lead mine at Annaglough was returned in the Griffith Valuation as being owned by the Tassan Mining Company and managed by James Skimming. In 1852, this mine is recorded as having produced 310 tonnes of lead.<sup>22</sup> As with the Tassan mine, it existed in the early nineteenth century as it is marked on the first edition OS six inch map. Captain Skimming's mining influence reached beyond Monaghan county, as he was managing the Baravore lead mine in the Glenmalure valley in county Wicklow, at least from summer 1859 to January 1860.<sup>23</sup>

Nearby, a lead mine at Cashel was worked for a two year period from July 1863. The mine was managed by George Henwood, a Scottish mine journalist and 'captain' (meaning someone with knowledge of running a mine in the midnineteenth century) who had considerable experience of the mines of Cornwall.<sup>24</sup> It appears that Henwood brought many of the Cornish mining traditions to this small mine in Monaghan, including having an 'engine opening day', as reported in the *Irish Times* of September 1863.<sup>25</sup> The mine was short lived, however, and only seems to have produced 9 tonnes of lead. It appears never to have been formed into a limited company, probably due to the uneconomic nature of the lead vein. No traces of this mine remain today.

Many mines in Monaghan, like that at Cashel, did not have a long life-span, mainly due to the small quantities of lead found in the veins. Lewis mentions a mine about half a mile from Ballybay, at Laragh, but that had closed in 1826.<sup>26</sup> The OS memoirs mention that a company from England opened three shafts in this mine around 1825 but as the ore was poor it was not seen as economical to pursue.<sup>27</sup> Silver was also encountered in this vein, and Lewis mentions that a local resident had a plate which was manufactured from the silver deposit in this locality.

### **Mining for Gold**

As we have seen, interest in lead mining waxed and waned through the nineteenth century, and was greatly influenced by the price available for lead, as

it had for antimony. Subsequent prospecting around the village of Clontibret, however, changed the focus of the mining, and the imagination of prospectors in the middle of the twentieth century was taken with a more valuable metal: gold. In 1952, William Sutton from Lancashire and Michael Hughes from Castleblayney acquired a prospecting licence for the Lisdrumgormley and Annaglogh area. This area had been the site of lead mines at the beginning of the twentieth century.<sup>28</sup> Within the first year, they spent 1200 on the prospect. Some initial interest was shown by a Dutch mining company, Billiton Mining, who sent a geologist (G L Kroll) to the area in November 1952. After two days in the area, Kroll reported to the GSI that, while the evidence was meagre, there were sufficient grounds for the licensing area to be of interest to himself and his company.<sup>29</sup> The possibility of a foreign company coming and exploiting the area was grounds for some concern in the GSI, as the question of the state ownership of minerals found on Irish soil was brought into question.

By the late 1950s, the focus had again turned to mineral prospecting around Clontibret. The old antimony workings were reopened by the Mining Corporation of Ireland in 1956. This time the investigations revealed quantities of gold within the walls of the old antimony workings at Tullybuck. The Mining Corporation of Ireland carried out diamond core drilling in 1957 and this concluded that there was a consistent, although weak, gold bearing vein within the rocks of the Clontibret area.<sup>30</sup> Subsequent geochemical explorations have found similar deposits in the townlands of Carrickaderry (to the south of Tullybuck) and Bryanlitter (to the north).<sup>31</sup> Together, these deposits form one of the best untapped gold reserves in these islands. As the viability of gold mining fluctuates with the global economy, there have been many interested parties who held the licence to exploit the area since 1957, but none acted on the deposit although most carried out further survey work on the minerals of the area. These have included Tara Exploration and Development Co., Anglo United Development Corporation, Irish Base Metals Ltd and more recently Munster Base Metals Ltd from 1974 to 1992.<sup>32</sup> The licence for prospecting is currently (2013) held by Conroy Gold and Natural Resources. In total, they estimate that there are over one million ounces of gold within the deposit in Monaghan.<sup>33</sup> At the time of writing (early 2013), tests are being carried out by Conroy Gold on cores taken from the ground in Monaghan, with a view to progressing the development of a gold mine in this part of Co. Monaghan.

### **Carboniferous Monaghan**

As can be seen from fig. 1, Monaghan has two areas of relatively lower elevation – one in the southeast and one towards the north. Both of these areas are associated with Carboniferous rocks (fig. 2).

The Carboniferous period of Earth's history was from 355 to 298 million years ago. At this time, Ireland was on one plate, having been joined during the previous geological time period. The Iapetus Ocean had disappeared as the continents of Laurentia and Gondwana had collided, forming mountains in the northwest (Donegal) and east (of which the Leinster mountains of Wicklow and Blackstairs are the remnants). Ireland, on the edge of its new landmass, now lay somewhere just south of the equator. Although the ocean was to the south of

this landmass, a sea did begin to encroach on the land (much like the Black Sea today).

Given the geography of Ireland at that time, the sea flooded the basins which were located between these upland zones. The basin to the north of the Leinster uplands has become known as the Dublin basin. Within this, there were zones that were shallower (with some areas, known as 'platforms' that were barely below sea level) and deeper zones (sub-basins). The shallower zones, where the sea was clear, were the locations for the deposition of sediments rich in calcium carbonate, formed from the carbonate contained within the organisms living in the water column, while the deeper zones saw the deposition of muds, in areas that were too murky to support much life. The platforms were zones of sedimentation of sandy material, which became sandstones and shales as this lithified. This warm, shallow tropical sea teemed with life typical of this type of environment. Monaghan would have been home to coral reefs during the Carboniferous, very similar to the Great Barrier Reef off the east coast of Australia today. Evidence can still be seen today of this warm, tropical past in Monaghan. Many of the limestone rocks of the county contain fossils of coral reefs, shells and other creatures that would have been living in this sea 350 million years ago.

In the southeast corner of county Monaghan, these limestones were laid down in what has been called the Moynalty basin, an extension of the Dublin basin.<sup>34</sup> These limestones are present in the townlands of Feahoe and Mullylusty, for example, to the south of Carrickmacross. Further north, between these very southern areas and the townland of Taplagh, 7km to the north of Carrickmacross, the rocks are part of the platform that leads into this tropical sea – they are composed of pure limestones which have some fossils, and have a lot of silica in places, creating a rock called chert. It is within this rock formation that most of Monaghan's caves are located.

### **Monaghan's caves**

Because pure limestone is chemically eroded by natural water (which is slightly acidic), it can host many 'karstic' formations. Karstic features in Monaghan include caves, sinking streams, turloughs and enclosed depressions. The GSI records 111 karstic features within Monaghan, only one of which was outside the Carrickmacross area.<sup>35</sup>

J.C. Coleman, in his seminal work on Irish caves, documented eleven caves in County Monaghan, all within a few kilometres of Carrickmacross (fig. 4).<sup>36</sup> This number corresponds with more recent work by the Geological Survey of Ireland. Most of these caves are small, with some being no more than a sink into which a stream vanishes. Some, however, were given more attention by Coleman and others, because of their size, and at times because of some other historical association. The six inch fieldsheets of the GSI note the cave at Tiragarvan, to



**Fig. 3:** Caves, swallow holes and lime kilns of county Monaghan.  
Source: GSI karst database and OSi 25" map.

the west of Carrickmacross (named ePuthe-warn-tagh' on the second edition six inch map) as a 'cave exposing underground rivers as at the Pigeon Hole and other places near Cong, Co. Mayo'.<sup>37</sup> Investigations to find further caves in the many quarries around this site were unsuccessful.<sup>38</sup>

E. P. Shirley also speaks of the caves at Tiragarvan, and he provides an explanation for one placename associated with them (although he does not record the name as given on the OS map):

*Here are some natural caves and rocks, known as 'The President's Caves', so called from Dr. O'Reilly, a very respectable Roman Catholic priest, and President of the Irish College at Antwerp, who formerly lived here. He was nephew and great nephew to two succeeding Roman Catholic Bishops of Clogher.*<sup>39</sup>

Coleman did not record this placename, but simply calls the cave 'the Tiragarvan cave' or Puthwarntagh, as on the six inch maps.

Other caves have grimmer associations. Shirley describes a site in the townland of Magheraboy as follows:

there was formerly a cave in this townland, marked in the Ordnance Map. It is now dug away for limestone; and here, in November 1878, was discovered in the floor of it a skeleton, supposed to have been the remains of a young man who was killed in an encounter with the Orangemen in 1797.<sup>40</sup>

This cave has not been recorded in later documents. The chemical weathering of limestone has also shaped some of the rocks of the south Monaghan area into curious shapes. One example is found in the townland of Doohatty, on Shirley's Lough Fea estate. He describes it as follows: 'In the

grounds of this place, called Lough Fea, [...] is a natural seat in the limestone rock, called “Fin-Mac-Coul’s Chair” and which is traditionally said to have been a place of sanctuary’.<sup>41</sup>

### **Carboniferous north Monaghan**

While the limestones of south Monaghan are related to limestones of the Dublin and Meath area, the limestone bedrock of the north of Monaghan is related to those found in a band extending from Ballyshannon, Co. Donegal. The limestone of this area was laid down early in the Carboniferous period in the tropical sea that invaded the land, this time to the north of the Longford-Down inlier. Again, the area was under the influence of a marine shelf, although this shelf seems to have been slightly muddier than that to the south.<sup>42</sup> This mud gave rise to shale rocks being deposited, such as those seen at Benbulbin in Sligo. The different quality and texture of these limestones and shales has meant that the area does not contain the same karstic features as the south.

This area of limestone in north Monaghan contains the most significant limestone quarries. In the early nineteenth century, Charles Coote documented a limestone quarry at Glennan just outside Glaslough village.<sup>43</sup> Given the purity of the limestone, Coote records it as a ‘marble’ (that is, a rock that takes a polish). The uses to which the limestone was put in 1801 were varied – from door cases (which were sold at 20-40 guineas at the quarry, according to Coote), to chimney pieces, gate posts and headstones. The quarry employed twenty people at the time of Coote’s writing. Today, only two limestone quarries are present in north Monaghan. Stone drawn from the quarry at Donagh in Mullaghbane is used for drainage works and for road material, indicating the poor nature of the stone compared to that extracted at the quarry at Glennan. The second quarry (Watterson Quarry) is located in Golan, Carrickroe, to the west of Emyvale, where limestone is extracted for the making of concrete.

Although Carboniferous limestone forms the lowlands of Monaghan, the highest point of the county, just to the east of Slieve Beagh (fig. 1), is also composed of Carboniferous rocks – this time when a coarse to medium sandstone was deposited, which also contained layers of pebbles. This indicates that the area may have been close to the mouth of a river when this deposit was laid down. As sandstones are more resistant to erosion than limestones, and this sandstone is stratigraphically higher than the limestones around it, the zone stands above the height of the surrounding land.

### **Lime kilns**

Limestone in Monaghan was not just used as a building stone, but was also central to the improvement of the soil through the process of ‘liming’ during the eighteenth century. Coote, writing in 1801, says about liming in Monaghan that ‘where the manure of lime has such powerful effects as in this country, and where the limestone is so very scarce, it is a matter of moment to erect the kiln on an economical scheme’.<sup>44</sup> This improving mechanism saw vast amounts of limestone being moved from quarries in lime-rich areas (areas of limestone in

the north and south) to areas where the soil was acidic (such as the Ordovician and Silurian areas on fig. 2). There, the limestone was burned in lime kilns, where the calcium carbonate within the limestone is changed to calcium oxide due to the high temperatures. This is then drawn off as a powder and used as 'manure' on the soil in the local area.

The Ordnance Survey records over 130 lime kilns throughout Monaghan (fig. 4), with most of these within areas of acidic soils around Castleblaney and to the south of Monaghan town. Some of these kilns occur in pairs and are impressive elements on the landscape, such as those at Laragh, which were built in the mid nineteenth century for the Bath estate. Others, such as the kiln in the townland of Carrickatee, south of Ballybay, or the kiln at Coolkill West, north of Scotstown, are built into the side of rath structures, thus utilising the existing slope of the banks of the ringfort to aid charging the kiln with stone.<sup>45</sup> More of the kilns are linked to estates – such as some of those around Carrickmacross, where E.J. Shirley used lime extensively as manure for the lands – with 8000 barrels of limestone burnt in the kilns on the Shirley estate in 1835 alone.<sup>46</sup>

## **Coal**

At the end of the Carboniferous period, the shallow tropical sea that had covered large areas of Ireland disappeared as the swampy land emerged. This period is known as the Upper Carboniferous. It appears that while this change from marine to land was owed in part to the northward migration of the continental plate on which Ireland was situated, the change in environmental conditions was principally due to tectonic activity. This uplifted part of the land, therefore causing rivers to form, which deposited quantities of sediment into basins around Ireland.<sup>47</sup> As the land emerged, plants began to colonise these areas, with large forests growing on the swamps. This sequence of silty muds, sands and organic material from the vegetation created a very different rock sequence above the Carboniferous limestones that had been laid down. The silts and muds formed a mudstone and shale rock, while the organic material formed seams of coal. In County Monaghan, these rock types are found in the south to the west of the town of Carrickmacross (fig. 3). While the shales and mudstones have been used in places for building works, it is the coal seams that have attracted most attention from those interested in exploiting Monaghan's natural resources. The amount of coal found within these areas has been limited. Indeed, in his 1845 work, Robert Kane dismisses the area in a few sentences, saying

The strata dip at so large an angle as to render the working very difficult; and as no beds exceeding twelve to fourteen inches in thickness have been found, this coal district need not be considered as of any value.<sup>48</sup>

Most of the Upper Carboniferous sediments are to be found stacked against the fault associated with the Permian gypsum rocks and coal is also found within this area. Although the area does not contain enough coal for it to boast of a

major mining industry, nonetheless coal has been mined intermittently by a select group of entrepreneurs over the past two centuries.

The modern landscape to the west of Carrickmacross shows little evidence of the existence of coal mines. However, some sites are marked on the OS first survey. In the townland of Corlea, a coal pit appears on the field sheets of the Geological Survey of Ireland.<sup>49</sup> The accompanying note states that a thin seam of coal was found here. John Thomas Holland, the Shirley estate agent, informed the GSI surveyor in 1873 that Mr Gartlan of the distillery in Carrickmacross had employed a Welsh miner to excavate and explore the possibilities of exploiting this coal seam. However, he reported that the deposit was not economically viable.

In general, the Shirley family, and their agents, were unsuccessful in their efforts to exploit the meagre coal deposits of the area. To the west of Carrickmacross, within the Upper Carboniferous rocks, a small number of locations were recorded as having deposits of coal. On the GSI field sheet in the townland of Lateralbany, a road is marked as the 'Coal Pit Road'.<sup>50</sup> In the second edition six-inch map of this area, fields on either side of this road contain a number of coal pits. In the townland of Clonsedy, the GSI nineteenth century field sheet records an 'old coal shaft worked 40 years ago'.<sup>51</sup> This is possibly the shaft of the colliery of the Shirley estate, with which this family initiated their mineral exploration. Richard Griffith had already written a report on the quality of the coal in the district for Shirley in 1816, and on the conditions in which the miners were working, adding that they had quit because of the danger of flooding.<sup>52</sup> The inferior coal deposits continued to be exploited locally and the carting of culm (for fuelling limekilns) was an annual undertaking recorded in the accounts of the estate in the pre-famine years.

It is evident from the census returns of the early twentieth century that these coal mines and pits provided some employment to the local population. The 1901 census shows two former elderly miners living in the workhouse in Carrickmacross and the 1911 census also lists two coal miner brothers, Campbells, living in Lisnakelly and Ballymackney.

In an effort to gain a greater knowledge of the resources at the disposal of a potentially independent Ireland, and as an exercise in civil government (as well as perhaps an act of defiance towards the ruling establishment), the revolutionary government of the first Dáil set up a Commission of Inquiry in June 1919 into the Resources and Industries of Ireland. John O'Neill was its first chairman and Darrell Figgis was secretary. A sub-committee was appointed to examine Ireland's peat, water-power, industrial alcohol and coal resources. In addition to sending out questionnaires to county surveyors, assistant county surveyors, mill owners, 'and others in Ireland who might be expected to have useful information',<sup>53</sup> the Commission decided to hold public hearings into the natural resources of Ireland. Their first port of call was to Monaghan County Council, on Monday 24 November 1919. According to the *Irish Times*, when Figgis and O'Neill walked into the council chamber in Monaghan courthouse they were greeted by loud applause. However, when the council chairman, Thomas Toal, took his seat, the tone of the meeting changed. Toal, who had

been involved in previous attempts to develop coal mining in Monaghan,<sup>54</sup> informed the meeting that the secretary had received a visit from Sergeant Rocks of the Royal Irish Constabulary, who informed him that the deputation was illegal, and therefore should not be received by the council. The chairman adjourned the entire meeting of the council ‘in consequence of our being no longer a free assembly of

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the people’s delegates’. The meeting concluded with the chair offering a rousing defence of Sinn Féin and its efforts to promote Irish industry and the development of its natural resources and as the meeting broke up, the Soldier’s Song could be heard wafting in the air of the chamber.<sup>55</sup>

This incident was to considerably help the cause of the Commission of Inquiry, as public opinion was swayed in favour of its efforts.<sup>56</sup> However, after a number of further attempts at public hearings, the Commission decided instead to meet with particular interested parties that could provide them with information. The Commission was eventually wound down in 1922, with reports on the various resources being published. Data on Irish coal resources, along with maps, was published as a *Memoir on the Coalfields of Ireland* in 1921. As early as June 1920 the Commission decided that a book should be published containing the ‘exact state of present knowledge’ with regard to the coal resources of Ireland.<sup>57</sup>

The Carrickmacross coal field was visited by members of the Commission in 1919. In the report published in the *Memoir*, the coalfield is described as being just over eight square miles in area, and containing a thin seam of coal, approximately 1 foot thick at most. The coal is a clean-burning bituminous coal. Given the limited extent of the coal, it reported that the coal is only worth mentioning because of its relationship to other mineral deposits – namely the sandstone and gypsum, which will be mentioned below. Indeed, the commission goes on to say that, if the gypsum deposit were to be mined more extensively, it might make sense to extend operations into the coal deposit, thus obtaining fuel for the milling process.<sup>58</sup> Despite the Commission’s confirmation of the uneconomic status of the deposit, Monaghan County Council persisted in its attempts to encourage the Government to reinstate the Monaghan coal mines during the early years of the Irish Free State.<sup>59</sup> This was particularly so during the British coal miners’ strike of 1926, when the County Council saw an opportunity to profit from the situation. The name that is most frequently associated with all these reports is that of Thomas Toal, by then a Cumann na nGaedheal Senator elected in 1925 and considered by the Council as having some influence in the Dáil.<sup>60</sup>

## **Gypsum**

While exploring for coal in the early nineteenth century, the workers on the Shirley estate discovered another valuable mineral that could be exploited – a white rock called gypsum. This soft white rock had also been discovered in Montmartre, near Paris, in the eighteenth century and had been mined for

plaster since then – thus becoming known as ‘plaster of Paris’. When the deposit around Carrickmacross was discovered (fig. 3), the estate shifted its attention away from the coal deposit to this new mineral. And so began the relationship of south Monaghan with the gypsum industry – a relationship that exists to the present.<sup>61</sup>

What is gypsum, and how did it develop in this area? At the end of the Carboniferous age, around 298 million years ago, Ireland was located to the north of the equator, in the middle of a new supercontinent called Pangaea. With the formation of this supercontinent, as smaller continents joined together, earth movements caused some of the land to fault and fold. In the northern part of Ireland, this created ‘graben structures’, large blocks of land which sank relative to the surrounding ground. In the area of modern-day Kingscourt, in county Cavan, only one side of the block slipped. This type of a structure is called a half graben, and the resulting landscape is still visible today (fig. 1) where the land to the southwest of Monaghan is lower. This area has a major fault running north-south, which marks the edge of the block that sank (‘down faulted’). The area was an arid desert, with red sands, and scree slopes on the faces of the major cliffs that had been created by the downfaulting.

Later during the Permian (298 – 250 million years ago), a sea invaded this part of Ireland. How extensive this sea was is not known, but it appears to have covered much of the north eastern corner of the island of Ireland. The sea was very salty, and in this desert environment, shallower parts of the sea were evaporated off to leave behind the salt deposits. The water was replenished on a cyclical basis – after some was evaporated off, the area would become flooded again, and this water was subsequently also evaporated off. This created a growing deposit of ‘evaporite’ (the material that was left behind after evaporation) on the sea bed. This white salt is known to us as gypsum, and the deposit is 45 metres thick in some places around Kingscourt.<sup>62</sup> As climate fluctuated, and the Permian period came to an end, the area returned to being arid, with some rivers flowing along the surface. This gave rise to a red sandstone soil which subsequently became lithified (changed to a rock). This is known as bunter, and is found above the gypsum in the area between Carrickmacross and Kingscourt.

The history of gypsum mining in Monaghan has been very well covered elsewhere,<sup>63</sup> so here I will give a brief outline of the development of this major economic activity of the county. Shortly after the failure of Shirley’s coal mining project, he set his sights on the gypsum deposit found beneath his land. Initially, as early as 1835, the gypsum was mined and managed by Evelyn John Shirley himself. In 1843, he leased the mine to George Butler of Pembrey, Wales but by the 1850’s Shirley had again taken back management of the mining business, which was now trading as the ‘Shirley Estate Alabaster and Gypsum Works.’ Monaghan ‘plaster of Paris’ was beginning to appear on the walls of buildings around Ireland, and even further afield, as bags were exported to Liverpool. The ‘Plaster of Paris mill’ appears marked in the townland of Knocknacran East on the second edition OS six-inch sheet of the area, which was surveyed some time around 1858. Griffith notes that the thick beds of gypsum had been

worked by Shirley in 1861 and in his valuation he places a value of 10 on the then unoccupied mill.<sup>64</sup>

However, in 1856, E.J. Shirley died in his Lough Fea residence. This brought to a sudden halt the gypsum mining enterprise, as a bitter dispute arose between Shirley's heir, Evelyn Philip Shirley, and an agent of the Assurance Company of London about costs that had been accrued by the gypsum mine. On the resolution of the dispute, in 1858 the mine was leased by E.P. Shirley to Parrot of Dublin. The next that is heard of the mine is a note in the GSI memoir for sheets 81 and 82, dated 1871, which states that at the mill the gypsum was manufactured into plaster on the premises, but that the works were 'lately burned to the ground, and the enterprise abandoned'.<sup>65</sup> Kinahan puts the year of the fire at about 1869.<sup>66</sup> Cole mentions a mine at Drumgill across the county boundary in Cavan, which was principally used to obtain marl for red brick building, but from which gypsum was also obtained. This mine was abandoned by 1886. A further, deeper pit was opened at Drumgill subsequently and worked by the Thompson Brothers. This pit closed in July 1890.<sup>67</sup>

Therefore, gypsum was obtained from more areas than the Knocknacran East mine in the nineteenth century, although none of these mines seemed to have prospered, perhaps due to the lack of fuel to power the mines, and the lack of routes to transport the plaster to markets. Gypsum was also mined for decorative purposes. The church of St Peter and Paul in Lower Magheraclone was renovated in 1860, and statues of St Joseph and the Blessed Virgin carved in gypsum from Knocknacran were erected around ten years later.<sup>68</sup>

At the sale of estate lands under the Wyndham Land Act (1903), the mineral rights were reserved to the Irish Land Commission. Thus, the Land Commission solicited applications for mineral leases from the general public. Speculators who wanted to make what they may have seen as 'easy money' tried their hand at mining all over Ireland, beginning a new phase of mineral activity. One of the individuals who was vying for a piece of the Shirley estate's gypsum, and who was mentioned earlier in relation to the antimony deposit, was the Dundalk based solicitor Robert Espinasse. In 1918, Espinasse worked to gather a syndicate to bid for the mineral rights at Knocknacran. This syndicate included Chaytor, his partner in the antimony enterprise, and also Captain Samuel Knott, a mining engineer. The antimony mine was at this stage being wound down, and it is likely that, with the experience gained at this previous enterprise, Espinasse and Chaytor sought to broaden their mining horizons by tackling what they thought was a more profitable mineral. Espinasse managed to convince E C Shirley to come into the syndicate, which was offered a lease of the mineral rights of Knocknacran and the plantation in Clonsedy (where coal deposits had been found) for two years at 20 per annum.<sup>69</sup> In 1920 Espinasse sold his Monaghan

Minerals Syndicate to McGhie & Knott, important players in the gypsum industry in England. This new syndicate became 'the Irish Gypsum Works Ltd'. However, the venture was to be a frustrating one initially and despite the pleas of Knott to begin work, the Irish Gypsum Company was dogged with financial

difficulties.<sup>70</sup> It was not until the late 1930's, and subsequently when the State stepped in during the 1940s, that gypsum began to be a commercially viable industry on the former Shirley lands.

The financial difficulties experienced during the 1920s and early 1930s were to be transformed by the Anglo-Irish Trade war. The introduction of a tariff of 9d per cwt on imported plaster meant that an Irish industry could now flourish. In 1936, the market for 'plaster of Paris' in Saorstát Éireann was estimated to be worth 17,000 per annum by the Dáil. This, according to Minister for Industry and Commerce, Sean Lemass, could all be supplied from the native deposits around Carrickmacross.<sup>71</sup> Gypsum Industries thus began mining at Knocknacran in 1936 and by 1948 gypsum was being exported to Finland.<sup>72</sup> The current opencast mine at Knocknacran is the centre of operations, having replaced the underground mines at Drumgoosat and Drumgill in 1989.

### **Ice ages in Monaghan**

It is precisely when this opencast mine was being excavated at Knocknacran that we perhaps learnt most about the more recent geological history of Monaghan. During overburden excavation for the gypsum mine in the mid-1990's, the peat bog at Knocknacran and part of a drumlin were removed.

These drumlins are perhaps the most characteristic feature of the Monaghan landscape. Drumlins are small, elongated hills formed beneath an ice sheet as it moves along. As they are formed beneath a moving ice sheet, they are 'streamlined', having a steep 'stoss' side on the up-ice direction and a gradually sloping 'lee' side as the ice streamlined its load around an obstruction. Thus, drumlins give an indication of ice-flow directions at the end of the last glaciation. In Monaghan in general, ice was flowing from the northwest to the southeast.<sup>73</sup>

Drumlins are composed of overconsolidated till – a sediment that the glacier created from the broken up rocks, some of which it has ground down into silt and clay. This till is therefore made up of bits of rock and stones (called 'clasts') and a matrix of silt and clay. Because of the weight of the ice sheet, the till within the drumlins is overconsolidated – it is compressed. As the rock from which the till is composed is mostly made up of greywacke and mudstone described earlier, the glacier grinds this down to its basic component – muds made up of fine silts and clays. This, coupled with the overconsolidation, gives rise to very impermeable subsoil. Around the drumlin belt, rain that falls on the land runs off the back of the drumlins and down the slopes where it gathers in the interdrumlin spaces. As the soil is quite impermeable, the water cannot soak in and therefore between the drumlins there is often an area of peat or marsh land. In places, local farmers have gone to great lengths to drain this interdrumlin area. The influence of these drumlins on the landscape, therefore, goes beyond the mere physical makeup of the land. They influence farming practices, have contributed to peat development, and also have a profound impact on the water and lake quality of the area, as all pollutants run off the land and into the nearest water body.

When Gypsum Industries Ltd stripped the till (and therefore the drumlin) from above the Knocknacran gypsum deposit to extend their mining operations in 1996, they uncovered an organic-rich deposit at the base of the drumlin, above the gypsum layer.<sup>74</sup> This peaty deposit which also contained trunks of trees (oak and yew) must have been ripped up by the ice and deposited at the bottom of the drumlin – therefore it predates the drumlin and the last ice sheet of the area. These types of deposit are very rare in Ireland, so to have found this in Knocknacran is very significant for our knowledge of the last Irish glaciation. However, the peat and trees present at the base of the drumlin have been reworked from their original position by the ice. Therefore, although researchers have established the conditions under which the various flora were growing, and the minimum age of the deposit, not much more can be said about the area before ice invaded. What is known about the deposits is that they are over 40,000 years old. Two different climates are seen within the deposits – one having a warm, temperate climate within which trees such as oak, hazel and alder flourished, while within the second section, pollen indicative of cooler conditions are seen with abundant grasses and some alder and cyprus but no oaks or hazel trees. Given that the deposits are not *in situ* and the limitations of dating techniques, it is not clear as to the sequence (whether the cold period came before or after the warm one).<sup>75</sup> Nonetheless, the deposits at Knocknacran do present a tantalising glimpse into the environment of Monaghan over 40,000 years ago.

Intriguingly, the enamel of a tooth was also found within the deposit at Knocknacran. As the enamel was much corroded, all that could be deduced from the find was that it was from a large herbivore.<sup>76</sup> However, this is not the first time that the remains of large ancient mammals have been discovered in Monaghan. The OS memoirs record the finding of the head of an ‘elk’ or giant deer (*Megaloceros giganteus*) within stiff blue clay along the shore of Drum lough.<sup>77</sup> Two specimens of giant deer found in county Monaghan are to be found within the collection of the National History Museum in Dublin, one recovered from Ballyhoe Bridge, on the river Lagan, and one from Lough Naglack.<sup>78</sup> Indeed, giant deer were one of the specimens that adorned many of the country houses of Ireland during the nineteenth century, and their distinctive antlers were a prized trophy of many a landlord. How many of Monaghan’s giant deer skulls are still in existence is unknown.

## **Peat**

The drumlin-rich landscape of Monaghan is ideal for peat development in the inter-drumlin areas, where water ponds. Coote links the high population of Monaghan county at the end of the eighteenth century with the profusion of turf, as he states that manufacturing is high in the county because of the amount of turf available for burning.<sup>79</sup> The fact that turf was available everywhere in the county meant that turf ‘can be reared on the bog, for about ten shillings the hundred statute kishes. These patches of bog are so thickly interspersed, it can be brought home for a very trifling additional expense’.<sup>80</sup> Indeed, over the centuries, the peat accumulations have been used not only for domestic fuel,

but also for fuelling some of the industry discussed in this essay, and indeed the harvesting of peat became in itself an economic activity.

Lewis' *Topographical Dictionary* talks about the town of Ballybay having grown since the establishment of the linen industry and market in the town in the middle of the eighteenth century, This industry was dependant on the 'very extensive tracts of bog', which were worked by 60 to 100 people for three months a year.<sup>81</sup> Indeed, it could be argued that peat, the quintessential soil type in marginal lands, was in fact one of Monaghan's best assets in the county's attempts at industrialisation, as it was the main, and most widespread, fuel source of the county. However, aside from blanket peat on Sliabh Beagh, most of the lowland peats have been cut-away: making mud-turf in the remnants of many of the peat bogs was a common practice from the late nineteenth century when the shallow surface peat was scraped into bogholes, mixed and spread to dry into turf sods on the banks.

### Conclusion

Within this chapter we have explored the influence of the physical landscape on the development of local industrial activity in Monaghan over the past three centuries. Its physical landscape is the result of millions of years of evolution, of the crashing of continents and the opening up of oceans, of ice waxing and waning over the area. During the eighteenth and nineteenth centuries, attention of both landowners and entrepreneurs turned to utilising the resources endowed on Monaghan by this geological activity. Ambitions were high for the county – the resources available were of good quality in many instances. However, quantity was lacking, and the ideals which the various parties held were oftentimes dashed – Monaghan would not become the Cornwall of Ireland. However, the endeavours to exploit the mineral resources of Monaghan continue today, and in many of the same areas as previously. Time will tell if the fate of today's entrepreneurs will be any different from that of their ancestors.

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